MAIN CATALOG 2024

# Motor protection and control

## Manual motor starters, contactors and overload relays



- Extensive portfolio for a wide range of applications
- ABB's control and protection solutions ensure performance when it is needed the most

# Motor protection and control

Manual motor starters, contactors and overload relays


OVERVIEW

MANUAL MOTOR STARTERS AND CIRCUIT BREAKERS FOR TRANSFORMER PROTECTION

AF, EK CONTACTORS AND NF CONTACTOR RELAYS

B, M MINI CONTACTORS, K, M MINI CONTACTOR RELAYS

AS CONTACTORS AND NS CONTACTOR RELAYS

OVERLOAD RELAYS

THERMISTOR PROTECTION RELAYS

TEMPERATURE MONITORING RELAYS

SELF RESETTING CURRENT LIMITING MODULE

DRAS AND DRAF ENCLOSED STARTERS

ELECTRONIC COMPACT STARTERS

UNIVERSAL MOTOR CONTROLLER

CUSTOMER MADE MOTOR STARTING SOLUTION

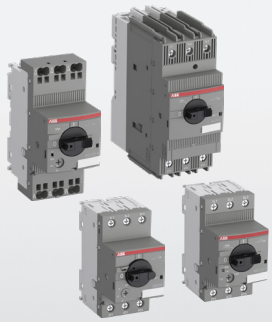
CERTIFICATIONS AND APPROVALS - GENERAL TECHNICAL DATA

INDEX

MARKETING MATERIAL

# Protection and control
## To keep things running you need control

02



**Manual motor starters and circuit breakers for transformer protection**

- Fuseless motor protection up to 80 A
- Designed to perfectly combine with ABB contactors
- Harmonized accessory range

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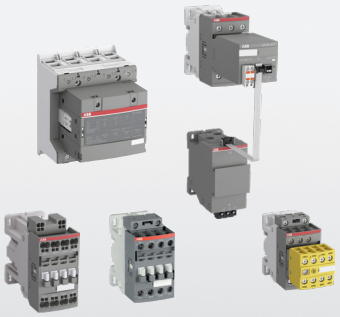
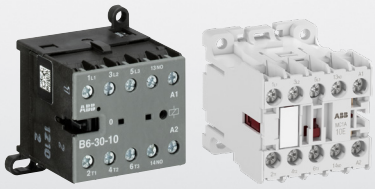


**Contactors and contactor relays**

- 3-pole and 4-pole AC / DC electronic control coil from 9 up to 2850 A AC-1, 500 kW AC-3
- GAF and GF for DC applications
- UA...UA..RA for capacitor switching
- AFS contactors for safety applications
- ABB Novolink devices: towards the digitalization for motor starting solutions

04




**Mini contactors and mini contactor relays**

- 2 ranges available: B and M mini contactors
- Up to 20 A AC-1 / 5.5 kW AC-3 400 V
- 4 different connecting terminals offered
- Wide accessories assortment

05



**Contactors and contactor relays designed for OEM's**

- Compact and powerful - up to 7.5 kW AC-3
- Designed for OEM's
- Specially suitable for motor control application

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**Overload relays**

- Thermal and electronic type
- Up to 200 A (thermal) and 1250 A (electronic)
- Direct mounting to AF contactors

07



**Thermistor protection relays**

- Monitoring of the winding temperature of motors which have PTC temperature sensors installed
- Evaluation of various motor conditions such as overheating, overload and insufficient cooling
- ATEX approval available for the use in hazardous areas

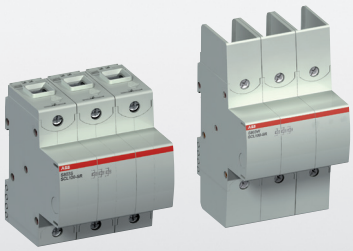
08



**Smart Monitoring Relays**

- Smart temperature monitoring relays that can be setup via display or smartphone app
- Measurement of temperatures using different types of sensors, such as PT100, PT1000, PTC or NTC within the same time.
- Monitoring of the winding and bearing temperature of motors.

09



## Self resetting current limiting module

- Increases the short-circuit breaking capacity of downstream devices
- Ideal solution for group protection

10




## Enclosed starters DRAS and DRAF

- For machine or wall mounting motor starter
- Up to 7.5 kW
- Robust IP66 and type 4X enclosure

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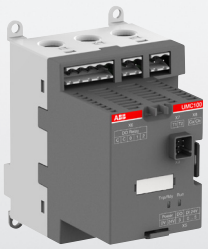
## Electronic compact starters: HF range

- Forward and reverse running, motor protection, emergency stop
- Space saving up to 90% with only 22.5 mm width
- Up to 75% reduced time in wiring and installation: less error-prone wiring

12



## Universal motor controller

- Provision of detailed operational, diagnostic and service data continuously
- Effective data source for modern predictive maintenance systems in any plant
- Seamless integration into ABB Ability™ System 800xA platform

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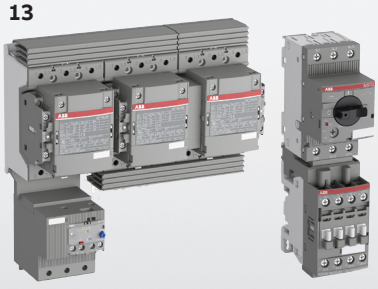

## Customer made motor starting solution with AF contactors

- Coordination type 1 and 2 for
  - Direct-on-line starting
  - Reversing starters
  - Star-delta starters
- Full range of connecting kits

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## Certifications and approvals general technical data

# **Protection and control**
## To keep things running you need control

ABB's protection and control solutions set the standard in sustainable performance, reliability and shape your daily life. ABB certified products and processes make it easier to design and service equipment through easy engineering, optimized logistics, simple installations, energy savings, reduced maintenance and long lasting solutions.

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01



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02





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03

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01 Appliances
—
02 Elevator
—
03 Food & beverage

# From small controls to power distribution

For system integrators, OEMs, engineering consultants and distributors to panel builders and industrial end-users, ABB's comprehensive range of motor starting solutions, products and services delivers the certainty of consistent quality and performance.



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04

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05



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06



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04 EV charging
—
05 Wind power
—
06 Solar power

Control matters, productivity and safety relies on keeping things running. ABB's control and protection solutions ensure performance when it is needed the most.

# ABB EcoSolutions™
## Leading the way to the circular economy

To help preserve the Earth's resources for future generations, ABB takes a company-wide approach to circularity. We aim to innovate towards new circular business models by cutting waste, increasing recyclability and reusability, and making our products more durable. We work closely with customers and suppliers to embed circularity across the value chain.

ABB's EcoSolutions™ label provides full transparency on a product's circularity value and environmental impact. ABB products with the EcoSolutions label carry an independently verified environmental product declaration (EPD) (ISO 14025) – and comply with a set of key performance indicators defined in ABB's circularity framework.

**ABB EcoSolutions: transparency for customers**
The ABB EcoSolutions™ label is an assurance that the product is:

- designed to last and manufactured with the maximum amount of sustainably sourced raw materials;
- made with processes that are designed to avoid waste and maximize the use of sustainable packaging materials;
- designed to increase resource and process efficiency while in use, be upgradable and optimize the lifetime of equipment and facilities;
- supported by take-back services leading to refurbishment, re-use or recycling of products and components, and is accompanied by instructions for responsible end-of-life treatment.

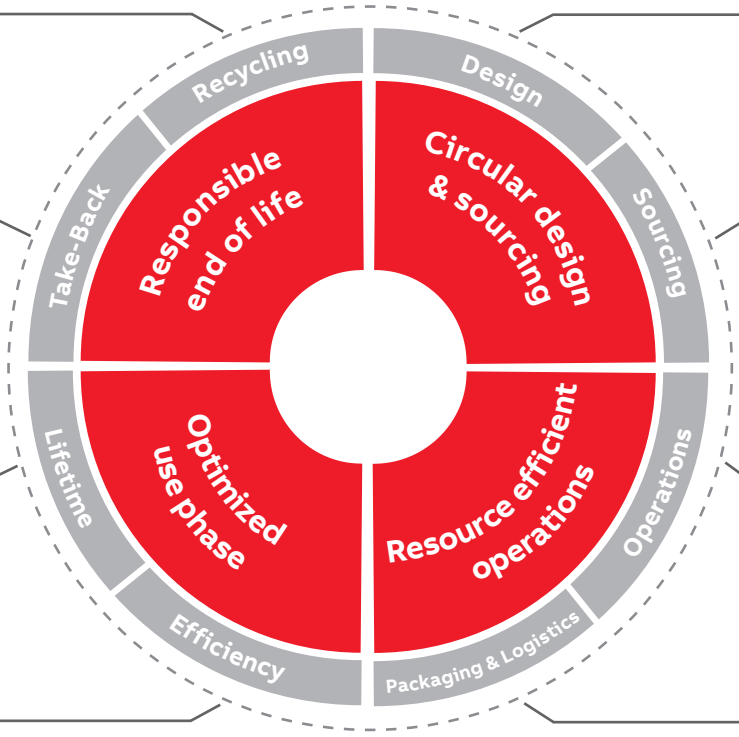
EcoSolutions products are evaluated against a clear set of 8 key performance indicators (KPIs) based on these four stages of the product life cycle.

**Recycling**
End-of-life instructions that help maximize recyclability

**Take-Back**
Take back services that support refurbishment, re-use or recycling

**Lifetime**
Longer product or process lifetimes through durable design, maintenance, or upgrades

**Efficiency**
Improved resource efficiency for customer operations




**Design concept**
Designed for sustainability, durability, and recyclability

**Sourcing**
Raw materials sourced with maximum sustainable content

**Operations**
Waste minimized in operations and in projects

**Packaging & Logistics**
Sustainable or recycled materials optimize packaging and logistics

* Contact ABB for information about products provided with ABB EcoSolutions™ in each production plant.

Look for the ABB EcoSolutions™ logo and QR code on packaging to access transparent sustainability information about the product. To receive information for a specific product, please contact ABB.

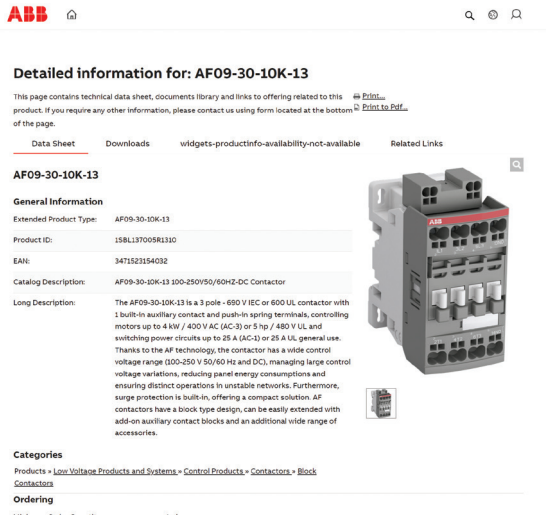
ABB Eco Solutions™



# Main online tools

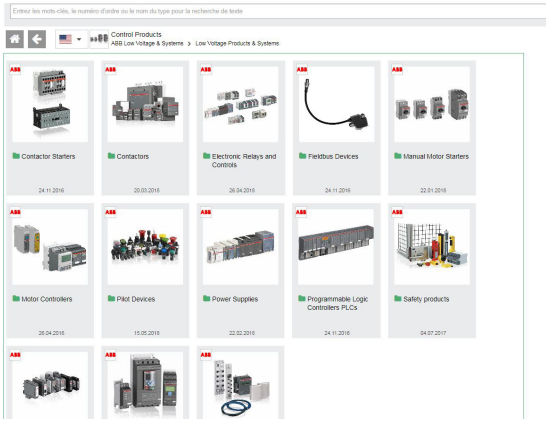
## Data sheets instructions, manuals, certificates, 2D / 3D drawings and Eplan data

2D and 3D data is now more easily accessible for customers. With just a few clicks by linking them directly on the abb.com online data sheet under the " Related Links " tab.
Now with new improved search function of the 2D/3D data portal powered by Cadenas.




For direct product details information, use product type or order code, ex:
**new.abb.com/products/1SBL137005R1310**
or new.abb.com/products/AF09-30-10K-13

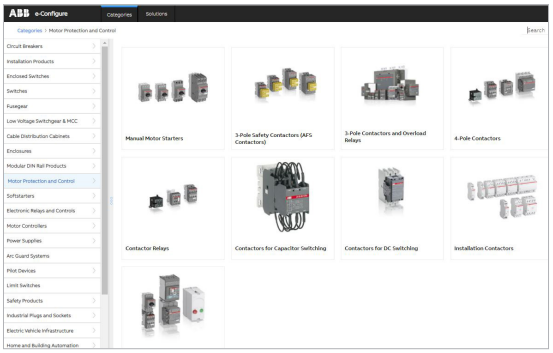
## 2D and 3D CAD models, ABB CAD Download center




**Cadenas portal:** Download 2D or 3D files according to your needs (STEP, IGES...)

## Configurators e-Configure

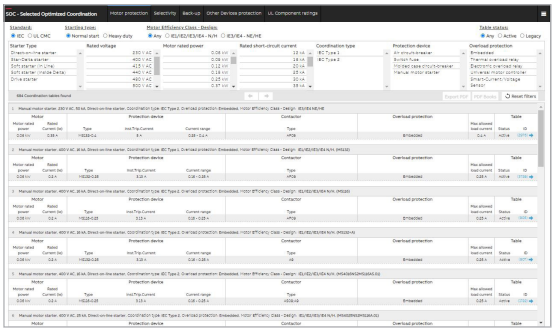
Traditionally the configuration of low voltage products with accessories is often complicated and time consuming. With e-Configure, customers can completely integrate the ordering process, selecting, configuring and ordering their products more quickly and simply.




https://econfigure.xe.abb.com/global/#/categories/9AAC100107

## Selected Optimized Coordination tables - SOC

Safety and protection are key values that ABB can provide its customers. The offering of new coordination and selectivity tables is based on a continuous process which helps end-users in making their daily work more efficient and increasing the quality of their installation and services: energy efficiency, continuous operation, optimum interface, and fast commissioning.



**Selected Optimized Coordination tables SOC**

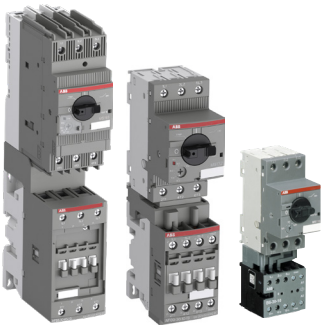
# Manual motor starters

## A complete motor protection concept
## Up to 80 A

### Protect equipment and installations with manual motor starters

Manual motor starters, are mainly used to switch motors ON/OFF manually and to provide fuseless protection against short-circuits, overloads and phase failures. ABB manual motor starters save costs, space and ensure a quick reaction under short-circuit condition by switching the motor off within milliseconds.





**Well coordinated and IE3/IE4 ready starter combinations**
ABB provides coordination tables for the selection of low voltage equipment specifically designed for starting and protecting IE3 and IE4 motors.
ABB's SOC tool (Selected Optimized Coordination) is available at:
**https://www.lowvoltage-tools.abb.com/soc**

**Combines naturally with ABB contactor ranges**
ABB manual motor starters match perfectly and are easy to connect with ABB motor control devices, to create type 1 or type 2 motor starting solutions

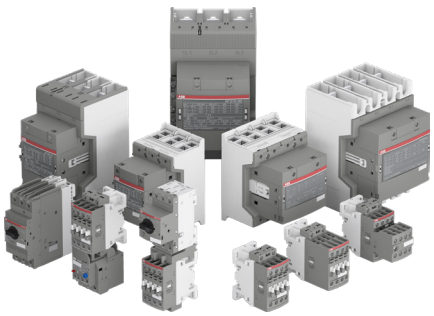
# AF contactors

## One range for motor starting and power switching
## Up to 2850 A AC-1

### Featuring AF technology as standard

ABB range of AF contactors is the industry benchmark. The integrated electronically controlled coil offers multiple benefits over conventional alternatives, and together with ABB's wide product offering  an optimal configuration, every time.



**Complete global range**
AF contactor range features a full assortment of accessories, thermal or electronic overload relays, connecting accessories, is available as standard globally and meets all major international and national standards, and marine applications

**3-pole and 4-pole range**
AF is available as 3-pole contactors from 9A up to 1060 A AC-3 or up to 2850 A AC-1 and as 4-pole contactors up to 525 A AC-1 all with AC / DC wide operational voltage range coils.

# Just push-it

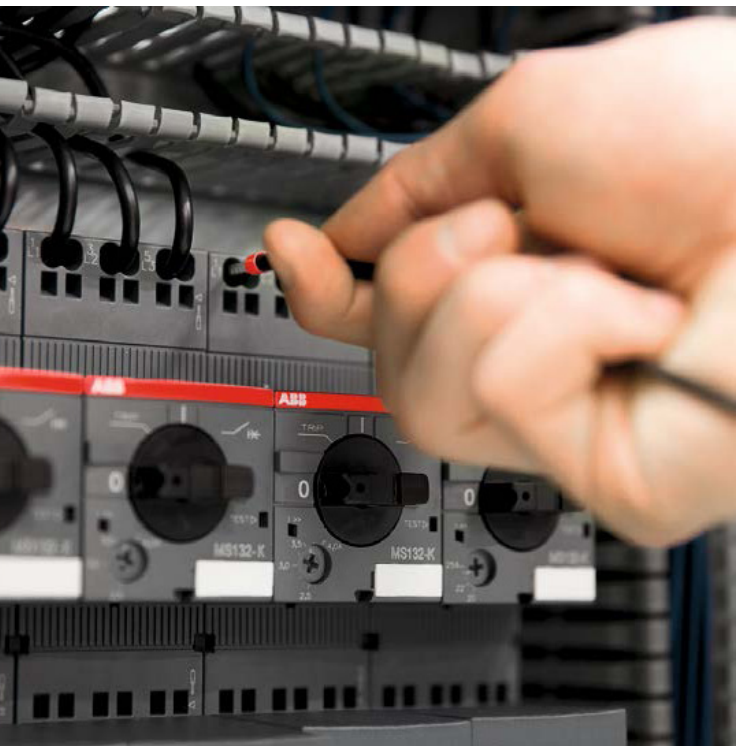
## The next generation of spring technology
## Up to 38 A

**Reliable as ever connections for manual motor starters and for contactors**

With the new Push-in Spring motor starting solution, one push is all you need for extremely fast wiring. No tool is required, so you can save up to 50% wiring time with Push-in Spring compared to conventional spring solutions, and the connections are just as reliable. So for speed, ease and reliability, just push it.

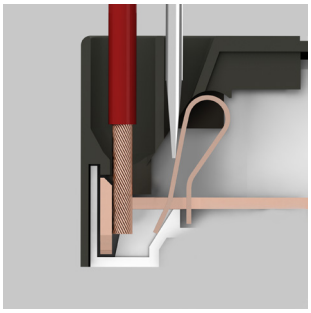


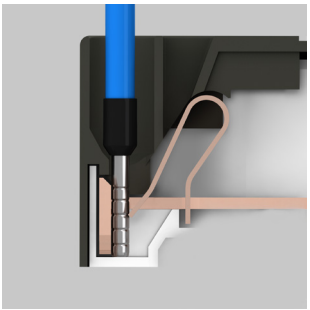
**Faster than ever installation, Easier than ever wiring**



**Push-in mode or spring mode in the same terminal**

For the very first time on the market, ABB's 2-in-1 connection allows you to use ferruled and rigid cables (Push-in mode) or cables without ferrules (Spring mode) in the same terminal. In Push-in mode, cables can be inserted by just simply pushing them in by hand.





# AFS contactors
## Because safety matters
## Up to 750 A

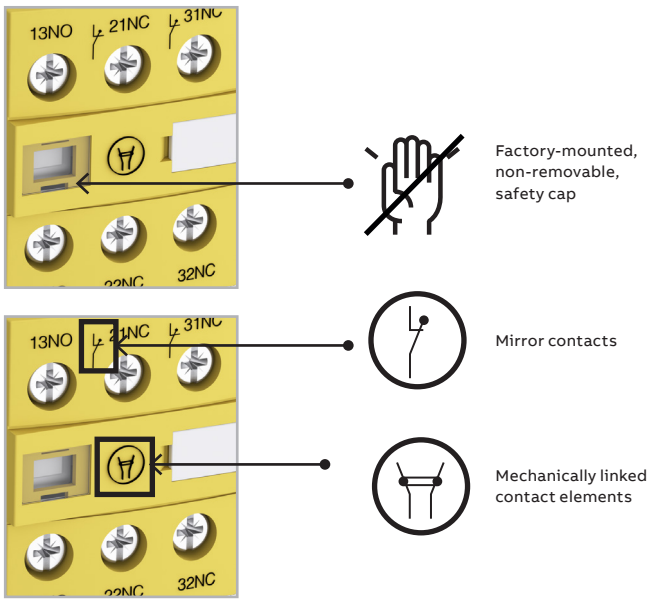


### Contactors dedicated for safety application

Easy to identify with its yellow signature, while enjoying the latest AF technology on board, AFS contactor is the chain link specially dedicated for safety application systems.



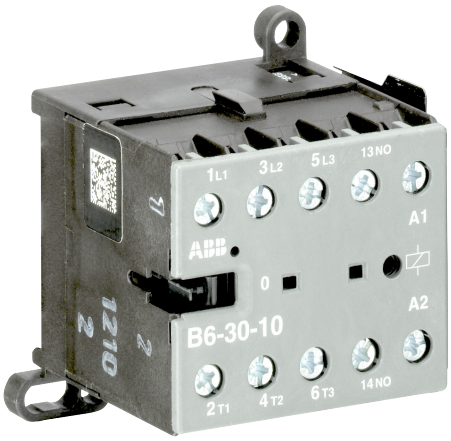
**Designed for machine safety applications,**
AFS contactors come with fixed front auxiliary contact blocks, making them ideal for monitoring and controlling circuits.

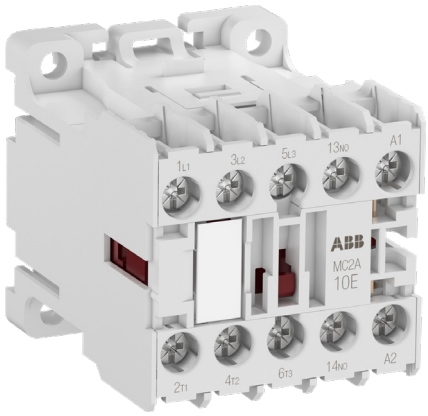



**Safety down to the detail**
Contactors status is guaranteed with mechanically linked and mirror contacts .
Non removable safety cap prevent unexpected manual operation.

# Mini contactors
## Efficient and space saving
## Up to 5.5 kW AC-3

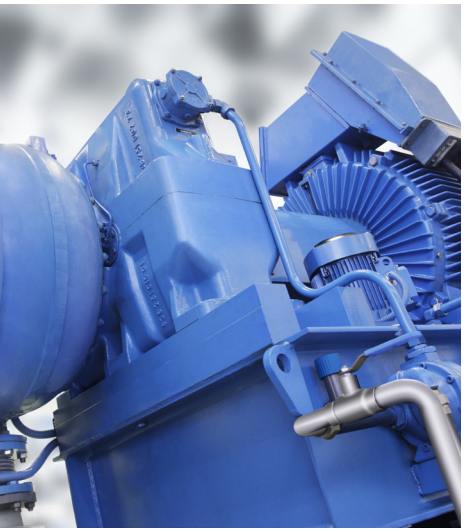
### High performances in small dimensions
Mini contactors are the best ally in all the applications where space is a challenge. Thanks to their compact size, wide offer, and accessory assortment, it's always possible to find space-optimized solutions without reducing performances.



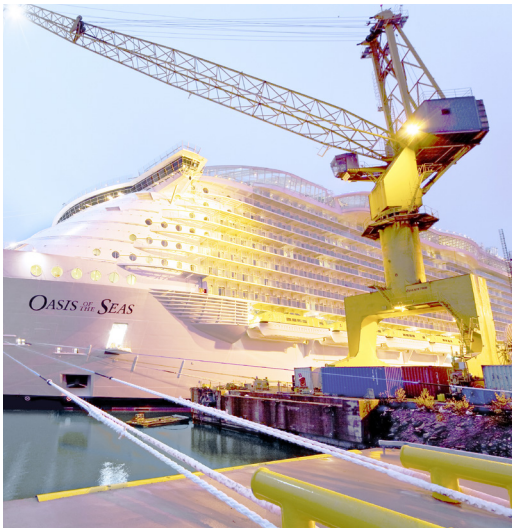




**Hides in any place**
Mini contactors can be used in any place such as for house or hotel fittings, small house equipment, swimming pools, your workshop or garage door as well as for bakeries or any machine that requires a very small control device.
Both ranges have marine approvals like any other ABB big brother.

**Small in all variants**
Mini contactors and mini contactor relays can offer several different connection types and a large number of AC or DC coils, always within small dimensions. Their compact reversing starter has no extra spacing required thanks to the inner mechanical interlock and, in addition, wall or din rail mounting possibilities also contribute making it simple to engineer compact panels.

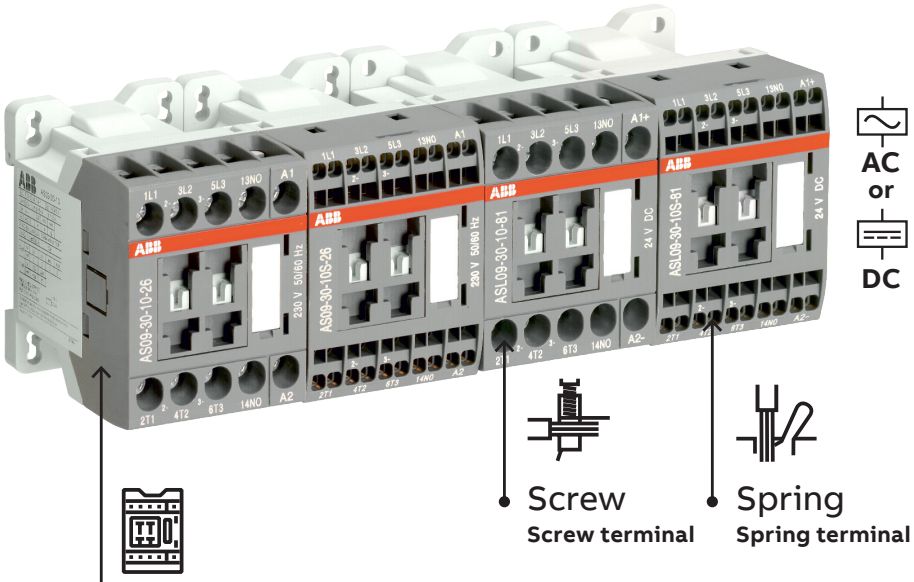


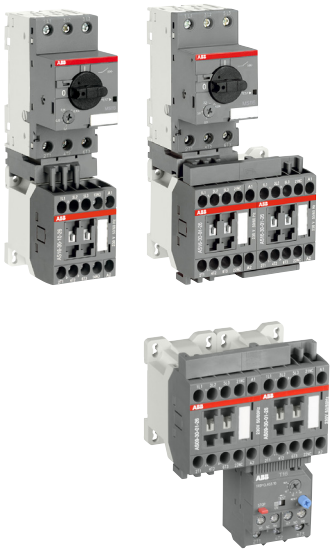




# AS contactors
## Compact and powerful
## Up to 16 A AC-3

### Designed for OEMs
AS solution has been specially designed for OEM applications. It allows to assemble starting solutions in compact size either with AC coil or DC coil and with screw terminals or spring terminals.



W 45 x H 68 x D 72.5 mm

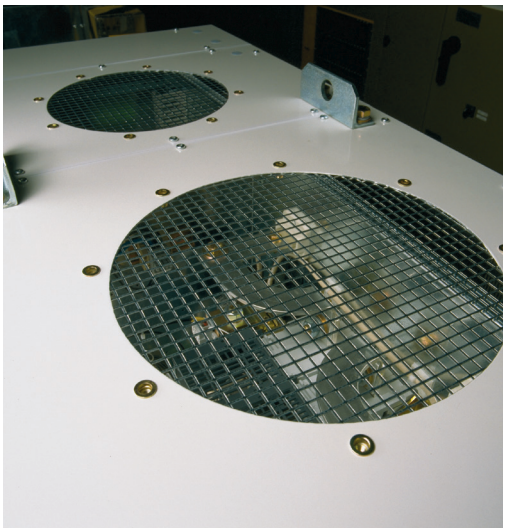
**All in same dimensions**

AS contactors feature AC and DC control circuits, screw or spring terminals all in 45 mm width modules with no spacing required even when they are combined with motor protection devices for direct-on-line reversing or star-delta starters.

**Mainly for motor control**

Combined with motor protection devices, AS 3-pole contactors are specially suitable for motor control applications such as ventilation systems, air conditioning, small pumps, escalators, laundries or food and baking equipment







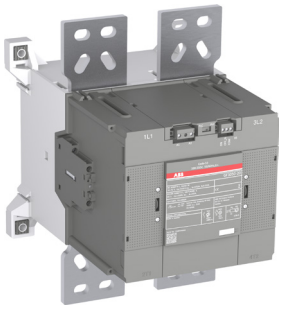
# GF and GAF contactors

## A compact and efficient way to switch DC loads

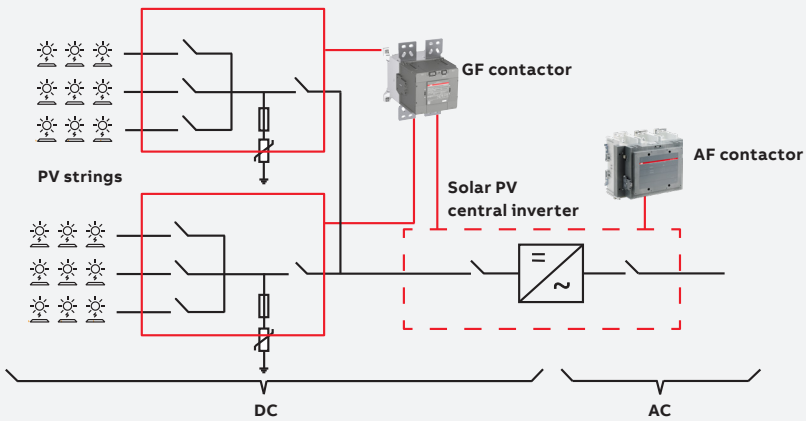
### Optimal for central inverters

ABB offers the widest range of compact contactors for DC load switching in low voltage power distribution. Thanks to their breaking performance of DC circuits, GF contactors will switch DC-PV3 inverter loads up to 1325 A 1500 V DC and GAF contactors will switch DC loads up to 2050 A 1000 V DC-1.



### PV solar plant






# UA and UA..RA contactors
## For capacitor switching up to 80 kvar

### Safely switch your capacitor banks without contacts welding

ABB offers the widest contactor range on the market for the capacitor switching demanding application. UA..RA contactors with damping resistors, are used when inrush peak currents are far exceeding 100 times. UA contactors is a simple solution used when peak currents are less or equal to 100 times nominal rms current.

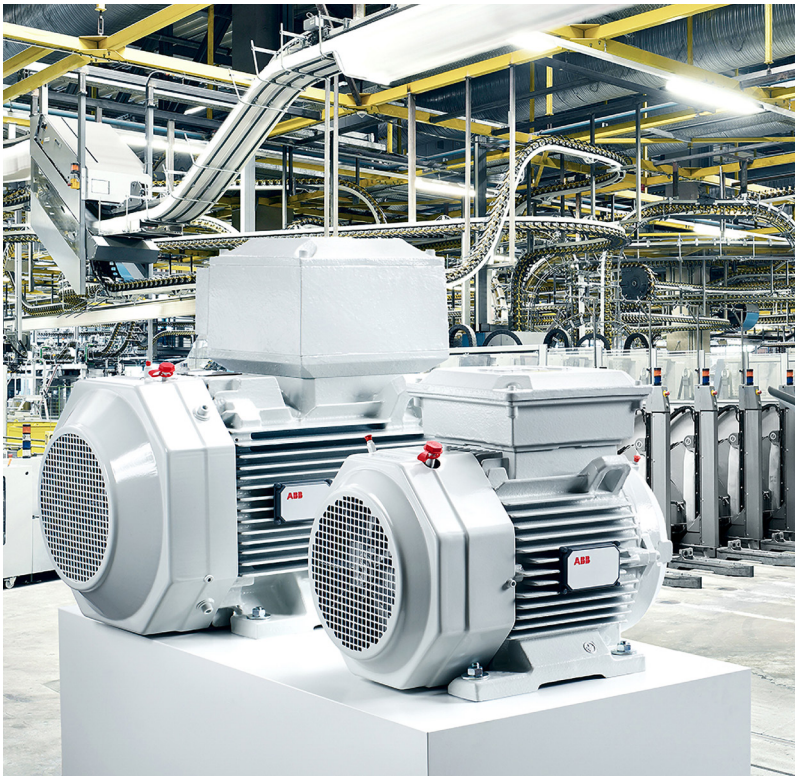
**Power factor correction**
Industrial sites have low power efficiency due to motor winding inductances. Capacitor bank panels are added for power factor correction.
An automatic power factor correction system consists of several capacitor banks of identical or different ratings (several steps), energized separately according to the value of the power factor to be corrected.

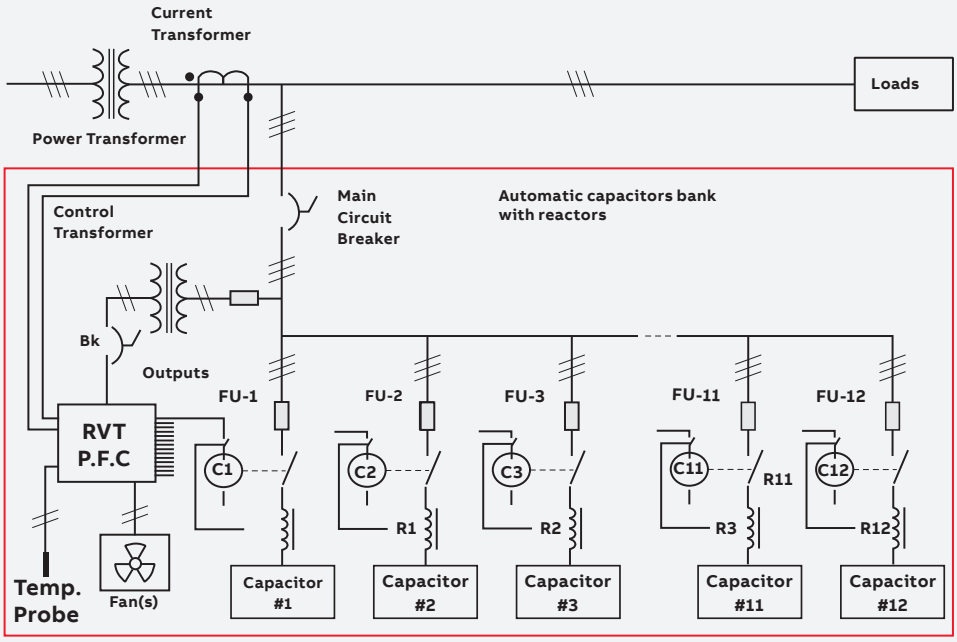
The inrush current peak, in the case of automatic correction, depends on the power of the steps already on duty, and can reach 100 times the nominal current of the step to be energized.

Switching capacitors banks with standard contactors may cause electrical damages like contact welding, coil burning or even fire on the installation.

ABB provides a choice of contactors dedicated for capacitor switching applications and CAPCAL a selection tool, available on the ABB Website:

https://new.abb.com/low-voltage/products/motor-protection/contactors-for-capacitor-switching



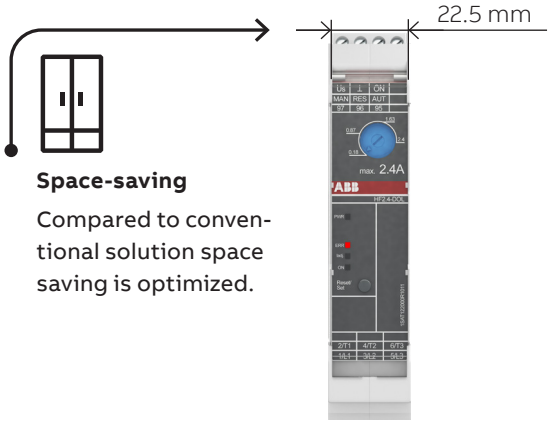


# HF range
## Great functionality in only 22.5 mm

### Electronic compact starters
Direct-on-line, reverse start, overload protection and emergency stop is all integrated in one compact device of only 22.5 mm width. Reliable 30 millions switching cycles for motors up to 3 kW / 400 V AC, reduced wiring time and faults are additional benefits.



**Short-circuit protection**
Coordinated short-circuit protection for single and group mounting with manual motor starters is available.




**Space-saving**
Compared to conventional solution space saving is optimized.



**Safety and ATEX**
In combination with Sentry safety relays the HF-Starter reaches SIL3, PL e certification. Feel free to use safety tools like FSDT and Sistema. The libaries are online on ABB.com. Additionally safety variants are ATEX certified.

**Control of cooling tanks**
The HF range is used to control pumps and compressor for cooling.

**Solar tracker**
The panels follow the sun and need to be switched frequently in a small cabinet.

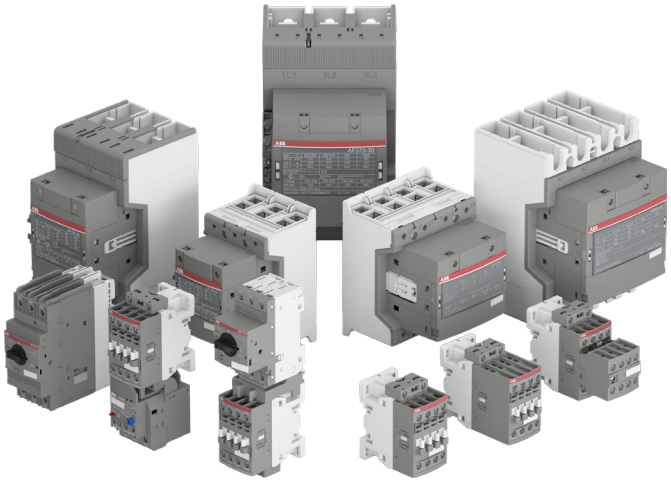
**Snow canons**
Similiar to the solar tracker the snow canon is switched left and right to ensure equal snow conditions.

**Straightening metal**
The metal is unrolled directly from the coil. The motor needs to be switched frequently.

# **Contactors and motor protection for rolling stock**
## Sustainable mobility for a better world

Specifically designed and manufactured for rolling stock applications (1), our products can be installed in any environment including passenger or driver cabins, for main or urban line trains, underground trains or trams circulating frequently in tunnels or underground passages.

IRIS Certification



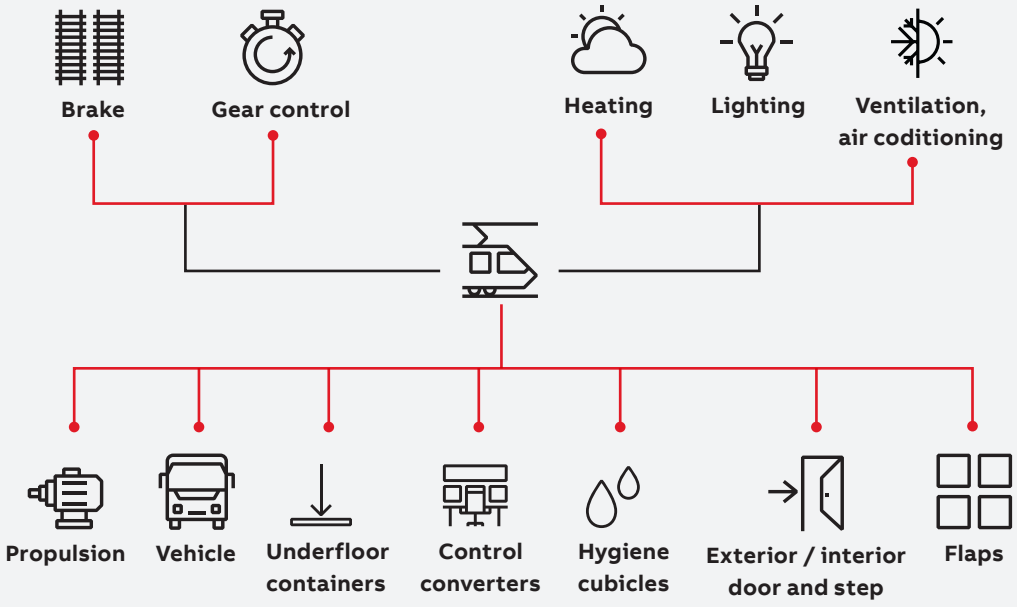
(1) Important notice:
Standard contactors are not suitable for rolling stock applications due to the specific requirements in terms of norms, performance and approvals.
For rolling stock applications, please contact your local ABB sales representative.

**With the latest technology in our products for rolling stock you can**

- Simplify your installation thanks to compact solution and modular frame size
- Reduce train energy consumption with lighter devices increasing passenger capacity and less coil energy consumption improving power management.
- Optimize your logistics and stocks
- Protect persons and equipment with products specifically designed to meet the latest rolling stock requirements
- Secure uptime thanks to AF technology, handle the large voltage fluctuation to battery use
- Reduce maintenance costs, downtimes and make trouble-shooting easier with real motor protection.




Discover the contactors and motor protection for rolling stock catalog



# How to use this catalog



## AF116 ... AF146 3-pole contactors

55 to 75 kW

AC / DC operated



AF146-30-00



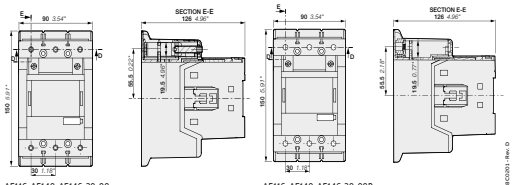
AF146-30-00B

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 kW | current θ ≤ 40 °C AC-1 A | 3-phase motor rating 480 V hp | General use rating 600 V AC A | V 50/60 Hz | V DC | | | | | Pkg (1 pce) kg |
| **For connection with built-in cable clamps** | | | | | | | | | | |
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 0 | 0 | AF116-30-00-11 | 1SFL427001R1100 | 1.750 |
| | | | | 48...130 | 48...130 | 0 | 0 | AF116-30-00-12 | 1SFL427001R1200 | 1.750 |
| | | | | 100...250 | 100...250 | 0 | 0 | AF116-30-00-13 | 1SFL427001R1300 | 1.750 |
| | | | | 250...500 | 250...500 | 0 | 0 | AF116-30-00-14 | 1SFL427001R1400 | 1.750 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 0 | 0 | AF140-30-00-11 | 1SFL447001R1100 | 1.750 |
| | | | | 48...130 | 48...130 | 0 | 0 | AF140-30-00-12 | 1SFL447001R1200 | 1.750 |
| | | | | 100...250 | 100...250 | 0 | 0 | AF140-30-00-13 | 1SFL447001R1300 | 1.750 |
| | | | | 250...500 | 250...500 | 0 | 0 | AF140-30-00-14 | 1SFL447001R1400 | 1.750 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 0 | 0 | AF146-30-00-11 | 1SFL467001R1100 | 1.750 |
| | | | | 48...130 | 48...130 | 0 | 0 | AF146-30-00-12 | 1SFL467001R1200 | 1.750 |
| | | | | 100...250 | 100...250 | 0 | 0 | AF146-30-00-13 | 1SFL467001R1300 | 1.750 |
| | | | | 250...500 | 250...500 | 0 | 0 | AF146-30-00-14 | 1SFL467001R1400 | 1.750 |
| **With bar connections** | | | | | | | | | | |
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 0 | 0 | AF116-30-00B-11 | 1SFL427002R1100 | 1.500 |
| | | | | 48...130 | 48...130 | 0 | 0 | AF116-30-00B-12 | 1SFL427002R1200 | 1.500 |
| | | | | 100...250 | 100...250 | 0 | 0 | AF116-30-00B-13 | 1SFL427002R1300 | 1.500 |
| | | | | 250...500 | 250...500 | 0 | 0 | AF116-30-00B-14 | 1SFL427002R1400 | 1.500 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 0 | 0 | AF140-30-00B-11 | 1SFL447002R1100 | 1.500 |
| | | | | 48...130 | 48...130 | 0 | 0 | AF140-30-00B-12 | 1SFL447002R1200 | 1.500 |
| | | | | 100...250 | 100...250 | 0 | 0 | AF140-30-00B-13 | 1SFL447002R1300 | 1.500 |
| | | | | 250...500 | 250...500 | 0 | 0 | AF140-30-00B-14 | 1SFL447002R1400 | 1.500 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 0 | 0 | AF146-30-00B-11 | 1SFL467002R1100 | 1.500 |
| | | | | 48...130 | 48...130 | 0 | 0 | AF146-30-00B-12 | 1SFL467002R1200 | 1.500 |
| | | | | 100...250 | 100...250 | 0 | 0 | AF146-30-00B-13 | 1SFL467002R1300 | 1.500 |
| | | | | 250...500 | 250...500 | 0 | 0 | AF146-30-00B-14 | 1SFL467002R1400 | 1.500 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.



AF116, AF140, AF146-30-00

AF116, AF140, AF146-30-00B

Main dimensions mm, inches

**Product order code**
click on the product order code to obtain the data sheet, the agreement and all technical information regarding that reference.

**Product order code**
For direct product details information, use product type or order code, ex:
**new.abb.com/products/1SBL137001R1310**
or
**new.abb.com/products/AF09-30-10-13**

Web catalog

Print catalog

**Find more information on our marketing material page.**

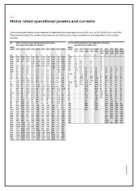


Chart and datas of motor rated operational powers and currents are available in the customer made motor starting solutions chapter.

The products in this catalog can also be found together with product news life cycle status, data sheets, certificates and tools at:
https://new.abb.com/low-voltage/products/motor-protection

# How to use this catalog

## Ordering details
Orders can be placed either by using the type code or the order code. The type codes or order codes generally relate to single devices like a contactor, overload relays or an accessory but they can sometimes relate to an indivisible set (ex: connecting kits) or a bag (ex 50 function markers). See the description of the device.

## Packaging unit
Products are generally packed as single units but very small products or accessories are often proposed in collective packs. Please refer to the “Package quantity” in the ordering detail charts.

## Standards and approvals for the products
Products in this catalogue are designed tested and have third party approvals and markings in compliance with major international or local standards such as IEC/EN 60947-1, IEC/EN 60947-2, IEC/EN 60947-4-1, IEC/EN 60947-5-1 or UL 60947-1, UL 60947-4-1.
See approvals and certification section.

## Standards and approvals for design and manufacturing
ABB has set up a quality assurance organization in compliance with the requirements of ISO 9001 standard and ABB factories are ISO 9001 approved.

## Guarantee
The information contained in this catalogue reflects the current state of our knowledge and aims to present our products and their possible applications as defined with the standards. The product data, ratings and utilization conditions are indicated in their respective sections, thus the information does not guarantee special utilizations or combination of characteristics that have not been defined or tested according to normalized values or test conditions defined with the standards.

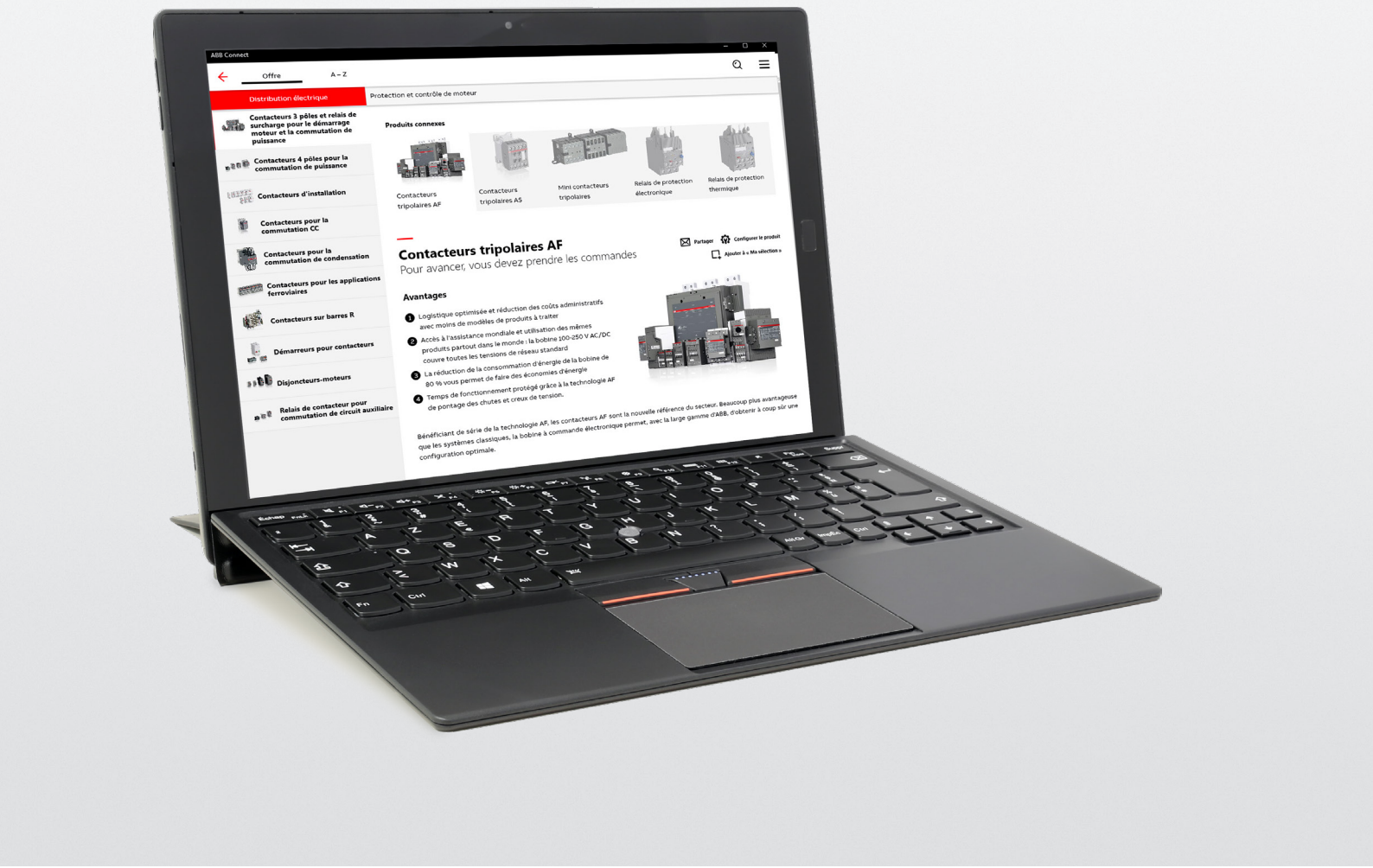
## Liability
The devices in this catalogue do not endanger safety when they are selected, mounted, commissioned used maintained and deposed with the rules and standards that apply to them.



## Railway applications for rolling stock are not covered with this catalog
The products in this catalog do generally not meet the special requirements and approvals for rolling stock applications. ABB offers specifically approved products, processes and support for this application.

**For rolling stock application see our dedicated portal**

https://new.abb.com/low-voltage/products/motor-protection/contactors-and-motor-protection-for-railway-applications

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# General overview motor protection and control

## 3-pole contactors

### Mini contactors

### Contactors








| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **IEC**(1) | **AC-3 Rated operational power** | θ ≤ 60 °C (2), 400 V | **kW** | 4 | 5.5 | 4 | 5.5 | 4 | 5.5 | 7.5 | 4 | 5.5 | 7.5 |
| **UL/CSA** | **3-phase motor rating** | 480 V | **hp** | 3 | 5 | 5 | 7.5 | 5 | 7.5 | 10 | 5 | 7.5 | 10 |
| **AC / DC Control supply** | | | Type | — | — | — | — | — | — | — | **AF09** | **AF12** | **AF16** |
| **AC Control supply** | | | Type | **B6** | **B7** | **MC1A** | **MC2A** | **AS09** | **AS12** | **AS16** | **AF09** | **AF12** | **AF16** |
| **DC Control supply** | | | Type | **BC6** | **BC7** | **MC1C, MC1I, MC1K** | **MC2C, MC2I, MC2K** | **ASL09** | **ASL12** | **ASL16** | **AF09** | **AF12** | **AF16** |
| **IEC** | AC-3 Rated operational current | θ ≤ 60 °C (2), 400 V | **A** | 9 | 12 | 9 | 12 | 9 | 12 | 15.5 | 9 | 12 | 18 |
| | AC-1 Rated operational current | θ ≤ 40 °C, 690 V | **A** | 20 (400 V)(3) | 20 (400 V)(3) | 20 | 20 | 22 | 24 | 24 | 25 | 28 | 30 |
| **UL/CSA** | General use rating | 600 V | **A** | 12 (300 V)(3) | 16(3) | 20 | 20 | 20 | 20 | 20 | 25 | 28 | 30 |
| **NEMA** | NEMA Size | | | — | — | — | — | 00 | 00 | 0 | 00 | 0 | — |

(1) 1000 V IEC ratings available for AF80, AF96 and AF146 ... AF2650 contactors.
(2) θ ≤ 55 °C for mini contactors and AF400 ... AF2650 contactors.
(3) Versions equipped with soldering pin terminals: 12 (400 V) IEC AC-1 / 8 (300 V) UL General use for B6 series and 12 (400 V) IEC AC-1 / 12 (600 V) UL General Use for B7 series.

### Main accessories

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Auxiliary contact blocks** | Front mounting | **CAF6** | **CAF6** | **MACN, MARN** | **MACN, MARN** | **CA3-10** (1 x N.O.)<br>**CA3-01** (1 x N.C.) | **CA4-10 (1 x N.O.)**<br>**CA4-01 (1 x N.C.)** |
| | Side mounting | **CA6** | **CA6** | **MACL, MARL** | **MACL, MARL** | | **CAL4-11**<br>**(1 x N.O. + 1 x N.C.)** |
| **Timers** | Electronic | | | **MREBC** | **MREBC** | **TEF3-ON**<br>**TEF3-OFF** | **TEF4-ON**<br>**TEF4-OFF** |
| **Interlocking units**(4) | Mechanical | | | **MMH0** | **MMH0** | **VM3** | **VM4** |
| | Mechanical / Electrical | | | — | — | | **VEM4** |
| **Connection sets** | For reversing contactors | **BSM6-30** | **BSM6-30** | **WKMIU** | **WKMIU** | **BER16C-3** | **BER16-4** |
| **Surge suppressors** | Varistor (AC/DC) | **RV-BC6** | **RV-BC6** | **MP0DAE4, MP0DAE5, MP0DAE6** | **MP0DAE4, MP0DAE5, MP0DAE6** | **RV5** (24...440 V) | **Built-in surge protection** |
| | RC type (AC) | | | **MP0DAE1, MP0DAE2** | **MP0DAE1, MP0DAE2** | **RC5-1** (24...440 V) | |
| | Transil diode (DC) | **RD7** | **RD7** | **MP0DAE3** | **MP0DAE3** | **RT5** (12...264 V) | |

(4) See available reversing contactors VB6, VB7 and VAS09 ... VAS16.

## Overload relays

| | | | | | | |
|---|---|---|---|---|---|---|
| **Thermal relays** | Class 10<br>(Class 10A for TF140, TA200DU) | **T16** (0.10...13 A) | | **T16** (0.10...13 A) | **T16** (0.10...16 A) | **TF42** (0.10...38 A) |
| **Electronic relays** | Class 10E, 20E, 30E | **E16DU** (0.10...18.9 A) | | — | | **EF19** (0.10...18.9 A) |
| **Accessories (for single mounting)** | Thermal relays | **DB16** | | **DB16** | | **DB42** |
| | Electronic relays | **DB16E** | | — | | **DB19EF** |



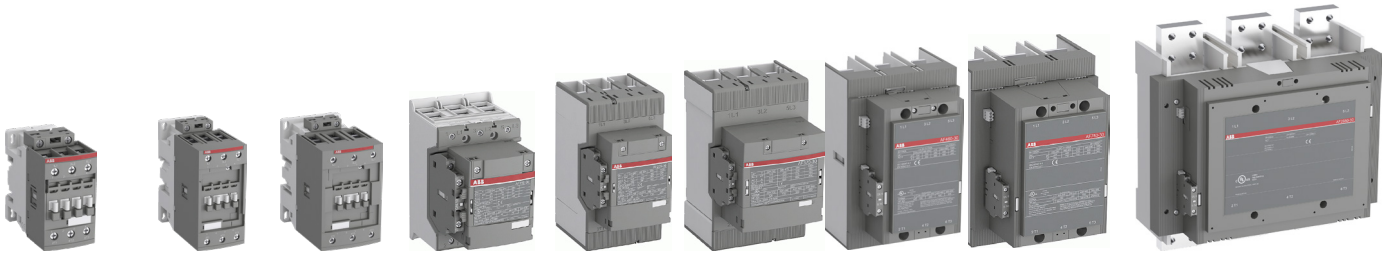
(6) -5 ... +40 °C for TA200-V1000

## Manual motor starters



| | | | | | |
|---|---|---|---|---|---|
| | Thermal / magnetic protection Class 10 | **MS116 (0.10...12 A)**<br>Ics up to 50 kA for class 10A | **MS116 (0.10...12 A)**<br>Ics up to 50 kA for class 10A | | |
| | | **MS132 (0.10...12 A)**<br>Ics up to 100 kA | **MS132 (0.10...12 A)**<br>Ics up to 100 kA | | |
| | Magnetic only types | **MO132 (0.16...12A)**<br>Ics up to 100 kA | **MO132 (0.16...12 A)**<br>Ics up to 100 kA | **MO132 (0.16...16 A)** | |
| **Accessories** | For contactor mounting | **BEA7/132** | **BEMC/132** | **BEMC/132** | |

(5) BEA65-4 suitable for MS165 and MO165 only.



| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 15 | 18.5 | 18.5 | 22 | 30 | 37 | 45/55 | 55 | 75 | 75 | 90 | 110 | 132 | 160 | 200 | 200 | 250 | 315 | 400 | — | 475 | 560 | — | — | — |
| 15 | 20 | 25 | 30 | 40 | 50 | 60 | 60/75 | 75 | 100 | 100 | 125 | 150 | 200 | 250 | 300 | 350 | 400 | 500 | 600 | — | 800 | 900 | — | — | — |
| **AF26** | | **AF30** | **AF38** | **AF40** | | **AF52** | **AF65** | **AF80** | | **AF96** | **AF116** | **AF140** | **AF146** | **AF190** | **AF205** | **AF265** | **AF305** | **AF370** | **AF400** | **AF460** | **AF580** | **AF750** | **AF1250** | **AF1350** | **AF1650** | **AF2050** | **AF2650** | **AF2850** |
| **AF26** | | **AF30** | **AF38** | **AF40** | | **AF52** | **AF65** | **AF80** | | **AF96** | **AF116** | **AF140** | **AF146** | **AF190** | **AF205** | **AF265** | **AF305** | **AF370** | **AF400** | **AF460** | **AF580** | **AF750** | **AF1250** | **AF1350** | **AF1650** | **AF2050** | **AF2650** | **AF2850** |
| **AF26** | | **AF30** | **AF38** | **AF40** | | **AF52** | **AF65** | **AF80** | | **AF96** | **AF116** | **AF140** | **AF146** | **AF190** | **AF205** | **AF265** | **AF305** | **AF370** | **AF400** | **AF460** | **AF580** | **AF750** | **AF1250** | **AF1350** | **AF1650** | **AF2050** | **AF2650** | **AF2850** |
| 26 | 32 | 38 | 40 | 53 | 65 | 80 | 96/105 | 116 | 140 | 146 | 190 | 205 | 265 | 305 | 370 | 400 | 460 | 580 | 750 | — | 860 | 1060 | — | — | — |
| 45 | 50 | 50 | 70 | 100 | 105 | 125 | 130 | 160 | 200 | 225 | 275 | 350 | 400 | 500 | 600 | 600 | 700 | 800 | 1050 | 1260 | 1350 | 1650 | 2050 | 2650 | 2850 |
| 45 | 50 | 50 | 60 | 80 | 90 | 105 | 115 | 160 | 200 | 200 | 250 | 300 | 350 | 400 | 520 | 550 | 650 | 750 | 900 | 1210 | 1350 | 1650 | 2100 | 2700 | 2850 |
| 1 | — | — | 2 | — | — | 3 | — | — | 4 | — | — | — | 5 | — | — | — | 6 | — | 7 | — | — | 8 | — | — | — |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | **CAL19-11** (1 x N.O. + 1 x N.C.) | | | | | | | | | **CAL18-11** (1 x N.O. + 1 x N.C.) | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | **VM96-4** | | | | | | | | **VM19** (for same size contactors) | | | | | | | | | **VM750H**<br>**VM750V** | | | | | | | | **VM1650H** | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **BER38-4** | | | **BER65-4** | | | **BER96-4** | | | **BER140-4** | | | **BER205-4** | | | **BER370-4** | | | **BEM460-30** | | | **BEM750-30** | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **TF65** (22...67 A) | | | **TF96**<br>(40...96 A) | | | **TF140DU**<br>(66...142 A)<br>θ ≤ 55 °C | | | **TA200DU**<br>(66...200 A)<br>[6]θ ≤ 55 °C | | | | | | | | | | | | | | | | | | | | |
| **EF19** (0.10...18.9 A)<br>**EF45** (9...45 A) | | | **EF65** (20...70 A) | | | **EF96**<br>(20...100 A) | | | **EF146**<br>(54...150 A) | | | **EF205**<br>(63...210 A) | | | **EF370** (115...380 A) | | | **EF460**<br>(150...500 A) | | | **EF750**<br>(250...800 A) | | | **EF1250DU**<br>(350...1250 A) | | | | | | | |
| | | | **DB65**<br>(only for TF65) | | | **DB96** | | | | | | **DB200** | | | | | | | | | | | | | | | | | | | | |
| **DB45EF** | | | | | | **DB96** | | | | | | | | | | | | | | | | | | | | | | | | | |

| |
|---|
| **MS165 (10...80 A)**<br>Ics up to 100 kA |
| **MO165 (16...80 A)**<br>Ics up to 100 kA |
| **MO165 (16...80 A)**<br>Ics up to 100 kA |
| **BEA65-4**[5] |

# General overview motor protection and control

## 4-pole contactors

## Mini contactors






| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **IEC** | **AC-1 Rated operational current** | **θ ≤ 40 °C, 690 V** | **A** | 20 (400 V)(1) | 20 (400 V)(1) | 20 | 20 |
| **UL/CSA** | **General use rating** | **600 V** | **A** | 12 (300 V)(1) | 16(1) | 20 | 20 |
| **AC / DC Control supply** | | | **Type** | — | — | — | — |
| **AC Control supply** | | | **Type** | **B6** | **B7** | **MC1A** | **MC2A** |
| **DC Control supply** | | | **Type** | **BC6** | **BC7** | **MC1C, MC1I, MC1K** | **MC2C** |

(1) Versions equipped with soldering pin terminals: 12 (400 V) IEC AC-1 / 8 (300 V) UL General use for B6 series and 12 (400 V) IEC AC-1 / 12 (600 V) UL General Use for B7 series

## Contactor relays

## Mini contactor relays




| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **IEC** | **AC-15 Rated operational current** | **400 V** | **A** | **3** | | | **4** | | |
| **UL/CSA** | **Pilot duty** | | | **A600** | | | **A600, Q600** | | |
| | | | | 2 2 | 3 1 | 4 0 | 2 2 | 3 1 | 4 0 |
| **AC / DC Control supply** | | | **Type** | — | — | — | — | — | — |
| **AC Control supply** | | | **Type** | **K6-22Z** | **K6-31Z** | **K6-40E** | **MCRA022** | **MCRA031** | **MCRA040** |
| **DC Control supply** | | | **Type** | **KC6-22Z** | **KC6-31Z** | **KC6-40E** | **MCRC022, MCRI022, MCRK022** | **MCRC031, MCRI031, MCRK031** | **MCRC040, MCRI040, MCRK040** |

## Specific contactors

## DC Circuit switching



100 A, 440 V, DC-1
GA75, GAE75 types



875A to 1325A, 1500VDC
DC-PV3/PV4 GF875 to GF1325 types

## Contactors










| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | 30 | 45 | 55 | 70 | 100 | 125 | 160 | 200 | 275 | 350 | 400 | 500 | 525 | 800 | 1000 |
| 25 | 30 | 45 | 55 | 60 | 80 | 105 | 160 | 175 | 230 | 250 | 300 | 350 | 420 | 540 | — |
| **AF09** | **AF16** | **AF26** | **AF38** | **AF40** | **AF52** | **AF80** | **AF116** | **AF140** | **AF190** | **AF205** | **AF265** | **AF305** | **AF370** | **—** | **—** |
| **AF09** | **AF16** | **AF26** | **AF38** | **AF40** | **AF52** | **AF80** | **AF116** | **AF140** | **AF190** | **AF205** | **AF265** | **AF305** | **AF370** | **EK550** | **EK1000** |
| **AF09** | **AF16** | **AF26** | **AF38** | **AF40** | **AF52** | **AF80** | **AF116** | **AF140** | **AF190** | **AF205** | **AF265** | **AF305** | **AF370** | **EK550** | **EK1000** |

## Contactor relays




| **3** | | | **3** | | |
|---|---|---|---|---|---|
| **A600, Q300** | | | **A600, Q600** | | |
| 2 2 | 3 1 | 4 0 | 2 2 | 3 1 | 4 0 |
| **—** | **—** | **—** | **NF22E** | **NF31E** | **NF40E** |
| **NS22E** | **NS31E** | **NS40E** | **NF22E** | **NF31E** | **NF40E** |
| **NSL22E** | **NSL31E** | **NSL40E** | **NF22E** | **NF31E** | **NF40E** |

## Capacitor switching



12.5 to 80 kvar
UA16..RA to UA110..RA types
UA16 to UA110 types



**For more information please find our electronic data sheets online, for example:**

new.abb.com/products/**1SAM250000R1001**

# Manual motor starters & circuit breakers for transformer protection


**Manual motor starters**

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**With thermal and electromagnetic protection**
**Ordering details - 0.10 to 80 A**

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**Ordering details - 0.16 to 80 A**

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**With thermal and electromagnetic protection**
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# MS and MO manual motor starters
## A complete motor protection concept




Fuseless protection saves costs, space and ensures a quick reaction under overload and short-circuit condition by switching off the motor within milliseconds. The full range of motor starters offers protection from 0.1 A to up to 100 A. The new family range has a harmonized range of accessories and offers the same features up to 80 A.

### Protection and control
**Protect equipment and installations**

ABB offers a broad range of manual motor starters, for protection and control in almost every situation including hazardous areas, protecting installations from short-circuits, overloads and phase failures while also controlling the current flow through a simple ON/OFF switch.

### Continuous operation
**Secure uptime**

Fuseless motor protection reduces maintenance costs and downtimes by avoiding fuse replacement after faults. Furthermore, MS132 and MS165 feature a magnetic trip indicator making troubleshooting easier.

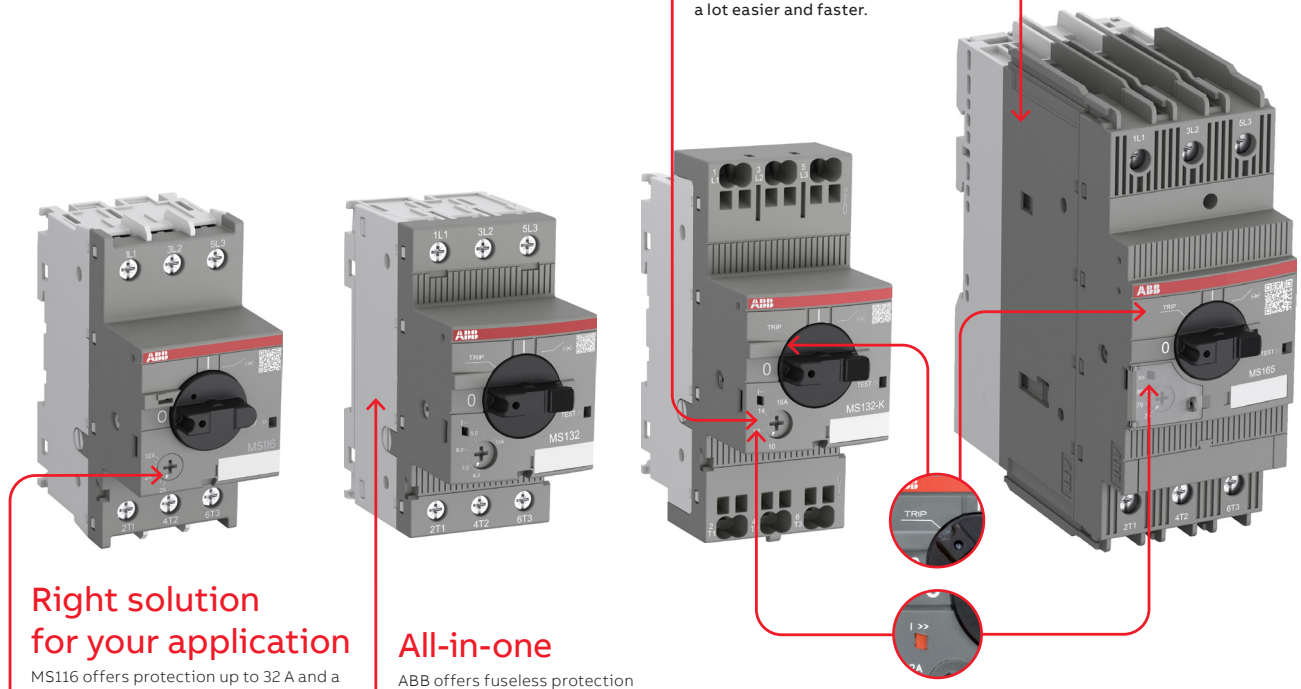
### Speed up your projects
**Simplified design**

Manual motor starters can be connected easily with ABB contactors or soft starters using the respective accessory. Additionally, the main range of accessories is shared across multiple starters (both with screw and Push-in Spring terminals available), making logistics and planning simpler.

# MS and MO manual motor starters
## A complete motor protection concept

### High performance in compact size
MS132 and MS165 manual motor starters cover short-circuit breaking capacities up to 100 kA. In addition, every manual motor starter is temperature compensated up to 60 °C.

### Troubleshooting made easy
MS132 and MS165 feature a magnetic trip indicator. This way, every tripping event will be distinguished, making troubleshooting a lot easier and faster.




### Right solution for your application
MS116 offers protection up to 32 A and a breaking capacity up to 100 kA – all in a 45 mm wide housing. They are designed to meet requirements of most standard applications.

### All-in-one
ABB offers fuseless protection against short-circuits, phase failures and overloads including disconnect function – all in one single compact product.

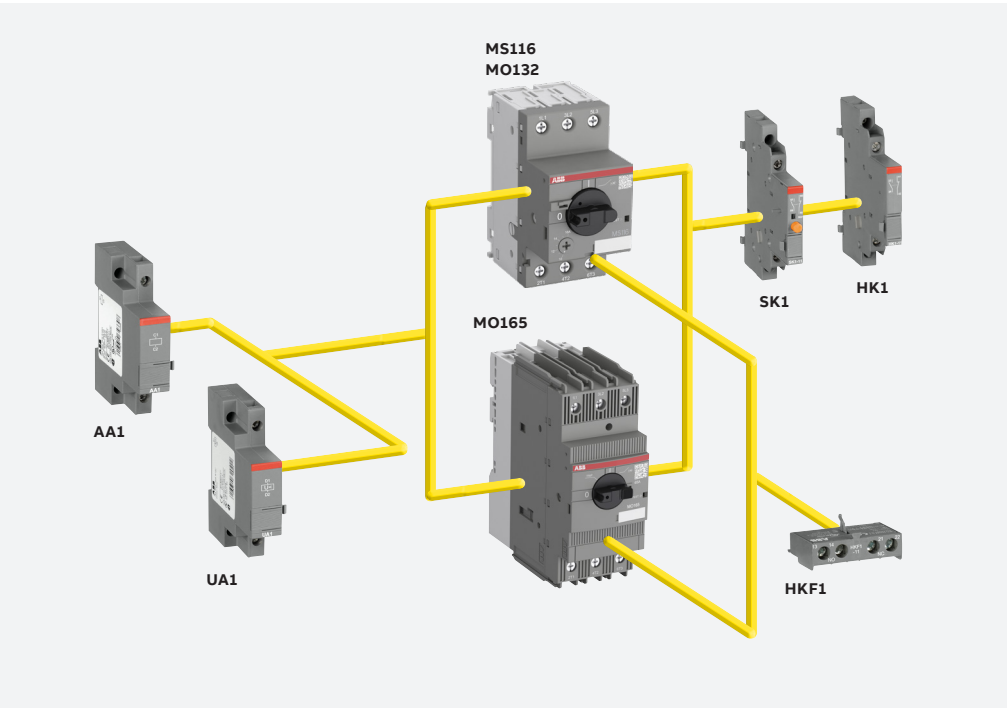
### Protection wherever you are
Manual motor starters are suitable for worldwide use. The wide range of certifications covers standards like IEC (CB), cULus, CCC and various ship approvals. MS132 and MS165 also apply to ATEX standards for hazardous areas.

BV France · DNV · LR Gr. Britain · RINa Italy · ABS USA

### Ready for IE3 and IE4 motors
MS116/MS132/MO132/MS165/MO165 comply with the latest IE3 and IE4 N/H and NE/HE motors. NE/HE requires utilization category AC-3e.

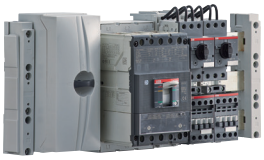
### Just push it
With the new Push-in Spring terminals, one push is all you need for a faster than ever installation, an easier than ever wiring and a reliable as ever connection which eliminates routine re-tightening.

# Protection and control
## The right accessories for your applications

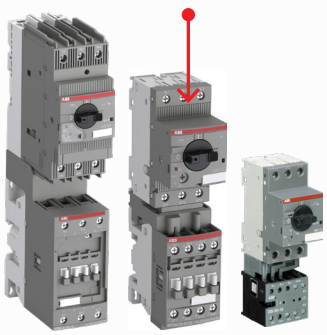



**Harmonized range of accessories**
All types up to 80 A share the same main accessories like auxiliary contacts, signaling contacts, shunt trips and undervoltage releases. This significantly reduces the part list and makes selection of the right accessories easy.

**Compatible with Unifix AD new distribution system**
Unifix AD allows an easy, safe and fast mounting of various components (manual motor starters, Tmax XT, circuit breakers, contactors etc.) without drilling the busbars, it's sufficient to clip them on the busbar system.

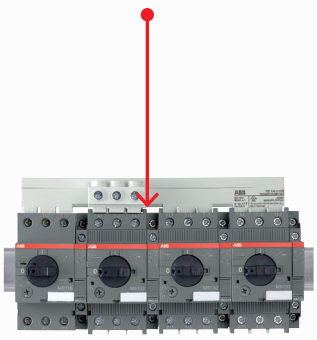


**Save wiring time**
and avoid mistakes by using a connecting link



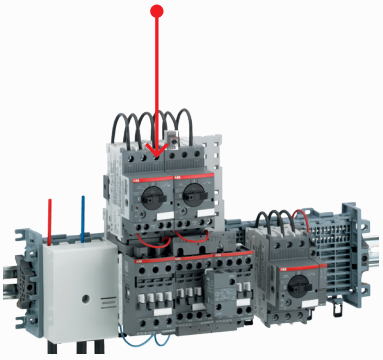
**Easy to connect**
Save wiring time and avoid mistakes by using a connecting link between ABB manual motor starters and soft starters or contactors. This creates harmonious and compact starter combinations that are easy to mount.

**Up to 5 manual motor starters**
can be fitted next to each other



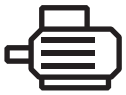
**Busbar connectors and enclosures**
With busbar connectors, up to 5 manual motor starters can be fitted next to each other with optional spacing for auxiliary contacts. Enclosures or door handle kits are available as well.

**With a lockable handle**
maintenance will be safe for every technician



**Compatible with SMISSLINE TP plug-in distribution system**
SMISSLINE TP allows to snap on and off load-free devices and components under voltage. When working under load please follow the applicable regulations and laws according to the country.

# Application examples



## MOTOR PROTECTION

No matter what type of starter is required by the application (direct-on-line, star-delta, soft starter or variable frequency drive), MS and MO manual motor starters (also known as motor protection circuit breakers or manual motor protectors) are the right protection devices for electric motors from 100 mA up to 100 A.



## STARTER PROTECTION

MO (magnetic-only) manual motor starters are
typically used, when motor overload protection is provided by a separate overload protection device.
This setup is specially beneficial for applications that require auto- or remote-reset of the starter in case of an overload tripping event (e.g. windmills or HVAC fans).



## CIRCUIT PROTECTION AND CONTROL

ABB's manual motor starters are fuseless circuit breakers (approved acc. to IEC60947-2) that can be used to control circuits and protect cables / lines in industrial and commercial applications from overloads and short-circuits. The built-in disconnect function allows the usage as main On-/Off-switch, typically for de-centralized applications (e.g. small machinery or laboratory systems).



## RESISTIVE LOADS

Manual motor starters are not only for motors! They are also an efficient solution for AC-1 applications, where it is required to protect and switch resistive loads (for example resistive furnaces or heaters).



## DC LOADS

Manual motor starters are not only for AC applications!
MS132 and MS165 manual motor starters are also rated for direct current loads (e.g. for motors used in solar panel tracking systems).



## EXTREME CONDITIONS

Regardless if high-altitudes, shock and vibration environments or hazardous areas, ABB's manual motor starters are designed and certified to withstand harsh conditions. Specific versions for rolling stock applications are part of our offer.





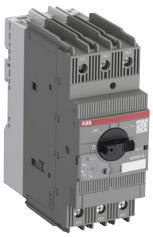

ABB
JUNGFRAUBAHN

# Manual motor starters

## Overview







| Type | MS116 | MS132 | MS165 |
|---|---|---|---|
| Thermal and electromagnetic protection | Yes | Yes | Yes |
| Electromagnetic protection | - | - | - |
| Phase loss sensitivity | Yes | Yes | Yes |
| Switch position | ON/OFF | ON/OFF/TRIP | ON/OFF/TRIP |
| Magnetic trip indication | - | Yes | Yes |
| Lockable handle without accessories | - | Yes | Yes |
| Disconnecting feature | Yes | Yes | Yes |
| Width | 45 mm | 45 mm | 55 mm |
| Rated operational current Ie | 0.10 ... 32 A | 0.10 ... 32 A | 10 ... 80 A |
| Setting range | 0.10 ... 32 A | 0.10 ... 32 A | 10 ... 80 A |
| Ambient air temperature | -25 ... +55 °C (1) | -25 ... +60 °C (1) | -25 ... +60 °C (1) |

(1) Compensated

### Accessories

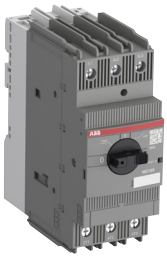
| | | | |
|---|---|---|---|
| Auxiliary contact | | HKF1, HK1 (2) | |
| Signaling contact | for tripped alarm | SK1 (2) | |
| | for short-circuit alarm | - | CK1 |
| Shunt trip | | AA1 | |
| Undervoltage release | | UA1 | |

### Table for short-circuit ratings for 400 V AC

| | Standard range MS116 | | Performance range MS132, MS165 | | |
|---|---|---|---|---|---|
| **Selection parameters** | | | | | |
| **Rated operational power** | **Setting range for thermal release** | **Type** | **Short-circuit breaking capacity** | **Type** | **Short-circuit breaking capacity** |
| | | | Icu / Ics | | Icu / Ics |
| 0.03 kW (1) | 0.1 ... 0.16 A | MS116-0.16 | 100 kA / 50 kA | MS132-0.16 (2) | 100 kA / 100 kA |
| 0.06 kW | 0.16 ... 0.25 A | MS116-0.25 | 100 kA / 50 kA | MS132-0.25 (2) | 100 kA / 100 kA |
| 0.09 kW | 0.25 ... 0.4 A | MS116-0.4 | 100 kA / 50 kA | MS132-0.4 (2) | 100 kA / 100 kA |
| 0.18 kW | 0.4 ... 0.63 A | MS116-0.63 | 100 kA / 50 kA | MS132-0.63 (2) | 100 kA / 100 kA |
| 0.25 kW | 0.63 ... 1.0 A | MS116-1.0 | 100 kA / 50 kA | MS132-1.0 (2) | 100 kA / 100 kA |
| 0.55 kW | 1.0...1.6 A | MS116-1.6 | 100 kA / 50 kA | MS132-1.6 (2) | 100 kA / 100 kA |
| 0.75 kW | 1.6...2.5 A | MS116-2.5 | 75 kA / 50 kA | MS132-2.5 (2) | 100 kA / 100 kA |
| 1.5 kW | 2.5...4.0 A | MS116-4.0 | 75 kA / 50 kA | MS132-4.0 (2) | 100 kA / 100 kA |
| 2.2 kW | 4.0...6.3 A | MS116-6.3 | 75 kA / 50 kA | MS132-6.3 (2) | 100 kA / 100 kA |
| 4.0 kW | 6.3...10 A | MS116-10 | 75 kA / 50 kA | MS132-10 (2) | 100 kA / 100 kA |
| 5.5 kW | 8...12 A | MS116-12 | 50 kA / 25 kA | MS132-12 | 100 kA / 100 kA |
| 7.5 kW | 10...16 A | MS116-16 | 16 kA / 16 kA | MS132-16 (2) / MS165-16 | 100 kA / 100 kA |
| 7.5 kW | 14 ... 20 A | | | MS165-20 | 100 kA / 100 kA |
| 7.5 kW | 16...20 A | MS116-20 | 16 kA / 10 kA | MS132-20 (2) | 100 kA / 100 kA |
| 11 kW | 18 ... 25 A | | | MS165-25 | 100 kA / 100 kA |
| 11 kW | 20...25 A | MS116-25 | 16 kA / 10 kA | MS132-25 (2) | 50 kA / 50 kA |
| 15 kW | 25...32 A | MS116-32 | 16 kA / 10 kA | MS132-32 (2) | 50 kA / 30 kA |
| 15 kW | 23 ... 32 A | | | MS165-32 | 100 kA / 100 kA |
| 22 kW | 30 ... 42 A | | | MS165-42 | 50 kA / 50 kA |
| 22 kW | 40 ... 54 A | | | MS165-54 | 50 kA / 30 kA |
| 30 kW | 52 ... 65 A | | | MS165-65 | 50 kA / 30 kA |
| 37 kW | 62 ... 73 A | | | MS165-73 | 30 kA / 30 kA |
| 45 kW | 70 ... 80 A | | | MS165-80 | 30 kA / 30 kA |

(1) 690 V AC
(2) Available with Push-in Spring terminals.







| Type | MO132 | MO165 | MS132-T |
|---|---|---|---|
| Thermal and electromagnetic protection | - | - | Yes |
| Electromagnetic protection | Yes | Yes | - |
| Phase loss sensitivity | - | - | Yes |
| Switch position | ON/OFF/TRIP | ON/OFF/TRIP | ON/OFF/TRIP |
| Magnetic trip indication | - | - | Yes |
| Lockable handle without accessories | Yes | Yes | Yes |
| Disconnecting feature | Yes | Yes | Yes |
| Width | 45 mm | 55 mm | 45 mm |
| Rated operational current Ie | 0.16 ... 32 A | 16 ... 80 A | 0.16 ... 25 A |
| Setting range | - | - | 0.10 ... 25 A |
| Ambient air temperature | -25 ... +60 °C | -25 ... +60 °C | -25 ... +60 °C (1) |

(1) Compensated

## Accessories

| | | | |
|---|---|---|---|
| Auxiliary contact | | HKF1, HK1 (2) | HKF1, HK1 (2) |
| Signaling contact | for tripped alarm | SK1 (2) | SK1 (2) |
| | for short-circuit alarm | - | CK1 |
| Shunt trip | | AA1 | AA1 |
| Undervoltage release | | UA1 | UA1 |

## Table for short-circuit ratings for 400 V AC

| | Performance range MO132, MO165 | | | Transformer protection MS132-T | |
|---|---|---|---|---|---|
| **Selection parameters** | | | | | |
| **Rated operational power** | **Type** | **Short-circuit breaking capacity** Icu | Ics | **Type** | **Short-circuit breaking capacity** Icu / Ics |
| 0.03 kW (1) | MO132-0.16 | 100 kA | 100 kA | MS132-0.16T (2) | 100 kA |
| 0.06 kW | MO132-0.25 | 100 kA | 100 kA | MS132-0.25T (2) | 100 kA |
| 0.09 kW | MO132-0.4 | 100 kA | 100 kA | MS132-0.4T (2) | 100 kA |
| 0.18 kW | MO132-0.63 | 100 kA | 100 kA | MS132-0.63T (2) | 100 kA |
| 0.25 kW | MO132-1.0 | 100 kA | 100 kA | MS132-1.0T (2) | 100 kA |
| 0.55 kW | MO132-1.6 | 100 kA | 100 kA | MS132-1.6T (2) | 100 kA |
| 0.75 kW | MO132-2.5 | 100 kA | 100 kA | MS132-2.5T (2) | 100 kA |
| 1.5 kW | MO132-4.0 | 100 kA | 100 kA | MS132-4.0T (2) | 100 kA |
| 2.2 kW | MO132-6.3 | 100 kA | 100 kA | MS132-6.3T (2) | 100 kA |
| 4.0 kW | MO132-10 | 100 kA | 100 kA | MS132-10T (2) | 100 kA |
| 5.5 kW | MO132-12 | 100 kA | 100 kA | MS132-12T | 100 kA |
| 7.5 kW | MO132-16 / MO165-16 | 100 kA | 100 kA | MS132-16T (2) | 100 kA |
| 7.5 kW | MO165-20 | 100 kA | 100 kA | | |
| 7.5 kW | MO132-20 | 100 kA | 100 kA | MS132-20T (2) | 100 kA |
| 11 kW | | | | | |
| 11 kW | MO132-25 / MO165-25 | 50 kA / 100 kA | 50 kA / 100 kA | MS132-25T (2) | 50 kA |
| 15 kW | MO132-32 | 50 kA | 30 kA | Transformer protection: The instantaneous short-circuit current setting Ii is 20 times the maximum rated operational current. | |
| 15 kW | MO165-32 | 100 kA | 100 kA | | |
| 22 kW | MO165-42 | 50 kA | 50 kA | | |
| 22 kW | MO165-54 | 50 kA | 30 kA | | |
| 30 kW | MO165-65 | 50 kA | 30 kA | | |
| 37 kW | MO165-73 | 30 kA | 30 kA | | |
| 45 kW | MO165-80 | 30 kA | 30 kA | | |

(1) 690 V AC
(2) Available with Push-in Spring terminals.

# MS116 manual motor starters

## 0.10 to 32 A – with thermal and electromagnetic protection



2CDC241004V0017

MS116-16



2CDC241017V0017

MS116-25



2CDC241019V0017

MS116-0.16-HKF1-11



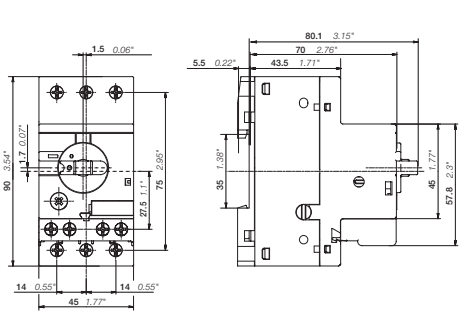
2CDC241020V0017

MS116-32-HKF1-11

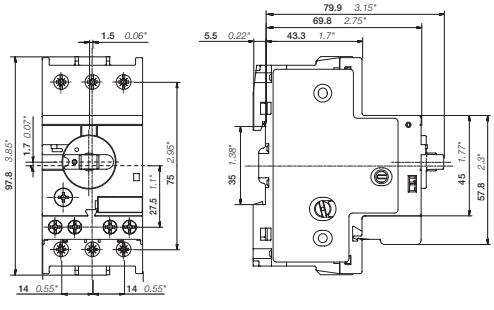
MS116 is a compact and economic range for motor protection up to 15 kW (400 V) / 32 A in width of 45 mm. Further features are the built-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable for three- and single-phase applications. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks and locking devices for protection against unauthorized changes are available as accessory. These are suitable throughout the MS116/MS132/MS165-range.

| Rated operational power 400 V AC-3, AC-3e<br>kW | Setting range<br>A | Short-circuit breaking capacity Ics at 400 V AC<br>kA | Rated instantaneous short-circuit current setting Ii<br>A | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|---|
| 0.03 (1) | 0.10 ... 0.16 | 50 | 2.00 | MS116-0.16 | 1SAM250000R1001 | 0.225 |
| 0.06 | 0.16 ... 0.25 | 50 | 3.10 | MS116-0.25 | 1SAM250000R1002 | 0.225 |
| 0.09 | 0.25 ... 0.40 | 50 | 5.00 | MS116-0.4 | 1SAM250000R1003 | 0.225 |
| 0.18 | 0.40 ... 0.63 | 50 | 7.90 | MS116-0.63 | 1SAM250000R1004 | 0.225 |
| 0.25 | 0.63 ... 1.00 | 50 | 12.5 | MS116-1.0 | 1SAM250000R1005 | 0.225 |
| 0.55 | 1.00 ... 1.60 | 50 | 20.0 | MS116-1.6 | 1SAM250000R1006 | 0.265 |
| 0.75 | 1.60 ... 2.50 | 50 | 31.3 | MS116-2.5 | 1SAM250000R1007 | 0.265 |
| 1.50 | 2.50 ... 4.00 | 50 | 50.0 | MS116-4.0 | 1SAM250000R1008 | 0.265 |
| 2.20 | 4.00 ... 6.30 | 50 | 78.8 | MS116-6.3 | 1SAM250000R1009 | 0.265 |
| 4.00 | 6.30 ... 10.0 | 50 | 150 | MS116-10 | 1SAM250000R1010 | 0.265 |
| 5.50 | 8.00 ... 12.0 | 25 | 180 | MS116-12 | 1SAM250000R1012 | 0.265 |
| 7.50 | 10.0 ... 16.0 | 16 | 240 | MS116-16 | 1SAM250000R1011 | 0.265 |
| 7.50 | 16.0 ... 20.0 | 10 | 300 | MS116-20 | 1SAM250000R1013 | 0.310 |
| 11.0 | 20.0 ... 25.0 | 10 | 375 | MS116-25 | 1SAM250000R1014 | 0.310 |
| 15.0 | 25.0 ... 32.0 | 10 | 480 | MS116-32 | 1SAM250000R1015 | 0.310 |
| **Mounted Auxiliary Contacts 1 N.O. + 1 N.C.** | | | | | | |
| 0.03 (1) | 0.10 ... 0.16 | 50 | 2.00 | MS116-0.16-HKF1-11 | 1SAM250005R1001 | 0.240 |
| 0.06 | 0.16 ... 0.25 | 50 | 3.10 | MS116-0.25-HKF1-11 | 1SAM250005R1002 | 0.240 |
| 0.09 | 0.25 ... 0.40 | 50 | 5.00 | MS116-0.4-HKF1-11 | 1SAM250005R1003 | 0.240 |
| 0.18 | 0.40 ... 0.63 | 50 | 7.90 | MS116-0.63-HKF1-11 | 1SAM250005R1004 | 0.240 |
| 0.25 | 0.63 ... 1.00 | 50 | 12.5 | MS116-1.0-HKF1-11 | 1SAM250005R1005 | 0.240 |
| 0.55 | 1.00 ... 1.60 | 50 | 20.0 | MS116-1.6-HKF1-11 | 1SAM250005R1006 | 0.280 |
| 0.75 | 1.60 ... 2.50 | 50 | 31.3 | MS116-2.5-HKF1-11 | 1SAM250005R1007 | 0.280 |
| 1.50 | 2.50 ... 4.00 | 50 | 50.0 | MS116-4.0-HKF1-11 | 1SAM250005R1008 | 0.280 |
| 2.20 | 4.00 ... 6.30 | 50 | 78.8 | MS116-6.3-HKF1-11 | 1SAM250005R1009 | 0.280 |
| 4.00 | 6.30 ... 10.0 | 50 | 150 | MS116-10.0-HKF1-11 | 1SAM250005R1010 | 0.280 |
| 5.50 | 8.00 ... 12.0 | 25 | 180 | MS116-12.0-HKF1-11 | 1SAM250005R1012 | 0.280 |
| 7.50 | 10.0 ... 16.0 | 16 | 240 | MS116-16.0-HKF1-11 | 1SAM250005R1011 | 0.280 |
| 7.50 | 16.0 ... 20.0 | 10 | 300 | MS116-20-HKF1-11 | 1SAM250005R1013 | 0.326 |
| 11.0 | 20.0 ... 25.0 | 10 | 375 | MS116-25-HKF1-11 | 1SAM250005R1014 | 0.326 |
| 15.0 | 25.0 ... 32.0 | 10 | 480 | MS116-32-HKF1-11 | 1SAM250005R1015 | 0.326 |

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range.
(1) 690 V




MS116 ≤ 16 A & MS116-HKF1-11 ≤ 16 A




MS116 ≥ 20 A & MS116-HKF1-11 ≥ 20 A

Main dimensions mm, inches

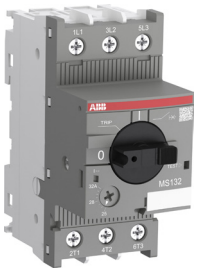
# MS132 manual motor starters

## 0.10 to 32 A – with thermal and electromagnetic protection



2CDC241002V0013

MS132-10



2CDC241006V0017

MS132-32



2CDC241021V0017

MS132-0.16-HKF1-11



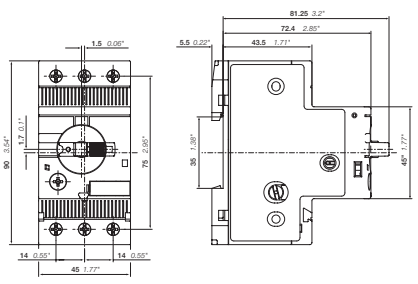
2CDC241022V0017

MS132-32-HKF1-11

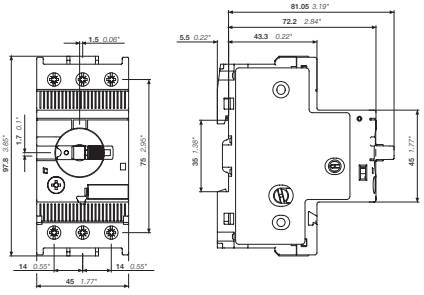
MS132 is a compact and powerful range for motor protection up to 15 kW (400 V) / 32 A in width of 45 mm. This type has a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the built-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks are available as accessory.
MS132 is ATEX and IECEx certified.

| Rated operational power 400 V AC-3, AC-3e kW | Setting range A | Short-circuit breaking capacity Ics at 400 V AC kA | Rated instantaneous short-circuit current setting Ii A | Type | Order code | Weight (1 pce) kg |
|---|---|---|---|---|---|---|
| 0.03 (1) | 0.10 ... 0.16 | 100 | 2.00 | MS132-0.16 | 1SAM350000R1001 | 0.215 |
| 0.06 | 0.16 ... 0.25 | 100 | 3.10 | MS132-0.25 | 1SAM350000R1002 | 0.215 |
| 0.09 | 0.25 ... 0.40 | 100 | 5.00 | MS132-0.4 | 1SAM350000R1003 | 0.215 |
| 0.18 | 0.40 ... 0.63 | 100 | 7.90 | MS132-0.63 | 1SAM350000R1004 | 0.215 |
| 0.25 | 0.63 ... 1.00 | 100 | 12.5 | MS132-1.0 | 1SAM350000R1005 | 0.215 |
| 0.55 | 1.00 ... 1.60 | 100 | 20.0 | MS132-1.6 | 1SAM350000R1006 | 0.265 |
| 0.75 | 1.60 ... 2.50 | 100 | 31.3 | MS132-2.5 | 1SAM350000R1007 | 0.265 |
| 1.50 | 2.50 ... 4.00 | 100 | 50.0 | MS132-4.0 | 1SAM350000R1008 | 0.265 |
| 2.20 | 4.00 ... 6.30 | 100 | 78.8 | MS132-6.3 | 1SAM350000R1009 | 0.265 |
| 4.00 | 6.30 ... 10.0 | 100 | 150 | MS132-10 | 1SAM350000R1010 | 0.265 |
| 5.50 | 8.00 ... 12.0 | 100 | 180 | MS132-12 | 1SAM350000R1012 | 0.310 |
| 7.50 | 10.0 ... 16.0 | 100 | 240 | MS132-16 | 1SAM350000R1011 | 0.310 |
| 7.50 | 16.0 ... 20.0 | 100 | 300 | MS132-20 | 1SAM350000R1013 | 0.310 |
| 11.0 | 20.0 ... 25.0 | 50 | 375 | MS132-25 | 1SAM350000R1014 | 0.310 |
| 15.0 | 25.0 ... 32.0 | 30 | 480 | MS132-32 | 1SAM350000R1015 | 0.310 |
| **Mounted Auxiliary Contacts 1 N.O. + 1 N.C.** | | | | | | |
| 0.03 (1) | 0.10 ... 0.16 | 100 | 2.00 | MS132-0.16-HKF1-11 | 1SAM350005R1001 | 0.231 |
| 0.06 | 0.16 ... 0.25 | 100 | 3.10 | MS132-0.25-HKF1-11 | 1SAM350005R1002 | 0.231 |
| 0.09 | 0.25 ... 0.40 | 100 | 5.0 | MS132-0.4-HKF1-11 | 1SAM350005R1003 | 0.231 |
| 0.18 | 0.40 ... 0.63 | 100 | 7.90 | MS132-0.63-HKF1-11 | 1SAM350005R1004 | 0.231 |
| 0.25 | 0.63 ... 1.00 | 100 | 12.5 | MS132-1.0-HKF1-11 | 1SAM350005R1005 | 0.231 |
| 0.55 | 1.00 ... 1.60 | 100 | 20.0 | MS132-1.6-HKF1-11 | 1SAM350005R1006 | 0.281 |
| 0.75 | 1.60 ... 2.50 | 100 | 31.3 | MS132-2.5-HKF1-11 | 1SAM350005R1007 | 0.281 |
| 1.50 | 2.50 ... 4.00 | 100 | 50.0 | MS132-4.0-HKF1-11 | 1SAM350005R1008 | 0.281 |
| 2.20 | 4.00 ... 6.30 | 100 | 78.8 | MS132-6.3-HKF1-11 | 1SAM350005R1009 | 0.281 |
| 4.00 | 6.30 ... 10.0 | 100 | 150 | MS132-10.0-HKF1-11 | 1SAM350005R1010 | 0.281 |
| 5.50 | 8.00 ... 12.0 | 100 | 180 | MS132-12.0-HKF1-11 | 1SAM350005R1012 | 0.326 |
| 7.50 | 10.0 ... 16.0 | 100 | 240 | MS132-16.0-HKF1-11 | 1SAM350005R1011 | 0.326 |
| 7.50 | 16.0 ... 20.0 | 100 | 300 | MS132-20-HKF1-11 | 1SAM350005R1013 | 0.326 |
| 11.0 | 20.0 ... 25.0 | 50 | 375 | MS132-25-HKF1-11 | 1SAM350005R1014 | 0.326 |
| 15.0 | 25.0 ... 32.0 | 30 | 480 | MS132-32-HKF1-11 | 1SAM350005R1015 | 0.326 |
| **Mounted Auxiliary Contacts 2 N.O. + 0 N.C.** | | | | | | |
| 7.50 | 10 ... 16 | 100 | 240 | MS132-16-HKF1-20 | 1SAM350006R1011 | 0.326 |

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range.
(1) 690 V



MS132 ≤ 10 A



MS132 ≥ 12 A

Main dimensions mm, inches

# MS132-K manual motor starters with Push-in Spring terminals

## 0.10 to 32 A – with thermal and electromagnetic protection



2CDC241025V0017

MS132-32K

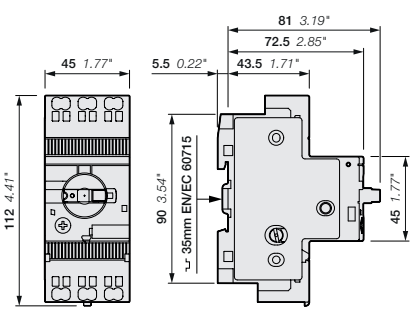
The MS132-K series is a compact and powerful range for motor protection up to 15 kW (400 V) / 32 A with a width of only 45 mm. The innovative Push-in Spring terminals enable tool-free wiring and eliminate the need for routine re-tightening.

The MS132-K also has a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the built-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication.

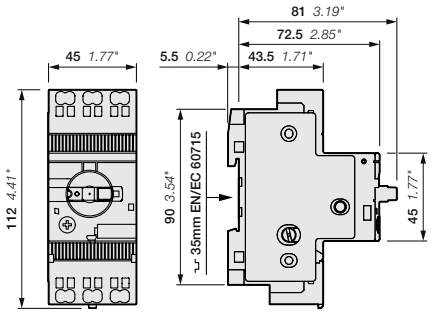
The manual motor starter is suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks are available as accessory. These are suitable throughout the MS116/MS132/MS165-range.
MS132-K is ATEX and IECEx certified.

| Rated operational power 400 V AC-3, AC-3e | Setting range | Short-circuit breaking capacity Ics at 400 V AC | Rated instantaneous short-circuit current setting Ii | Type | Order code | Weight (1 pce) |
|---|---|---|---|---|---|---|
| kW | A | kA | A | | | kg |
| 0.03(1) | 0.10 ... 0.16 | 100 | 2.00 | MS132-0.16K | 1SAM350010R1001 | 0.256 |
| 0.06 | 0.16 ... 0.25 | 100 | 3.10 | MS132-0.25K | 1SAM350010R1002 | 0.256 |
| 0.09 | 0.25 ... 0.40 | 100 | 5.00 | MS132-0.4K | 1SAM350010R1003 | 0.256 |
| 0.18 | 0.40 ... 0.63 | 100 | 7.90 | MS132-0.63K | 1SAM350010R1004 | 0.256 |
| 0.25 | 0.63 ... 1.00 | 100 | 12.5 | MS132-1.0K | 1SAM350010R1005 | 0.256 |
| 0.55 | 1.00 ... 1.60 | 100 | 20.0 | MS132-1.6K | 1SAM350010R1006 | 0.298 |
| 0.75 | 1.60 ... 2.50 | 100 | 31.3 | MS132-2.5K | 1SAM350010R1007 | 0.280 |
| 1.50 | 2.50 ... 4.00 | 100 | 50.0 | MS132-4.0K | 1SAM350010R1008 | 0.286 |
| 2.20 | 4.00 ... 6.30 | 100 | 78.8 | MS132-6.3K | 1SAM350010R1009 | 0.289 |
| 4.00 | 6.30 ... 10.0 | 100 | 150 | MS132-10K | 1SAM350010R1010 | 0.296 |
| 7.50 | 10.0 ... 16.0 | 100 | 240 | MS132-16K | 1SAM350010R1011 | 0.316 |
| 7.50 | 16.0 ... 20.0 | 100 | 300 | MS132-20K | 1SAM350010R1013 | 0.317 |
| 11.0 | 20.0 ... 25.0 | 50 | 375 | MS132-25K | 1SAM350010R1014 | 0.316 |
| 15.0 | 25.0 ... 32.0 | 25 | 480 | MS132-32K | 1SAM350010R1015 | 0.316 |

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range.
(1) 690 V




MS132-K > 10 A

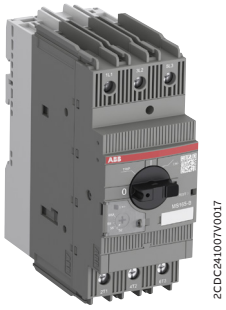



MS132-K ≤ 10 A

Main dimensions mm, inches

# MS165 manual motor starters

## 10 to 80 A – with thermal and electromagnetic protection



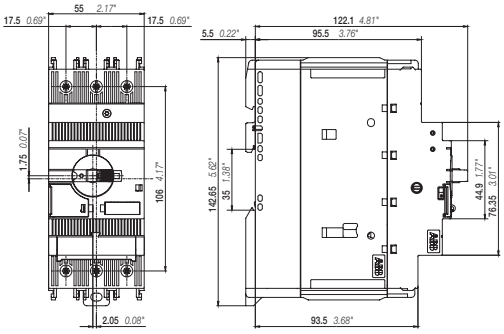
2CDC241007V0017

MS165-65

MS165 is a compact and powerful range for motor protection up to 45 kW (400 V) / 80 A in width of 55 mm. This type also has a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the built-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks are available as accessory.
These are suitable throughout the MS116/MS132/MS165-range.
MS165 is ATEX and IECEx certified.

| Rated operational power 400 V AC-3, AC-3e<br>kW | Setting range<br>A | Short-circuit breaking capacity Ics at 400 V AC<br>kA | Rated instantaneous short-circuit current setting Ii<br>A | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|---|
| 7.5 | 10 ... 16 | 100 | 240 | MS165-16 | 1SAM451000R1011 | 0.950 |
| 7.5 | 14 ... 20 | 100 | 300 | MS165-20 | 1SAM451000R1012 | 0.950 |
| 11 | 18 ... 25 | 100 | 375 | MS165-25 | 1SAM451000R1013 | 0.960 |
| 15 | 23 ... 32 | 100 | 480 | MS165-32 | 1SAM451000R1014 | 0.970 |
| 22 | 30 ... 42 | 50 | 630 | MS165-42 | 1SAM451000R1015 | 0.970 |
| 22 | 40 ... 54 | 30 | 810 | MS165-54 | 1SAM451000R1016 | 0.970 |
| 30 | 52 ... 65 | 30 | 975 | MS165-65 | 1SAM451000R1017 | 0.980 |
| 37 | 62 ... 73 | 30 | 1022 | MS165-73 | 1SAM451000R1018 | 1.000 |
| 45 | 70 ... 80 | 30 | 1120 | MS165-80 | 1SAM451000R1019 | 1.000 |

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range.




MS165

Main dimensions mm, inches

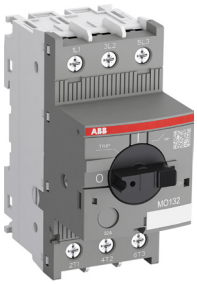
# MO132 manual motor starters magnetic only

## 0.16 to 32 A – with electromagnetic protection



2CDC241018V0017

MO132-6.3



2CDC241015V0017

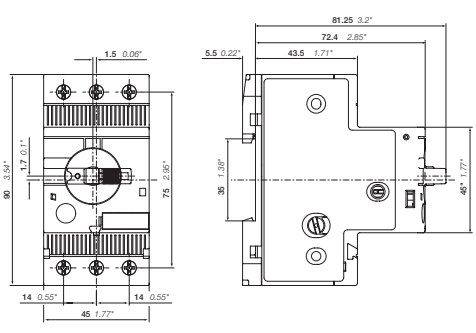
MO132-32

The MO132 manual motor starter magnetic only is a compact and powerful range for motor protection up to 15 kW (400 V AC) in width of 45 mm. The devices are used to manually switch on and off loads/motors and to protect them reliably and without the need for a fuse from short-circuits.

The manual motor starter offers a rated service short-circuit breaking capacity up to 100 kA at 400 V AC. A combination together with overload relays or motor controllers allows the protection of motors. Further features are the built-in disconnect function, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starters magnetic only are suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, 3-phase busbars and power in-feed blocks are available as accessory.

| Rated operational power 400 V AC-3, AC-3e<br>kW | Rated operational current<br>A | Short-circuit breaking capacity Ics at 400 V AC<br>kA | Rated instantaneous short-circuit current setting li<br>A | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|---|
| 0.03 (1) | 0.16 | 100 | 2.00 | MO132-0.16 | 1SAM360000R1001 | 0.215 |
| 0.06 | 0.25 | 100 | 3.10 | MO132-0.25 | 1SAM360000R1002 | 0.215 |
| 0.09 | 0.40 | 100 | 5.00 | MO132-0.4 | 1SAM360000R1003 | 0.215 |
| 0.12 | 0.63 | 100 | 7.90 | MO132-0.63 | 1SAM360000R1004 | 0.215 |
| 0.25 | 1.0 | 100 | 12.5 | MO132-1.0 | 1SAM360000R1005 | 0.215 |
| 0.55 | 1.6 | 100 | 20.0 | MO132-1.6 | 1SAM360000R1006 | 0.265 |
| 0.75 | 2.5 | 100 | 31.3 | MO132-2.5 | 1SAM360000R1007 | 0.265 |
| 1.5 | 4.0 | 100 | 50.0 | MO132-4.0 | 1SAM360000R1008 | 0.265 |
| 2.2 | 6.3 | 100 | 78.8 | MO132-6.3 | 1SAM360000R1009 | 0.265 |
| 4.0 | 10 | 100 | 125 | MO132-10 | 1SAM360000R1010 | 0.265 |
| 5.5 | 12 | 100 | 150 | MO132-12 | 1SAM360000R1012 | 0.310 |
| 7.5 | 16 | 100 | 200 | MO132-16 | 1SAM360000R1011 | 0.310 |
| 7.5 | 20 | 100 | 250 | MO132-20 | 1SAM360000R1013 | 0.310 |
| 11 | 25 | 50 | 313 | MO132-25 | 1SAM360000R1014 | 0.310 |
| 15 | 32 | 30 | 400 | MO132-32 | 1SAM360000R1015 | 0.310 |

Note: For overload protection of motors, an appropriate thermal or electronic overload relay must be used.
(1) 690 V



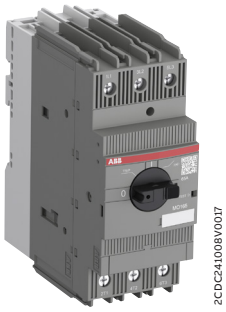

MO132 ≤ 10 A

MO132 ≥ 12 A

Main dimensions mm, inches

# MO165 manual motor starters magnetic only

## 16 to 80 A – with electromagnetic protection



2CDC241008V0017

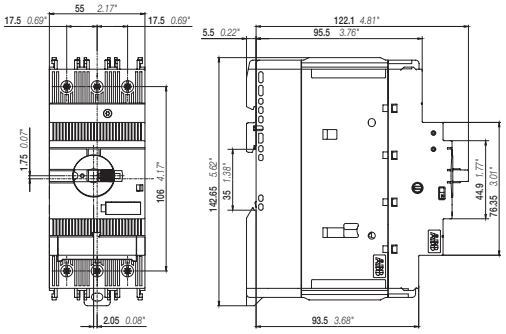
MO165-65

The MO165 manual motor starter magnetic only is a compact and powerful range for motor protection up to 45 kW (400 V AC) in width of 55 mm. The devices are used to manually switch on and off loads/motors and to protect them reliably and without the need for a fuse from short-circuits. The manual motor starter offers a rated service short-circuit breaking capacity up to 100 kA at 400 V AC. A combination together with overload relays or motor controllers allows the protection of motors. Further features are the built-in disconnect function, trip-free mechanism and a rotary handle with a clear switch position indication.

The manual motor starters magnetic only are suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, 3-phase bus bars and power in-feed blocks are available as accessory.

| Rated operational power 400 V AC-3, AC-3e<br>kW | Rated operational current<br>A | Short-circuit breaking capacity Ics at 400 V AC<br>kA | Rated instantaneous short-circuit current setting Ii<br>A | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|---|
| 7.5 | 16 | 100 | 240 | MO165-16 | 1SAM461000R1011 | 0.950 |
| 7.5 | 20 | 100 | 300 | MO165-20 | 1SAM461000R1012 | 0.950 |
| 11 | 25 | 100 | 375 | MO165-25 | 1SAM461000R1013 | 0.960 |
| 15 | 32 | 100 | 480 | MO165-32 | 1SAM461000R1014 | 0.970 |
| 22 | 42 | 50 | 630 | MO165-42 | 1SAM461000R1015 | 0.970 |
| 22 | 54 | 30 | 810 | MO165-54 | 1SAM461000R1016 | 0.970 |
| 30 | 65 | 30 | 975 | MO165-65 | 1SAM461000R1017 | 0.980 |
| 37 | 73 | 30 | 1022 | MO165-73 | 1SAM461000R1018 | 1.000 |
| 45 | 80 | 30 | 1120 | MO165-80 | 1SAM461000R1019 | 1.000 |

Note: For overload protection of motors, an appropriate thermal or electronic overload relay must be used.




MO165

Main dimensions mm, inches

02

# MS116, MS132, MS165, MO132, MO165
Technical data

## Main circuit – Utilization characteristics according to IEC/EN

| Type | | MS116 | MS132 | MS165 | MO132 | MO165 |
|---|---|---|---|---|---|---|
| Standards | | IEC/EN 60947–2, IEC/EN 60947-4-1, IEC/EN 60947-1 | | | | |
| Rated operational voltage Ue | | 690 V AC | 690 V AC / 250 V DC | 690 V AC / 250 V DC | 690 V AC | 690 V AC / 250 V DC |
| Rated frequency | | 50/60 Hz | DC, 50/60 Hz | DC, 50/60 Hz | 50/60 Hz | DC, 50/60 Hz |
| Operational frequency | | 50/60 Hz | 0 ... 400 Hz | 0 ... 400 Hz | 0 ... 400 Hz | 0 ... 400 Hz |
| Trip class | | 10A | 10 | 10 | – | – |
| Number of poles | | 3 | | | | |
| Duty time | | 100% | | | | |
| Mechanical durability | | 100000 cycles | 100000 cycles | 50000 cycles | 100000 cycles | 50000 cycles |
| Electrical durability | up to 10 A | up to 100000 cycles | up to 100000 cycles | up to 25000 cycles | up to 100000 cycles | up to 50000 cycles |
| | up to 16 A | 100000 cycles | 50000 cycles | 25000 cycles | 50000 cycles | 25000 cycles |
| | 20 ... 65 A | 50000 cycles | 50000 cycles | 25000 cycles | 50000 cycles | 25000 cycles |
| | 65 ... 80 A | – | – | 20000 cycles | – | 20000 cycles |
| Rated impulse withstand voltage Uimp | | 6 kV | 6 kV | 8 kV | 6 kV | 8 kV |
| Rated insulation voltage Ui | | 690 V | 690 V | 1000 V | 690 V | 1000 V |
| Rated operational current Ie | | See ordering details | | | | |
| Rated operational current DC-5 Ie<br>3 conducting paths in series up to 250 V | | – | See "Rated operational current Ie" | See "Rated operational current Ie" | – | See "Rated operational current Ie" |
| Rated instantaneous short-circuit current setting Ii | | See ordering details | | | | |
| Rated service short-circuit breaking capacity Ics | | See table "Short-circuit breaking capacity and back-up fuses" | | | | |
| Rated ultimate short-circuit breaking capacity Icu | | See table "Short-circuit breaking capacity and back-up fuses" | | | | |
| Rated service short-circuit breaking capacity DC Ics<br>3 conducting paths in series up to 250 V | | – | 10 kA | 100 kA | – | 100 kA |
| Suitable for use in IT networks | | Yes | | | | |

## Short-circuit breaking capacity and back-up fuses – MS116

Ics Rated service short-circuit breaking capacity

Icu Rated ultimate short-circuit breaking capacity

Iq (Icc) Rated conditional short-circuit current

\- No back-up fuse required, because short-circuit proof up to Icu (for Icu see table below)

## Short-circuit breaking capacity and back-up fuses – MS116

| Type | 230 V AC | | | 400 V AC | | | 440 V AC | | | 500 V AC | | | 690 V AC | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A |
| MS116-0.16 | 50 | 100 | - | 50 | 100 | - | 50 | 100 | - | 30 | 100 | - | 30 | 100 | - |
| MS116-0.25 | 50 | 100 | - | 50 | 100 | - | 50 | 100 | - | 30 | 100 | - | 30 | 100 | - |
| MS116-0.4 | 50 | 100 | - | 50 | 100 | - | 50 | 100 | - | 30 | 100 | - | 30 | 100 | - |
| MS116-0.63 | 50 | 100 | - | 50 | 100 | - | 50 | 100 | - | 30 | 100 | - | 30 | 100 | - |
| MS116-1.0 | 50 | 100 | - | 50 | 100 | - | 50 | 100 | - | 30 | 100 | - | 30 | 100 | - |
| MS116-1.6 | 50 | 100 | - | 50 | 100 | - | 50 | 100 | - | 30 | 100 | - | 30 | 100 | - |
| MS116-2.5 | 50 | 75 | - | 50 | 75 | - | 10 | 30 | 25 (1) | 10 | 20 | 25 (1) | 5 | 10 | 25 (1) |
| MS116-4.0 | 50 | 75 | - | 50 | 75 | - | 6 | 18 | 25 (1) | 6 | 15 | 25 (1) | 2 | 3 | 25 (1) |
| MS116-6.3 | 50 | 75 | - | 50 | 75 | - | 6 | 18 | 63 (1) | 6 | 15 | 63 (1) | 2 | 3 | 40 (1) |
| MS116-10 | 50 | 75 | - | 50 | 75 | - | 6 | 18 | 63 (1) | 6 | 15 | 63 (1) | 2 | 3 | 50 (1) |
| MS116-12 | 25 | 50 | 80 (1) | 25 | 50 | 80 (1) | 6 | 15 | 63 (1) | 6 | 15 | 63 (1) | 2 | 3 | 50 (1) |
| MS116-16 | 16 | 16 | 80 (1) | 16 | 16 | 80 (1) | 6 | 15 | 63 (1) | 4 | 10 | 63 (1) | 2 | 3 | 63 (1) |
| MS116-20 | 10 | 16 | 125 (1) | 10 | 16 | 125 (1) | 3 | 15 | 125 (1) | 3 | 10 | 125 (1) | 2 | 3 | 80 (1) |
| MS116-25 | 10 | 16 | 125 (1) | 10 | 16 | 125 (1) | 3 | 15 | 125 (1) | 3 | 10 | 125 (1) | 2 | 3 | 100 (1) |
| MS116-32 | 10 | 16 | 125 (1) | 10 | 16 | 125 (1) | 3 | 15 | 125 (1) | 3 | 10 | 125 (1) | 2 | 3 | 100 (1) |

(1) Maximum rated current of the back-up fuse for short circuit up to 50 kA if Icc > Ics

# MS116, MS132, MS165, MO132, MO165
## Technical data

Ics Rated service short-circuit breaking capacity
Icu Rated ultimate short-circuit breaking capacity
Iq (Icc) Rated conditional short-circuit current
- No back-up fuse required, because short-circuit proof up to Icu (for Icu see table below)

### Short-circuit breaking capacity and back-up fuses – MS132

| Type | 230 V AC | | | 400 V AC | | | 440 V AC | | | 500 V AC | | | 690 V AC | | | 250 V DC(2) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A |
| MS132-0.16 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 10 | 10 | - |
| MS132-0.25 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 10 | 10 | - |
| MS132-0.4 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 10 | 10 | - |
| MS132-0.63 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 10 | 10 | - |
| MS132-1.0 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 10 | 10 | - |
| MS132-1.6 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 10 | 10 | - |
| MS132-2.5 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 10 | 10 | - |
| MS132-4.0 | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 35(1) | 20 | 20 | 35(1) | 3 | 3 | 32(1) | 10 | 10 | - |
| MS132-6.3 | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 63(1) | 20 | 20 | 63(1) | 3 | 3 | 50(1) | 10 | 10 | - |
| MS132-10 | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 100(1) | 20 | 20 | 100(1) | 3 | 3 | 50(1) | 10 | 10 | - |
| MS132-12 | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 100(1) | 20 | 20 | 100(1) | 3 | 3 | 63(1) | 10 | 10 | - |
| MS132-16 | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 125(1) | 20 | 20 | 125(1) | 3 | 3 | 63(1) | 10 | 10 | - |
| MS132-20 | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 125(1) | 20 | 20 | 125(1) | 3 | 3 | 80(1) | 10 | 10 | - |
| MS132-25 | 50 | 50 | 125(1) | 50 | 50 | 125(1) | 30 | 30 | 125(1) | 10 | 10 | 125(1) | 3 | 3 | 100(1) | 10 | 10 | - |
| MS132-32 | 30 | 50 | 125(1) | 30 | 50 | 125(1) | 30 | 30 | 125(1) | 10 | 10 | 125(1) | 3 | 3 | 100(1) | 10 | 10 | - |

(1) Maximum rated current of the back-up fuse for short circuit up to 100kA if Icc > Ics
(2) 3 poles in series

### Short-circuit breaking capacity and back-up fuses – MS165

| Type | 230 V AC | | | 400 V AC | | | 415 V AC | | | 440 V AC | | | 500 V AC | | | 690 V AC | | | 250 V DC (2) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A |
| MS165-16 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 75 | 75 | 125 (1) | 40 | 40 | 125 (1) | 10 | 10 | 63 (1) | 100 | 100 | - |
| MS165-20 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 75 | 75 | 125 (1) | 40 | 40 | 125 (1) | 10 | 10 | 63 (1) | 100 | 100 | - |
| MS165-25 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 50 | 50 | 125 (1) | 30 | 30 | 125 (1) | 10 | 10 | 80 (1) | 100 | 100 | - |
| MS165-32 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 50 | 50 | 125 (1) | 30 | 30 | 125 (1) | 10 | 10 | 100 (1) | 100 | 100 | - |
| MS165-42 | 50 | 50 | 125 (1) | 50 | 50 | 125 (1) | 50 | 50 | 125 | 50 | 50 | 125 (1) | 30 | 30 | 125 (1) | 10 | 10 | 100 (1) | 100 | 100 | - |
| MS165-54 | 30 | 50 | 125 (1) | 30 | 50 | 125 (1) | 30 | 45 | 125 | 30 | 45 | 125 (1) | 20 | 20 | 125 (1) | 6 | 8 | 100 (1) | 100 | 100 | - |
| MS165-65 | 30 | 50 | 125 (1) | 30 | 50 | 125 (1) | 30 | 45 | 125 | 30 | 45 | 125 (1) | 20 | 20 | 125 (1) | 6 | 8 | 100 (1) | 100 | 100 | - |
| MS165-73 | 30 | 30 | 200 (1) | 30 | 30 | 200 (1) | 18 | 18 | 200 (1) | 18 | 18 | 200 (1) | 10 | 10 | 200 (1) | 6 | 8 | 160 (1) | 100 | 100 | - |
| MS165-80 | 30 | 30 | 200 (1) | 30 | 30 | 200 (1) | 18 | 18 | 200 (1) | 18 | 18 | 200 (1) | 10 | 10 | 200 (1) | 6 | 8 | 160 (1) | 100 | 100 | - |

(1) Maximum rated current of the back-up fuse for short circuit up to 100kA if Icc > Ics
(2) 3 poles in series

### Short-circuit breaking capacity and back-up fuses - MO132

| Type | 230 V AC | | | 400 V AC | | | 440 V AC | | | 500 V AC | | | 690 V AC | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A |
| MO132-0.16 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MO132-0.25 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MO132-0.4 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MO132-0.63 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MO132-1.0 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MO132-1.6 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MO132-2.5 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MO132-4.0 | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 35 (1) | 20 | 20 | 35 (1) | 3 | 3 | 32 (1) |
| MO132-6.3 | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 63 (1) | 20 | 20 | 63 (1) | 3 | 3 | 50 (1) |
| MO132-10 | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 100 (1) | 20 | 20 | 100 (1) | 3 | 3 | 50 (1) |
| MO132-12 | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 100 (1) | 20 | 20 | 100 (1) | 3 | 3 | 63 (1) |
| MO132-16 | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 125 (1) | 20 | 20 | 125 (1) | 3 | 3 | 63 (1) |
| MO132-20 | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 125 (1) | 20 | 20 | 125 (1) | 3 | 3 | 80 (1) |
| MO132-25 | 50 | 50 | 125 (1) | 50 | 50 | 125 (1) | 30 | 30 | 125 (1) | 10 | 10 | 125 (1) | 3 | 3 | 100 (1) |
| MO132-32 | 30 | 50 | 125 (1) | 30 | 50 | 125 (1) | 30 | 30 | 125 (1) | 10 | 10 | 125 (1) | 3 | 3 | 100 (1) |

(1) Maximum rated current of the back-up fuse for short circuit up to 100kA if Icc > Ics

02

# MS116, MS132, MS165, MO132, MO165
## Technical data

Ics Rated service short-circuit breaking capacity
Icu Rated ultimate short-circuit breaking capacity
Iq (Icc) Rated conditional short-circuit current
- No back-up fuse required, because short-circuit proof up to Icu (for Icu see table below)

### Short-circuit breaking capacity and back-up fuses – MO165

| Type | 230 V AC | | | 400 V AC | | | 415 V AC | | | 440 V AC | | | 500 V AC | | | 690 V AC | | | 250 V DC (2) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A |
| MO165-16 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 75 | 75 | 125 (1) | 40 | 40 | 125 (1) | 10 | 10 | 63 (1) | 100 | 100 | - |
| MO165-20 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 75 | 75 | 125 (1) | 40 | 40 | 125 (1) | 10 | 10 | 63 (1) | 100 | 100 | - |
| MO165-25 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 50 | 50 | 125 (1) | 30 | 30 | 125 (1) | 10 | 10 | 80 (1) | 100 | 100 | - |
| MO165-32 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 50 | 50 | 125 (1) | 30 | 30 | 125 (1) | 10 | 10 | 100 (1) | 100 | 100 | - |
| MO165-42 | 50 | 50 | 125 (1) | 50 | 50 | 125 (1) | 50 | 50 | 125 | 50 | 50 | 125 (1) | 30 | 30 | 125 (1) | 10 | 10 | 100 (1) | 100 | 100 | - |
| MO165-54 | 30 | 50 | 125 (1) | 30 | 50 | 125 (1) | 30 | 45 | 125 | 30 | 45 | 125 (1) | 20 | 20 | 125 (1) | 6 | 8 | 100 (1) | 100 | 100 | - |
| MO165-65 | 30 | 50 | 125 (1) | 30 | 50 | 125 (1) | 30 | 45 | 125 | 30 | 45 | 125 (1) | 20 | 20 | 125 (1) | 6 | 8 | 100 (1) | 100 | 100 | - |
| MO165-73 | 30 | 30 | 200 (1) | 30 | 30 | 200 (1) | 18 | 18 | 200 (1) | 18 | 18 | 200 (1) | 10 | 10 | 200 (1) | 6 | 8 | 160 (1) | 100 | 100 | - |
| MO165-80 | 30 | 30 | 200 (1) | 30 | 30 | 200 (1) | 18 | 18 | 200 (1) | 18 | 18 | 200 (1) | 10 | 10 | 200 (1) | 6 | 8 | 160 (1) | 100 | 100 | - |

(1) Maximum rated current of the back-up fuse for short circuit up to 100kA if Icc > Ics
(2) 3 poles in series

### Main circuit – Utilization characteristics according to UL/CSA

| Type | | MS116 | MS132 | MS165 | MO132 | MO165 |
|---|---|---|---|---|---|---|
| Standards | | UL 60947-1, UL 60947-4-1 (UL 508), CSA C22.2 No.60947-4-1 (CSA C22.2 No.14) | | | | |
| Rated operational voltage Ue acc. to UL/CSA | | 600 V AC | 600 V AC | 600 V AC | 600 V AC | 600 V AC |
| Trip class | | 10A | 10 | | - | |
| Motor ratings (1) | Horsepower | See table "Motor ratings, three phase" | | | | |
| | Full Load Amps (FLA) | See table "Motor ratings, three phase" | | | | |
| | Locked Rotor Amps (LRA) | See table "Motor ratings, three phase" | | | | |

(1) See product data sheets for UL/CSA single phase motor and general use ratings.

### UL/CSA ratings overview

| Type | MS116 | MS132 | MS165 | MO132 | MO165 |
|---|---|---|---|---|---|
| Manual Motor Controller | x | x | x | x | x |
| Manual Motor Controller, Suitable as Motor Disconnect | x | x | x | x | x |
| Manual Motor Controller, Suitable for use in Group Installations | x | x | x | x | x |
| Manual Motor Controller, Suitable for Tap Conductor Protection in Group Installations | - | x | x | x | x |
| Manual self-protected Combination Motor Controller (Type E) | - | x | x | - | - |
| Combination Motor Controller (Type F) | - | with AF contactor | with AF contactor (up to 80 A) | with AF contactor and EOL | with AF contactor and EOL or TOL (up to 80 A) |

# MS116, MS132, MS165, MO132, MO165

## Technical data

### UL/CSA Motor ratings, three phase – MS116

| Type | 110-120 V AC | | | 200 V AC | | | 208 V AC | | | 220 ... 240 V AC | | | 440 ... 480 V AC | | | 550 ... 600 V AC | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA |
| MS116-0.16 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 |
| MS116-0.25 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 |
| MS116-0.40 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 |
| MS116-0.63 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 |
| MS116-1.0 | - | 1.0 | 6.0 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 | 1/2 | 1 | 6 |
| MS116-1.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | 3/4 | 1.6 | 9.6 | 3/4 | 1.6 | 9.6 |
| MS116-2.5 | - | 2.5 | 15.0 | 1/2 | 2.5 | 15 | 1/2 | 2.5 | 15 | 1/2 | 2.5 | 15 | 1 | 2.5 | 15 | 1 1/2 | 2.5 | 15 |
| MS116-4.0 | - | 4.0 | 24 | 3/4 | 4 | 24 | 3/4 | 4 | 24 | 3/4 | 4 | 24 | 2 | 4 | 24 | 3 | 3.9 | 25.6 |
| MS116-6.3 | 1/2 | 6.3 | 37.8 | 1 | 6.3 | 37.8 | 1 | 6.3 | 37.8 | 1 1/2 | 6.3 | 37.8 | 3 | 4.8 | 32 | 5 | 6.1 | 36.8 |
| MS116-10 | 1 | 10 | 60 | 2 | 7.8 | 57.5 | 2 | 7.5 | 55 | 3 | 9.6 | 64 | 5 | 7.6 | 46 | 7 1/2 | 9 | 50.8 |
| MS116-12 | 1 1/2 | 12 | 72 | 3 | 11 | 73.6 | 3 | 10.6 | 71 | 3 | 9.6 | 64 | 7 1/2 | 11 | 63.5 | 10 | 11 | 64.8 |
| MS116-16 | 2 | 16 | 84 | 3 | 11 | 73.6 | 3 | 10.6 | 71 | 5 | 15.2 | 92 | 10 | 14 | 81 | 10 | 11 | 64.8 |
| MS116-20 | 3 | 19.2 | 128 | 5 | 17.5 | 105.8 | 5 | 16.7 | 102 | 5 | 15.2 | 92 | 10 | 14 | 81 | 15 | 17 | 93 |
| MS116-25 | 3 | 19.2 | 128 | 5 | 17.5 | 105.8 | 7 1/2 | 24.2 | 140 | 7 1/2 | 22 | 127 | 15 | 21 | 116 | 20 | 22 | 116 |
| MS116-32 | 5 | 30.4 | 184 | 7 1/2 | 25.3 | 146 | 10 | 30.8 | 179 | 10 | 28 | 162 | 20 | 27 | 145 | 25 | 27 | 146 |

### UL/CSA Motor ratings, three phase – MS132

| Type | 110-120 V AC | | | 200 V AC | | | 208 V AC | | | 220 ... 240 V AC | | | 440 ... 480 V AC | | | 550 ... 600 V AC | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA |
| MS132-0.16 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 |
| MS132-0.25 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 |
| MS132-0.40 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 |
| MS132-0.63 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 |
| MS132-1.0 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 | 1/2 | 1 | 6 |
| MS132-1.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | 3/4 | 1.6 | 9.6 | 3/4 | 1.6 | 9.6 |
| MS132-2.5 | - | 2.5 | 15 | 1/2 | 2.5 | 15 | 1/2 | 2.5 | 15 | 1/2 | 2.5 | 15 | 1 | 2.5 | 15 | 1-1/2 | 2.5 | 15 |
| MS132-4.0 | - | 4 | 24 | 3/4 | 4 | 24 | 3/4 | 4 | 24 | 3/4 | 4 | 24 | 2 | 4 | 24 | 3 | 3.9 | 25.6 |
| MS132-6.3 | 1/2 | 6.3 | 37.8 | 1 | 6.3 | 37.8 | 1 | 6.3 | 37.8 | 1 1/2 | 6.3 | 37.8 | 3 | 4.8 | 32 | 5 | 6.1 | 36.8 |
| MS132-10 | 1 | 10 | 60 | 2 | 7.8 | 57.5 | 2 | 7.5 | 55 | 3 | 9.6 | 64 | 5 | 7.6 | 46 | 7 1/2 | 9 | 50.8 |
| MS132-12 | 1 1/2 | 12 | 72 | 3 | 11 | 73.6 | 3 | 10.6 | 71 | 3 | 9.6 | 64 | 7 1/2 | 11 | 63.5 | 10 | 11 | 64.8 |
| MS132-16 | 2 | 16 | 84 | 3 | 11 | 73.6 | 3 | 10.6 | 71 | 5 | 15.2 | 92 | 10 | 14 | 81 | 10 | 11 | 64.8 |
| MS132-20 | 3 | 19.2 | 128 | 5 | 17.5 | 105.8 | 5 | 16.7 | 102 | 5 | 15.2 | 92 | 10 | 14 | 81 | 15 | 17 | 93 |
| MS132-25 | 3 | 19.2 | 128 | 5 | 17.5 | 105.8 | 7 1/2 | 24.2 | 140 | 7 1/2 | 22 | 127 | 15 | 21 | 116 | 20 | 22 | 116 |
| MS132-32 | 5 | 30.4 | 184 | 7 1/2 | 25.3 | 146 | 10 | 30.8 | 179 | 10 | 28 | 162 | 20 | 27 | 145 | 25 | 27 | 146 |

### UL/CSA Motor ratings, three phase – MS165

| Type | 110-120 V AC | | | 200 V AC | | | 208 V AC | | | 220 ... 240 V AC | | | 440 ... 480 V AC | | | 550 ... 600 V AC | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA |
| MS165-16 | 2 | 16 | 96 | 3 | 16 | 96 | 3 | 16 | 96 | 5 | 16 | 96 | 10 | 16 | 96 | 10 | 16 | 96 |
| MS165-20 | 3 | 20 | 120 | 5 | 20 | 120 | 5 | 20 | 120 | 5 | 20 | 120 | 10 | 20 | 120 | 15 | 20 | 120 |
| MS165-25 | 3 | 25 | 150 | 5 | 25 | 150 | 7 1/2 | 25 | 150 | 7 1/2 | 25 | 150 | 15 | 25 | 150 | 20 | 25 | 150 |
| MS165-32 | 5 | 32 | 192 | 7 1/2 | 32 | 192 | 10 | 32 | 192 | 10 | 32 | 192 | 20 | 32 | 192 | 30 | 32 | 192 |
| MS165-42 | 5 | 42 | 252 | 10 | 42 | 252 | 10 | 42 | 252 | 15 | 42 | 252 | 30 | 42 | 252 | 40 | 42 | 252 |
| MS165-54 | 7 1/2 | 54 | 324 | 15 | 54 | 324 | 15 | 54 | 324 | 20 | 54 | 324 | 40 | 54 | 324 | 50 | 54 | 324 |
| MS165-65 | 10 | 65 | 348 | 20 | 65 | 348 | 20 | 65 | 348 | 20 | 65 | 348 | 50 | 65 | 348 | 60 | 65 | 348 |
| MS165-73 | 10 | 73 | 435 | 20 | 73 | 435 | 20 | 73 | 435 | 25 | 73 | 435 | 50 | 73 | 435 | 60 | 73 | 435 |
| MS165-80 | 10 | 80 | 435 | 25 | 80 | 435 | 25 | 80 | 435 | 30 | 80 | 435 | 60 | 80 | 435 | 75 | 80 | 435 |

hp Horsepower
FLA Full Load Amps
LRA Locked Rotor Amps

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range; see ordering detail pages. Horsepower (hp) ratings are for reference only.

# MS116, MS132, MS165, MO132, MO165

## Technical data

### UL/CSA Motor ratings, three phase – MO132

| Type | 110-120 V AC | | | 200 V AC | | | 208 V AC | | | 220 ... 240 V AC | | | 440 ... 480 V AC | | | 550 ... 600 V AC | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA |
| MO132-0.16 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 |
| MO132-0.25 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 |
| MO132-0.40 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 |
| MO132-0.63 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 |
| MO132-1.0 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 | 1/2 | 1 | 6 |
| MO132-1.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | 3/4 | 1.6 | 9.6 | 3/4 | 1.6 | 9.6 |
| MO132-2.5 | - | 2.5 | 15 | 1/2 | 2.5 | 15 | 1/2 | 2.5 | 15 | 1/2 | 2.5 | 15 | 1 | 2.5 | 15 | 1 1/2 | 2.5 | 15 |
| MO132-4.0 | - | 4 | 24 | 3/4 | 4 | 24 | 3/4 | 4 | 24 | 1 | 4 | 24 | 2 | 4 | 24 | 3 | 3.9 | 25.6 |
| MO132-6.3 | 1/2 | 6.3 | 37.8 | 1 | 6.3 | 37.8 | 1 | 6.3 | 37.8 | 1 1/2 | 6.3 | 37.8 | 3 | 4.8 | 32 | 5 | 6.1 | 36.8 |
| MO132-10 | 1 | 10 | 60 | 2 | 7.8 | 57.5 | 2 | 7.5 | 55 | 3 | 9.6 | 64 | 5 | 7.6 | 46 | 7 1/2 | 9 | 50.8 |
| MO132-12 | 1 1/2 | 12 | 72 | 3 | 11 | 73.6 | 3 | 10.6 | 71 | 3 | 9.6 | 64 | 7 1/2 | 11 | 63.5 | 10 | 11 | 64.8 |
| MO132-16 | 2 | 16 | 84 | 3 | 11 | 73.6 | 3 | 10.6 | 71 | 5 | 15.2 | 92 | 10 | 14 | 81 | 10 | 11 | 64.8 |
| MO132-20 | 3 | 19.2 | 128 | 5 | 17.5 | 105.8 | 5 | 16.7 | 102 | 5 | 15.2 | 92 | 10 | 14 | 81 | 15 | 17 | 93 |
| MO132-25 | 3 | 19.2 | 128 | 5 | 17.5 | 105.8 | 7 1/2 | 24.2 | 140 | 7 1/2 | 22 | 127 | 15 | 21 | 116 | 20 | 22 | 116 |
| MO132-32 | 5 | 30.4 | 184 | 7 1/2 | 25.3 | 146 | 10 | 30.8 | 179 | 10 | 28 | 162 | 20 | 27 | 145 | 25 | 27 | 146 |

### UL/CSA Motor ratings, three phase – MO165

| Type | 110-120 V AC | | | 200 V AC | | | 208 V AC | | | 220 ... 240 V AC | | | 440 ... 480 V AC | | | 550 ... 600 V AC | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA |
| MO165-16 | 2 | 16 | 96 | 3 | 16 | 96 | 3 | 16 | 96 | 5 | 16 | 96 | 10 | 16 | 96 | 10 | 16 | 96 |
| MO165-20 | 3 | 20 | 120 | 5 | 20 | 120 | 5 | 20 | 120 | 5 | 20 | 120 | 10 | 20 | 120 | 15 | 20 | 120 |
| MO165-25 | 3 | 25 | 150 | 5 | 25 | 150 | 7 1/2 | 25 | 150 | 7 1/2 | 25 | 150 | 15 | 25 | 150 | 20 | 25 | 150 |
| MO165-32 | 5 | 32 | 192 | 7 1/2 | 32 | 192 | 10 | 32 | 192 | 10 | 32 | 192 | 20 | 32 | 192 | 30 | 32 | 192 |
| MO165-42 | 5 | 42 | 252 | 10 | 42 | 252 | 10 | 42 | 252 | 15 | 42 | 252 | 30 | 42 | 252 | 40 | 42 | 252 |
| MO165-54 | 7 1/2 | 54 | 324 | 15 | 54 | 324 | 15 | 54 | 324 | 20 | 54 | 324 | 40 | 54 | 324 | 50 | 54 | 324 |
| MO165-65 | 10 | 65 | 348 | 20 | 65 | 348 | 20 | 65 | 348 | 20 | 65 | 348 | 50 | 65 | 348 | 60 | 65 | 348 |
| MO165-73 | 10 | 73 | 435 | 20 | 73 | 435 | 20 | 73 | 435 | 25 | 73 | 435 | 50 | 73 | 435 | 60 | 73 | 435 |
| MO165-80 | 10 | 80 | 435 | 25 | 80 | 435 | 25 | 80 | 435 | 30 | 80 | 435 | 60 | 80 | 435 | 75 | 80 | 435 |

hp Horsepower
FLA Full Load Amps
LRA Locked Rotor Amps

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range; see ordering detail pages. Horsepower (hp) ratings are for reference only.

# MS116, MS132, MS165, MO132, MO165

## Technical data

### UL/CSA Motor ratings, single phase – MS116

| Type | 110-120 V AC | | | 200 V AC | | | 208 V AC | | | 220 ... 240 V AC | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA |
| MS116-0.16 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 |
| MS116-0.25 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 |
| MS116-0.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 |
| MS116-0.63 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 |
| MS116-1.0 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 | - | 1.0 | 6.0 |
| MS116-1.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | 1/10 | 1.6 | 9.6 |
| MS116-2.5 | - | 2.5 | 15 | 1/6 | 2.5 | 15 | 1/6 | 2.5 | 15 | 1/6 | 2.5 | 15 |
| MS116-4.0 | 1/8 | 4 | 24 | 1/4 | 4 | 24 | 1/3 | 4 | 24 | 1/3 | 4 | 24 |
| MS116-6.3 | 1/4 | 6.3 | 37.8 | 1/2 | 6.3 | 37.8 | 1/2 | 6.3 | 37.8 | 1/2 | 6.3 | 37.8 |
| MS116-10 | 1/2 | 9.8 | 58.8 | 1 | 10 | 60 | 1 | 10 | 60 | 1 1/2 | 10 | 60 |
| MS116-12 | 1/2 | 9.8 | 58.8 | 1 1/2 | 12 | 72 | 1 1/2 | 12 | 72 | 2 | 12 | 72 |
| MS116-16 | 1 | 16 | 96 | 2 | 12 | 72 | 2 | 12 | 72 | 2 | 12 | 72 |
| MS116-20 | 1 1/2 | 20 | 120 | 3 | 19.6 | 73.6 | 3 | 18.7 | 71 | 3 | 17 | 64 |
| MS116-25 | 2 | 24 | 144 | 3 | 19.6 | 73.6 | 3 | 18.7 | 71 | 3 | 17 | 64 |
| MS116-32 | 2 | 24 | 144 | 3 | 19.6 | 73.6 | 5 | 30.8 | 102 | 5 | 28 | 92 |

### UL/CSA Motor ratings, single phase – MS132

| Type | 110-120 V AC | | | 200 V AC | | | 208 V AC | | | 220 ... 240 V AC | | | 440 ... 480 V AC | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA |
| MS132-0.16 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 |
| MS132-0.25 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 |
| MS132-0.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 |
| MS132-0.63 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 |
| MS132-1.0 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 |
| MS132-1.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | 1/10 | 1.6 | 9.6 | - | 1.6 | 9.6 |
| MS132-2.5 | - | 2.5 | 15 | 1/6 | 2.5 | 15 | 1/6 | 2.5 | 15 | 1/6 | 2.5 | 15 | 1/2 | 2.5 | 15 |
| MS132-4.0 | 1/8 | 4 | 24 | 1/4 | 4.0 | 24 | 1/3 | 4 | 24 | 1/3 | 4 | 24 | 1 | 4 | 24 |
| MS132-6.3 | 1/4 | 6.3 | 37.8 | 1/2 | 6.3 | 37.8 | 1/2 | 6.3 | 37.8 | 1/2 | 6.3 | 37.8 | 2 | 6 | 36 |
| MS132-10 | 1/2 | 9.8 | 58.8 | 1 | 10 | 60 | 1 | 8.8 | 52.8 | 1 1/2 | 10 | 60 | 3 | 8.5 | 51 |
| MS132-12 | 1/2 | 9.8 | 58.8 | 1 1/2 | 12 | 72 | 1 1/2 | 12 | 72 | 2 | 12 | 72 | 3 | 8.5 | 51 |
| MS132-16 | 1 | 16 | 96 | 2 | 13.8 | 82.8 | 2 | 13.2 | 79,2 | 2 | 12 | 72 | 5 | 14 | 84 |
| MS132-20 | 1 1/2 | 20 | 120 | 3 | 19.6 | 118 | 3 | 18.7 | 112 | 3 | 17 | 102 | 5 | 14 | 84 |
| MS132-25 | 2 | 24 | 144 | 3 | 19.6 | 118 | 3 | 18.7 | 112 | 3 | 17 | 102 | 7 1/2 | 21 | 126 |
| MS132-32 | 2 | 24 | 144 | 3 | 19.6 | 118 | 5 | 30.8 | 185 | 5 | 28 | 168 | 10 | 26 | 156 |

### UL/CSA Motor ratings, single phase – MS165

| Type | 110-120 V AC | | | 200 V AC | | | 208 V AC | | | 220 ... 240 V AC | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA |
| MS165-16 | 1 | 16 | 96 | 2 | 16 | 96 | 2 | 16 | 96 | 2 | 16 | 96 |
| MS165-20 | 1 1/2 | 20 | 120 | 3 | 20 | 120 | 3 | 20 | 120 | 3 | 20 | 120 |
| MS165-25 | 2 | 25 | 150 | 3 | 25 | 150 | 3 | 25 | 150 | 3 | 25 | 150 |
| MS165-32 | 2 | 32 | 192 | 3 | 32 | 192 | 5 | 32 | 192 | 5 | 32 | 192 |
| MS165-42 | 3 | 42 | 252 | 5 | 42 | 252 | 5 | 42 | 252 | 7 1/2 | 42 | 252 |
| MS165-54 | 3 | 54 | 324 | 7 1/2 | 54 | 324 | 7 1/2 | 54 | 324 | 10 | 54 | 324 |
| MS165-65 | 5 | 65 | 348 | 10 | 65 | 348 | 10 | 65 | 348 | 10 | 65 | 348 |
| MS165-73 | 5 | 73 | 435 | 10 | 73 | 435 | 10 | 73 | 435 | 15 | 73 | 435 |
| MS165-80 | 5 | 80 | 435 | 10 | 80 | 435 | 10 | 80 | 435 | 15 | 80 | 435 |

hp Horsepower
FLA Full Load Amps
LRA Locked Rotor Amps

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range; see ordering detail pages. Horsepower (hp) ratings are for reference only.

# MS116, MS132, MS165, MO132, MO165

## Technical data

### UL/CSA Motor ratings, single phase – MO132

| Type | 110-120 V AC | | | 200 V AC | | | 208 V AC | | | 220 ... 240 V AC | | | 440 ... 480 V AC | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA |
| MO132-0.16 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 |
| MO132-0.25 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 |
| MO132-0.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 |
| MO132-0.63 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 |
| MO132-1.0 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 |
| MO132-1.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | 1/10 | 1.6 | 9.6 | - | 1.6 | 9.6 |
| MO132-2.5 | - | 2.5 | 15 | 1/6 | 2.5 | 15 | 1/6 | 2.5 | 15 | 1/6 | 2.5 | 15 | 1/2 | 2.5 | 15 |
| MO132-4.0 | 1/8 | 4 | 24 | 1/4 | 4.0 | 24 | 1/3 | 4 | 24 | 1/3 | 4 | 24 | 1 | 4 | 24 |
| MO132-6.3 | 1/4 | 6.3 | 37.8 | 1/2 | 6.3 | 37.8 | 1/2 | 6.3 | 37.8 | 1/2 | 6.3 | 37.8 | 2 | 6 | 36 |
| MO132-10 | 1/2 | 9.8 | 58.8 | 1 | 10 | 60 | 1 | 8.8 | 52.8 | 1 1/2 | 10 | 60 | 3 | 8.5 | 51 |
| MO132-12 | 1/2 | 9.8 | 58.8 | 1 1/2 | 12 | 72 | 1 1/2 | 12 | 72 | 2 | 12 | 72 | 3 | 8.5 | 51 |
| MO132-16 | 1 | 16 | 96 | 2 | 13.8 | 82.8 | 2 | 13.2 | 79.2 | 2 | 12 | 72 | 5 | 14 | 84 |
| MO132-20 | 1 1/2 | 20 | 120 | 3 | 19.6 | 118 | 3 | 18.7 | 112 | 3 | 17 | 102 | 5 | 14 | 84 |
| MO132-25 | 2 | 24 | 144 | 3 | 19.6 | 118 | 3 | 18.7 | 112 | 3 | 17 | 102 | 7 1/2 | 21 | 126 |
| MO132-32 | 2 | 24 | 144 | 3 | 19.6 | 118 | 5 | 30.8 | 185 | 5 | 28 | 168 | 10 | 26 | 156 |

### UL/CSA Motor ratings, single phase – MO165

| Type | 110-120 V AC | | | 200 V AC | | | 208 V AC | | | 220 ... 240 V AC | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA |
| MO165-16 | 1 | 16 | 96 | 2 | 16 | 96 | 2 | 16 | 96 | 2 | 16 | 96 |
| MO165-20 | 1 1/2 | 20 | 120 | 3 | 20 | 120 | 3 | 20 | 120 | 3 | 20 | 120 |
| MO165-25 | 2 | 25 | 150 | 3 | 25 | 150 | 3 | 25 | 150 | 3 | 25 | 150 |
| MO165-32 | 2 | 32 | 192 | 3 | 32 | 192 | 5 | 32 | 192 | 5 | 32 | 192 |
| MO165-42 | 3 | 42 | 252 | 5 | 42 | 252 | 5 | 42 | 252 | 7 1/2 | 42 | 252 |
| MO165-54 | 3 | 54 | 324 | 7 1/2 | 54 | 324 | 7 1/2 | 54 | 324 | 10 | 54 | 324 |
| MO165-65 | 5 | 65 | 348 | 10 | 65 | 348 | 10 | 65 | 348 | 10 | 65 | 348 |
| MO165-73 | 5 | 73 | 435 | 10 | 73 | 435 | 10 | 73 | 435 | 15 | 73 | 435 |
| MO165-80 | 5 | 80 | 435 | 10 | 80 | 435 | 10 | 80 | 435 | 15 | 80 | 435 |

hp Horsepower
FLA Full Load Amps
LRA Locked Rotor Amps

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range; see ordering detail pages. Horsepower (hp) ratings are for reference only.

# MS116, MS132, MS165, MO132, MO165

## Technical data

### UL/CSA Maximum short-circuit current ratings – MS116

| Type | Manual Motor Controllers Branch circuit protection, max. size per NEC/CEC (1) | | Maximum short-circuit current for motor disconnect (2) | | for group installations | |
|---|---|---|---|---|---|---|
| | Fuses | Circuit breaker | 480 V | 600 V | 480 V | 600 V |
| | A | A | kA | kA | kA | kA |
| MS116-0.16 | Any listed fuses. Size per NEC/CEC | Any listed UL489 / CSA C22.2 N° 5 circuit breaker. Size per NEC/CEC | 30 | 5 | 30 | 5 |
| MS116-0.25 | | | 30 | 5 | 30 | 5 |
| MS116-0.40 | | | 30 | 5 | 30 | 5 |
| MS116-0.63 | | | 30 | 5 | 30 | 5 |
| MS116-1.0 | | | 30 | 5 | 30 | 5 |
| MS116-1.6 | | | 30 | 5 | 30 | 5 |
| MS116-2.5 | | | 30 | 5 | 30 | 5 |
| MS116-4.0 | | | 18 | 5 | 18 | 5 |
| MS116-6.3 | | | 18 | 5 | 18 | 5 |
| MS116-10 | | | 18 | 5 | 18 | 5 |
| MS116-12 | | | 18 | 5 | 18 | 5 |
| MS116-16 | | | 18 | 5 | 18 | 5 |
| MS116-20 | | | 18 | 5 | 18 | 5 |
| MS116-25 | | | 18 | 5 | 18 | 5 |
| MS116-32 | | | 18 | 5 | 18 | 5 |

(1) NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.
(2) Suitable as motor disconnect with padlock adaptor SA1 or SA3.

### UL/CSA Maximum short-circuit current ratings – MS132

| Type | Manual Motor Controllers Branch circuit protection, max. size per NEC/CEC (1) | | for motor disconnect | | for group installations | | for tap conductor protection in group installations | | Manual self-protected Combination Motor Controllers (Type E) (2) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Fuses | Circuit breaker | 480 V | 600 V | 480 V | 600 V | 480Y / 277 V | 600Y / 347 V | 480Y / 277 V | 600Y / 347 V |
| | A | A | kA | kA | kA | kA | kA | kA | kA | kA |
| MS132-0.16 | Any Listed fuses. Size per NEC/CEC | Any Listed UL489 / CSA C22.2 No.5 circuit breaker. Size per NEC/CEC | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-0.25 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-0.40 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-0.63 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-1.0 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-1.6 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-2.5 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-4.0 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-6.3 | | | 65 | 18 | 65 | 18 | 65 | 18 | 65 | 18 |
| MS132-10 | | | 65 | 18 | 65 | 18 | 65 | 18 | 65 | 18 |
| MS132-12 | | | 30 | 18 | 30 | 18 | 30 | 18 | 30 | - |
| MS132-16 | | | 30 | 18 | 30 | 18 | 30 | 18 | 30 | - |
| MS132-20 | | | 30 | 18 | 30 | 18 | 30 | 18 | 30 | - |
| MS132-25 | | | 30 | 18 | 30 | 18 | 30 | 18 | 30 | - |
| MS132-32 | | | 30 | 18 | 30 | 18 | 30 | 18 | 30 | - |

(1) NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.
(2) In combination with feeder block S1-M3-xx or terminal spacer TS1-M3-S1 (for 0.16 ... 10 A) / TS1-M3-S2 (for 12 ... 32 A).

02

# MS116, MS132, MS165, MO132, MO165
## Technical data

### UL/CSA Maximum short-circuit current ratings – MS116 with AF contactors

| Type | Motor Disconnect, Group Installations, Coordination Type 2 | | | |
|---|---|---|---|---|
| | 480 V | | 600 V | |
| | Minimum contactor size | kA | Minimum contactor size | kA |
| MS116-0.16 | AF09-AF16 | 30 | AF09-AF16 | 5 |
| MS116-0.25 | AF09-AF16 | 30 | AF09-AF16 | 5 |
| MS116-0.4 | AF09-AF16 | 30 | AF09-AF16 | 5 |
| MS116-0.63 | AF09-AF16 | 30 | AF09-AF16 | 5 |
| MS116-1.0 | AF09-AF16 | 30 | AF09-AF16 | 5 |
| MS116-1.6 | AF09-AF16 | 30 | AF09-AF16 | 5 |
| MS116-2.5 | AF26-AF38 | 30 | AF16 | 5 |
| MS116-4.0 | AF26-AF38 | 18 | AF16 | 5 |
| MS116-6.3 | AF26-AF38 | 18 | AF26-AF38 | 5 |
| MS116-10 | AF26-AF38 | 18 | AF30-AF38 | 5 |
| MS116-12 | AF26-AF38 | 18 | AF30-AF38 | 5 |
| MS116-16 | AF26-AF38 | 18 | AF40 | 5 |
| MS116-20 | AF26-AF38 | 18 | AF40 | 5 |
| MS116-25 | AF30-AF38 | 18 | AF40 | 5 |
| MS116-32 | AF38 | 18 | AF40 | 5 |

### UL/CSA Maximum short-circuit current ratings – MS132 with AF contactors

| Type | Combination Motor Controllers (Type F) (1) | | | | | |
|---|---|---|---|---|---|---|
| | Coordination type 1 Minimum contactor size | 480Y / 277 V kA | 600Y / 347 V kA | Coordination type 2 Minimum contactor size | 480Y / 277 V kA | 600Y / 347 V kA |
| MS132-0.16 | AF09 ... AF38 | 100 | 50 | AF26 ... AF38 | 65 | 47 |
| MS132-0.25 | AF09 ... AF38 | 100 | 50 | AF26 ... AF38 | 65 | 47 |
| MS132-0.40 | AF09 ... AF38 | 100 | 50 | AF26 ... AF38 | 65 | 47 |
| MS132-0.63 | AF09 ... AF38 | 100 | 50 | AF26 ... AF38 | 65 | 47 |
| MS132-1.0 | AF09 ... AF38 | 100 | 50 | AF26 ... AF38 | 65 | 47 |
| MS132-1.6 | AF09 ... AF38 | 100 | 50 | AF26 ... AF38 | 65 | 47 |
| MS132-2.5 | AF09 ... AF38 | 100 | 50 | AF26 ... AF38 | 65 | 47 |
| MS132-4.0 | AF09 ... AF38 | 100 | 50 | AF26 ... AF38 | 65 | 47 |
| MS132-6.3 | AF09 ... AF38 | 100 | 47 | AF26 ... AF38 | 65 | 47 |
| MS132-10 | AF09 ... AF38 | 100 | 30 | AF26 ... AF38 | 65 | 47 |
| MS132-12 | AF09 ... AF38 | 65 | 30 | AF26 ... AF38 | 30 | - |
| MS132-16 | AF26 ... AF38 | 65 | 30 | AF26 ... AF38 | 30 | - |
| MS132-20 | AF26 ... AF38 | 65 | – | AF26 ... AF38 | 30 | - |
| MS132-25 | AF26 ... AF38 | 50 | – | AF26 ... AF38 | 30 | - |
| MS132-32 | AF38 | 50 | – | AF26 ... AF38 | 30 | - |

(1) In combination with feeder block S1-M3-xx or terminal spacer TS1-M3-S1 (for 0.16 ... 10 A) / TS1-M3-S2 (for 12 ... 32 A).

# MS116, MS132, MS165, MO132, MO165
Technical data

## UL/CSA Maximum short-circuit current ratings – MO132 with electronic overload relays and AF contactors

| Type | EOL | Combination Motor Controllers (Type F) (1) Coordination type 1 Minimum contactor size | 480Y / 277 V kA | 600Y / 347 V kA |
|---|---|---|---|---|
| MO132-0.16 | EF19 | AF09 ... AF38 | 100 | 50 |
| MO132-0.25 | EF19 | AF09 ... AF38 | 100 | 50 |
| MO132-0.40 | EF19 | AF09 ... AF38 | 100 | 50 |
| MO132-0.63 | EF19 | AF09 ... AF38 | 100 | 50 |
| MO132-1.0 | EF19 | AF09 ... AF38 | 100 | 50 |
| MO132-1.6 | EF19 | AF09 ... AF38 | 100 | 50 |
| MO132-2.5 | EF19 | AF09 ... AF38 | 100 | 50 |
| MO132-4.0 | EF19 | AF09 ... AF38 | 100 | 50 |
| MO132-6.3 | EF19 | AF09 ... AF38 | 100 | 50 |
| MO132-10 | EF19 | AF09 ... AF38 | 100 | 30 |
| MO132-12 | EF19 | AF09 ... AF38 | 65 | 30 |
| MO132-16 | EF19 | AF12 ... AF38 | 65 | 30 |
| MO132-20 | EF19 | AF16 ... AF38 | 65 | – |
| MO132-25 | EF45-30 | AF26 ... AF38 | 50 | – |
| MO132-32 | EF45-45 | AF38 | 50 | – |

NOTE : More coordination tables are available in our SOC (selected optimized coordination) tool: https://applications.it.abb.com/SOC/Motor.
(1) In combination with feeder block S1-M3-xx or terminal spacer TS1-M3-S1 (for 0.16 ... 10 A) / TS1-M3-S2 ( for 12 ... 32 A).

## UL/CSA Maximum short-circuit current ratings – MS165

| Type | Manual Motor Controllers Branch circuit protection, max. size per NEC/CEC (1) | | for motor disconnect | | for group installations | | for tap conductor protection in group installations | | Manual self-protected Combination Motor Controllers (Type E) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Fuses A | Circuit breaker A | 480 V kA | 600 V kA | 480 V kA | 600 V kA | 480Y / 277 V kA | 600Y / 347 V kA | 480Y / 277 V kA | 600Y / 347 V kA |
| MS165-16 | Any Listed fuses. Size per NEC/CEC | Any Listed UL489 / CSA C22.2 No.5 circuit breaker. Size per NEC/CEC | 65 | 30 | 65 | 30 | 65 | 30 | 65 | 30 |
| MS165-20 | | | 65 | 30 | 65 | 30 | 65 | 30 | 65 | 30 |
| MS165-25 | | | 65 | 30 | 65 | 30 | 65 | 30 | 65 | 30 |
| MS165-32 | | | 65 | 30 | 65 | 30 | 65 | 30 | 65 | 30 |
| MS165-42 | | | 65 | 30 | 65 | 30 | 65 | 30 | 65 | 30 |
| MS165-54 | | | 65 | 30 | 65 | 30 | 65 | 30 | 65 | 30 |
| MS165-65 | | | 65 | 30 | 65 | 30 | 65 | 30 | 65 | 30 |
| MS165-73 | | | 50 | 10 | 50 | 10 | 50 | 10 | 50 | – |
| MS165-80 | | | 50 | 10 | 50 | 10 | 50 | 10 | 50 | – |

(1) NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.

## UL/CSA Maximum short-circuit current ratings – MS165 with AF contactors

| Type | Manual self-protected Combination Motor Controllers (Type F) Coordination type 1 | | | | Manual self-protected Combination Motor Controllers (Type F) Coordination type 2 | | | |
|---|---|---|---|---|---|---|---|---|
| | Minimum contactor size | 480Y / 277 V kA | Minimum contactor size | 600Y / 347 V kA | Minimum contactor size | 480Y / 277 V kA | Minimum contactor size | 600Y / 347 V kA |
| MS165-16 | AF09...AF38 | 65 | AF09...AF38 | 50 | AF26...AF38 | 65 | AF09...AF38 | 30 |
| MS165-20 | AF26...AF38 | 65 | AF26...AF38 | 50 | AF26...AF38 | 65 | AF09...AF38 | 30 |
| MS165-25 | AF26...AF38 | 65 | AF26...AF38 | 50 | AF26...AF38 | 65 | AF40...AF65 | 30 |
| MS165-32 | AF26...AF38 | 65 | AF26...AF38 | 50 | AF26...AF38 | 65 | AF40...AF65 | 30 |
| MS165-42 | AF40...AF65 | 65 | AF40...AF65 | 30 | AF40...AF65 | 65 | AF40...AF65 | 30 |
| MS165-54 | AF40...AF65 | 65 | AF40...AF65 | 30 | AF40...AF65 | 65 | AF40...AF65 | 30 |
| MS165-65 | AF40...AF65 | 65 | AF40...AF65 | 30 | AF40...AF65 | 65 | AF40...AF65 | 30 |
| MS165-73 | AF80...AF96 | 50 | – | – | AF80...AF96 | 50 | – | – |
| MS165-80 | AF80...AF96 | 50 | – | – | AF80...AF96 | 50 | – | – |

# MS116, MS132, MS165, MO132, MO165
## Technical data

More coordination tables are available in our SOC (selected optimized coordination) tool:
https://applications.it.abb.com/SOC/Motor

### UL/CSA Maximum short-circuit current ratings – MO132

| Type | Manual Motor Controllers | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Branch circuit protection, max. size per NEC/CEC (1) | | for motor disconnect | | for group installations | | for tap conductor protection in group installations | |
| | Fuses | Circuit breaker | 480 V | 600 V | 480 V | 600 V | 480 Y / 277 V | 600 Y / 347 V |
| | A | A | kA | kA | kA | kA | kA | kA |
| MO132-0.16 | Any Listed fuses. Size per NEC/CEC | Any Listed UL489 / CSA C22.2 No.5 circuit breaker. Size per NEC/CEC | 65 | 47 | 65 | 47 | 65 | 47 |
| MO132-0.25 | | | 65 | 47 | 65 | 47 | 65 | 47 |
| MO132-0.40 | | | 65 | 47 | 65 | 47 | 65 | 47 |
| MO132-0.63 | | | 65 | 47 | 65 | 47 | 65 | 47 |
| MO132-1.0 | | | 65 | 47 | 65 | 47 | 65 | 47 |
| MO132-1.6 | | | 65 | 47 | 65 | 47 | 65 | 47 |
| MO132-2.5 | | | 65 | 47 | 65 | 47 | 65 | 47 |
| MO132-4.0 | | | 65 | 47 | 65 | 47 | 65 | 47 |
| MO132-6.3 | | | 65 | 18 | 65 | 18 | 65 | 18 |
| MO132-10 | | | 65 | 18 | 65 | 18 | 65 | 18 |
| MO132-12 | | | 30 | 18 | 30 | 18 | 30 | 18 |
| MO132-16 | | | 30 | 18 | 30 | 18 | 30 | 18 |
| MO132-20 | | | 30 | 18 | 30 | 18 | 30 | 18 |
| MO132-25 | | | 30 | 18 | 30 | 18 | 30 | 18 |
| MO132-32 | | | 30 | 18 | 30 | 18 | 30 | 18 |

(1) NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.

### UL/CSA Maximum short-circuit current ratings – MO165

| Type | Manual Motor Controllers | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Branch circuit protection, max. size per NEC/CEC (1) | | for motor disconnect | | for group installations | | for tap conductor protection in group installations | |
| | Fuses | Circuit breaker | 480 V | 600 V | 480 V | 600 V | 480Y / 277 V | 600Y / 347 V |
| | A | A | kA | kA | kA | kA | kA | kA |
| MO165-16 | Any Listed fuses. Size per NEC/CEC | Any Listed UL489 / CSA C22.2 No.5 circuit breaker. Size per NEC/CEC | 65 | 30 | 65 | 30 | 65 | 30 |
| MO165-20 | | | 65 | 30 | 65 | 30 | 65 | 30 |
| MO165-25 | | | 65 | 30 | 65 | 30 | 65 | 30 |
| MO165-32 | | | 65 | 30 | 65 | 30 | 65 | 30 |
| MO165-42 | | | 65 | 30 | 65 | 30 | 65 | 30 |
| MO165-54 | | | 65 | 30 | 65 | 30 | 65 | 30 |
| MO165-65 | | | 65 | 30 | 65 | 30 | 65 | 30 |
| MO165-73 | | | 50 | 10 | 50 | 10 | 50 | 10 |
| MO165-80 | | | 50 | 10 | 50 | 10 | 50 | 10 |

(1) NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.

# MS116, MS132, MS165, MO132, MO165

## Technical data

### UL/CSA Maximum short-circuit current ratings – MO165 with AF contactors and electronic overload relays

| Type | Combination Motor Controllers (Type F) Coordination type 1 | | | | | |
|---|---|---|---|---|---|---|
| | 480Y / 277 V kA | OL Relay | Contactor | 600Y / 347 V kA | OL Relay | Contactor |
| MO165-16 | 65 | EF19-18.9 | AF09...AF38 | 50 | EF19-18.9 | AF09...AF38 |
| MO165-20 | 65 | EF45-30 | AF26...AF38 | 50 | EF45-30 | AF26...AF38 |
| MO165-25 | 65 | EF45-30 | AF26...AF38 | 50 | EF45-30 | AF26...AF38 |
| MO165-32 | 65 | EF45-45 | AF26...AF38 | 50 | EF45-45 | AF26...AF38 |
| MO165-42 | 65 | EF65 | AF40...AF65 | 30 | EF65 | AF40...AF65 |
| MO165-54 | 65 | EF65 | AF40...AF65 | 30 | EF65 | AF40...AF65 |
| MO165-65 | 65 | EF65 | AF40...AF65 | 30 | EF65 | AF40...AF65 |
| MO165-73 | 50 | EF96 | AF80 ... AF96 | – | – | – |
| MO165-80 | 50 | EF96 | AF80 ... AF96 | – | – | – |

### UL/CSA Maximum short-circuit current ratings – MO165 with AF contactors and thermal overload relays

| Type | Combination Motor Controllers (Type F) Coordination type 1 | | | | | |
|---|---|---|---|---|---|---|
| | 480Y / 277 V kA | OL Relay | Contactor | 600Y / 347 V kA | OL Relay | Contactor |
| MO165-16 | 65 | TF42 | AF09...AF38 | 30 | TF42 | AF09...AF38 |
| MO165-20 | 65 | TF42 | AF26...AF38 | 30 | TF42 | AF09...AF38 |
| MO165-25 | 65 | TF42 | AF26...AF38 | 50 | TF42 | AF26...AF38 |
| MO165-32 | 65 | TF42 | AF26...AF38 | 50 | TF42 | AF26...AF38 |
| MO165-42 | 65 | TF65 | AF40...AF65 | 30 | TF65 | AF40...AF65 |
| MO165-54 | 65 | TF65 | AF40...AF65 | 30 | TF65 | AF40...AF65 |
| MO165-65 | 65 | TF65 | AF40...AF65 | 30 | TF65 | AF40...AF65 |
| MO165-73 | 50 | TF96 | AF80 ... AF96 | – | – | – |
| MO165-80 | 50 | TF96 | AF80 ... AF96 | – | – | – |

# MS116, MS132, MS165, MO132, MO165
## Technical data

### General technical data

| Type | | | MS116 | MS132 | MS165 | MO132 | MO165 |
|---|---|---|---|---|---|---|---|
| Pollution degree | | | 3 | 3 | 3 | 3 | 3 |
| Phase loss sensitivity | | | Yes | Yes | Yes | No | No |
| Disconnect function acc. to IEC/EN 60947-2 | | | Yes | Yes | Yes | Yes | Yes |
| Ambient air temperature | | | | | | | |
| | Operation | Open - compensated | -25 ... +55 °C | -25 ... +60 °C | -25 ... +60 °C | - | - |
| | | Open | -25 ... +70 °C | -25 ... +70 °C | -25 ... +60 °C | -25 ... +60 °C | -25 ... +60 °C |
| | | Enclosed (IB132) | 0 ... +40 °C | 0 ... +40 °C | - | - | - |
| | Storage | | -50 ... +80 °C | -50 ... +80 °C | -50 ... +80 °C | -50 ... +80 °C | -50 ... +80 °C |
| Ambient air temperature compensation | | | Acc. to IEC/EN60947-4-1 | Acc. to IEC/EN60947-4-1 | Acc. to IEC/EN60947-4-1 | - | - |
| Maximum operating altitude permissible | | | 2000 m | 2000 m | 2000 m | 2000 m | 2000 m |
| Resistance to shock acc. to IEC 60068-2-27 | | | 25g / 11 ms | 25g / 11 ms | 25g / 11 ms | 25g / 11 ms | 25g / 11 ms |
| Resistance to vibrations acc. to IEC 60068-2-6 | | mounted on DIN-rail | 5g / 3 ... 150 Hz | 5g / 3 ... 150 Hz | 4g / 3 ... 150 Hz | 5g / 3 ... 150 Hz | 4g / 3 ... 150 Hz |
| | | mounted on mounting plate | 5g / 3 ... 150 Hz | 5g / 3 ... 150 Hz | 5g / 3...150Hz | 5g / 3 ... 150 Hz | 5g / 3 ... 150 Hz |
| Mounting position | | | Position 1-6 (optional for single mounting) | Position 1-6 (optional for single mounting) | Position 1-6 (optional for single mounting) | Position 1-6 (optional for single mounting) | Position 1-6 (optional for single mounting) |
| Mounting | | | DIN-rail (EN 60715) | DIN-rail (EN 60715) | DIN-rail (EN 60715) | DIN-rail (EN 60715) | DIN-rail (EN 60715) |
| Group mounting | | | On request (2) | On request (2) | On request (2) | On request (2) | On request (2) |
| Recommended screw for mounting plate | | | - | - | M4 | - | M4 |
| Screw torque for mounting plate | | | - | - | 2 Nm | - | 2 Nm |
| Minimum distance to other units same type | | Horizontal | 0 mm | 0 mm | 0 mm | 0 mm | 0 mm |
| | | Vertical | 150 mm | 150 mm | 150 mm | 150 mm | 150 mm |
| Minimum distance to electrical conductive board | | Horizontal, up to 400 V | 0 mm | 0 mm | 0 mm | 0 mm | 0 mm |
| | | Horizontal, up to 690 V | > 1.5 mm | > 1.5 mm | > 1.5 mm | > 1.5 mm | > 1.5 mm |
| | | Vertical | 75 mm | 75 mm | 75 mm | 75 mm | 75 mm |
| Degree of protection | | Housing | IP20 | IP20 | IP20 | IP20 | IP20 |
| | | Main circuit terminals | IP10 | IP10 (1) | IP10 | IP10 | IP10 |

(1) Push-in Spring terminals : IP20
(2) Please refer to application note: **2CDC131183M0201**

### Connecting characteristics - Main circuit

| Type | | | MS116 ≤ 16 A | MS116 ≥ 20 A |
|---|---|---|---|---|
| Connecting capacity | | | | |
| | Rigid | 1 or 2 x | 1 ... 4 mm² | 2.5 ... 6 mm² |
| | Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm² | 1 ... 6 mm² |
| | Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 2.5 mm² | 1 ... 6 mm² |
| | Flexible | 1 or 2 x | 0.75 ... 2.5 mm² | 1 ... 6 mm² |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 16 ... 12 | AWG 16 ... 8 |
| Stripping length | | | 9 mm | 10 mm |
| Tightening torque | | | 0.8 ... 1.2 Nm / 10 ... 12 lb.in | 2.0 Nm / 18 lb.in |
| Recommended screwdriver | | | Pozidriv 2 | Pozidriv 2 |

| Type | | | MS132 ≤ 10 A | MS132 ≥ 12 A |
|---|---|---|---|---|
| Connecting capacity | | | | |
| | Rigid | 1 or 2 x | 1 ... 4 mm² | 1 ... 2.5 mm²<br>2.5 ... 6 mm² |
| | Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm² | 0.75 ... 6 mm² |
| | Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 2.5 mm² | 0.75 ... 6 mm² |
| | Flexible | 1 or 2 x | 0.75 ... 2.5 mm² | 1 ... 2.5 mm²<br>2.5 ... 6 mm² |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 16 ... 12 | AWG 16 ... 8 |
| Stripping length | | | 9 mm | 10 mm |
| Tightening torque | | | 0.8 ... 1.2 Nm / 10 ... 12 lb.in | 2.0 Nm / 18 lb.in |
| Recommended screwdriver | | | Pozidriv 2 | Pozidriv 2 |

| Type | | | MS132-K with Push-in Spring terminals |
|---|---|---|---|
| Connecting capacity | | | |
| | Rigid solid | 1 or 2 x | 1 ... 2.5 mm² |
| | Rigid stranded | 1 or 2 x | 1 ... 6 mm² |
| | Flexible with ferrule | 1 or 2 x | 1 (push-in) / 0.5 (spring) ... 4 mm² |
| | Flexible with insulated ferrule | 1 x | 1 (push-in) / 0.5 (spring) ... 4 mm² |
| | | 1/2 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm² |
| | Flexible | 1 or 2 x | 0.5 (spring) ... 4 mm² |
| | Stranded acc. to UL/CSA | 1/2 x | AWG 18 ... 10 (push-in) / AWG 18 ... 8 (spring) |
| | | 1 x | AWG 8 |
| Wire stripping length | | | 12 mm |
| Screwdriver | | | Flat Ø 3 mm x 0.5 mm |

## Connecting characteristics - Main circuit

| Type | | | **MS165** |
|---|---|---|---|
| Connecting capacity | | | |
| | Rigid stranded | 1 or 2 x | 1 ... 50 mm² |
| | Flexible with ferrule | 1 or 2 x | 1 ... 35 mm² |
| | Flexible with insulated ferrule | 1 or 2 x | 1 ... 35 mm² |
| | Flexible | 1 or 2 x | 1 ... 35 mm² |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 16 ... 0 |
| Stripping length | | | 16 mm |
| Tightening torque | | | 4.0 Nm / 35 lb.in |
| Recommended screw driver | | | Pozidriv 2 |

| Type | | | **MO132 ≤ 10 A** | **MO132 ≥ 12 A** |
|---|---|---|---|---|
| Connecting capacity | | | | |
| | Rigid | 1 or 2 x | 1 ... 4 mm² | 1 ... 2.5 mm²<br>2.5 ... 6 mm² |
| | Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm² | 0.75 ... 6 mm² |
| | Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 2.5 mm² | 0.75 ... 6 mm² |
| | Flexible | 1 or 2 x | 0.75 ... 2.5 mm² | 1 ... 2.5 mm²<br>2.5 ... 6 mm² |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 16 ... 12 | AWG 16 ... 8 |
| Stripping length | | | 9 mm | 10 mm |
| Tightening torque | | | 0.8 ... 1.2 Nm / 10 ... 12 lb.in | 2.0 Nm / 18 lb.in |
| Recommended screw driver | | | Pozidriv 2 | Pozidriv 2 |

| Type | | | **MO165** |
|---|---|---|---|
| Connecting capacity | | | |
| | Rigid stranded | 1 or 2 x | 1 ... 50 mm² |
| | Flexible with ferrule | 1 or 2 x | 1 ... 35 mm² |
| | Flexible with insulated ferrule | 1 or 2 x | 1 ... 35 mm² |
| | Flexible | 1 or 2 x | 1 ... 35 mm² |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 16 ... 0 |
| Stripping length | | | 16 mm |
| Tightening torque | | | 4.0 Nm / 35 lb.in |
| Recommended screw driver | | | Pozidriv 2 |

# MS132-T circuit breakers for transformer protection

Low voltage transformers are used to supply power to control and auxiliary circuits in distribution and automation boards and to provide galvanic isolation. These transformers may be damaged by an electrical failure (short-circuit or overload on the primary side), therefore a proper protection should be provided.

## Complete portfolio

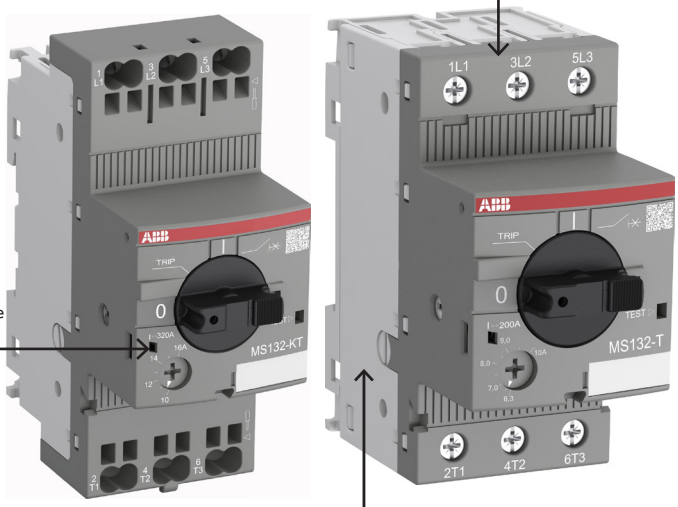
Manual motor starter accessories are suitable throughout the complete range. Moreover ABB offers special accessories for fast single-phase setup.

S1-PB1-25 PB1-1-32



## Troubleshooting made easy

MS132-T feature a magnetic trip indicator. This way, every tripping event will be distinguished, making troubleshooting a lot easier and faste




## Transformer protection

MS132-T is an inrush compensated circuit breaker for control transformer protec-tion. With the right selection, it provides overcurrent protection on the primary side of the transformer. This avoids expensive protection on the secondary side.



Circuit breakers for transformers protection are specially designed for fuseless protection of control transformers on the primary side against overloads and short-circuits.

**Selection table MS132-T with ABB control transformers:**
**Please refer to document no. 2CDC131111D0201**

**Application example**
Protection of transformers for power supply of control and auxiliary circuits, both in distribution and automation boards (checking, signaling, interlock, etc).

# MS132-T circuit breakers for transformer protection

## 0.10 to 25 A – with thermal and electromagnetic protection



2CDC241009V0017

MS132-10T



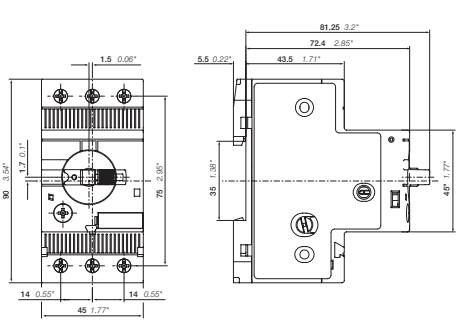
2CDC241002F0014

MS132-25T

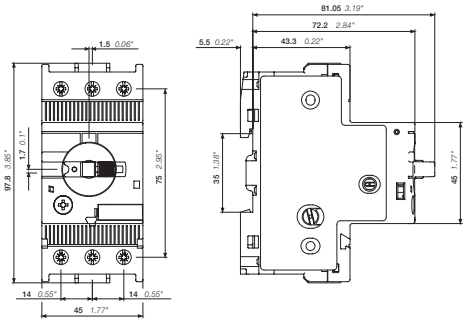
Circuit breakers for transformer protection are electro-mechanical protection devices specially designed to protect control transformers on the primary side. They allow fuseless protection against overload and short-circuit, saving space and cost and ensuring a quick reaction under short-circuit condition by switching off the transformer within milliseconds. The short-circuit current setting is fixed to 20 times the operating current to handle the high inrush current generated by transformers. The device allows manual connection and disconnection of the transformer from the mains.

MS132-T is a 45 mm (width) compact and powerful range for transformer protection up to 12.5 kW (400 V) / 25 A. This type has also a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the built-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks are available as accessory. These are suitable throughout the MS116/MS132/MS165-range.
Moreover ABB offers special accessories for fast single phase setup.

| Setting range<br>A | Short-circuit breaking capacity Ics at 400 V AC<br>kA | Rated instantaneous short-circuit current setting Ii<br>A | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|
| 0.10 ... 0.16 | 100 | 3.2 | MS132-0.16T | 1SAM340000R1001 | 0.215 |
| 0.16 ... 0.25 | 100 | 5 | MS132-0.25T | 1SAM340000R1002 | 0.215 |
| 0.25 ... 0.40 | 100 | 8 | MS132-0.4T | 1SAM340000R1003 | 0.215 |
| 0.40 ... 0.63 | 100 | 12.6 | MS132-0.63T | 1SAM340000R1004 | 0.215 |
| 0.63 ... 1.00 | 100 | 20 | MS132-1.0T | 1SAM340000R1005 | 0.215 |
| 1.00 ... 1.60 | 100 | 32 | MS132-1.6T | 1SAM340000R1006 | 0.265 |
| 1.60 ... 2.50 | 100 | 50 | MS132-2.5T | 1SAM340000R1007 | 0.265 |
| 2.50 ... 4.00 | 100 | 80 | MS132-4.0T | 1SAM340000R1008 | 0.265 |
| 4.00 ... 6.30 | 100 | 126 | MS132-6.3T | 1SAM340000R1009 | 0.265 |
| 6.30 ... 10.0 | 100 | 200 | MS132-10T | 1SAM340000R1010 | 0.265 |
| 8.00 ... 12.0 | 100 | 240 | MS132-12T | 1SAM340000R1012 | 0.310 |
| 10.0 ... 16.0 | 100 | 320 | MS132-16T | 1SAM340000R1011 | 0.310 |
| 16.0 ... 20.0 | 100 | 400 | MS132-20T | 1SAM340000R1013 | 0.310 |
| 20.0 ... 25.0 | 50 | 500 | MS132-25T | 1SAM340000R1014 | 0.310 |




MS132T ≤ 10 A




MS132T ≥ 12 A

Main dimensions mm, inches

# MS132-KT circuit breakers for transformer protection with Push-in Spring terminals

0.10 to 25 A – with thermal and electromagnetic protection

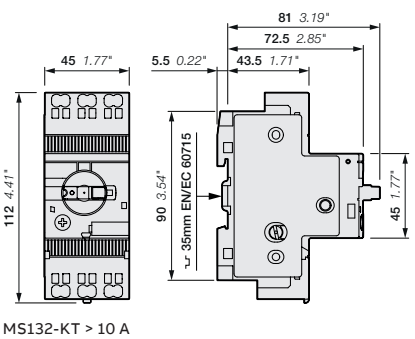


MS132-KT

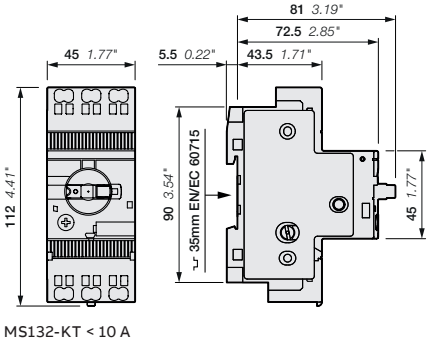
Circuit breakers for transformer protection with Push-in Spring terminals are electro-mechanical protection devices specially designed to protect control transformers on the primary side. They allow fuseless protection against overload and short-circuit, saving space and cost and ensuring a quick reaction under short-circuit condition by switching off the transformer within milliseconds. The short-circuit current setting is fixed to 20 times the operating current to handle the high inrush current generated by transformers. The device allows manual connection and disconnection of the transformer from the mains.

MS132-KT is a 45 mm (width) compact and powerful range for transformer protection up to 12.5 kW (400 V) / 25 A. This type has also a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the built-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases and shunt trips are available as accessory. These are suitable throughout the MS116/MS132/MS165-range.

| Setting range<br>A | Short-circuit breaking capacity Ics at 400 V AC<br>kA | Rated instantaneous short-circuit current setting Ii<br>A | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|
| 0.10 ... 0.16 | 100 | 3.2 | MS132-0.16KT | 1SAM340010R1001 | 0.256 |
| 0.16 ... 0.25 | 100 | 5 | MS132-0.25KT | 1SAM340010R1002 | 0.256 |
| 0.25 ... 0.40 | 100 | 8 | MS132-0.4KT | 1SAM340010R1003 | 0.256 |
| 0.40 ... 0.63 | 100 | 12.6 | MS132-0.63KT | 1SAM340010R1004 | 0.256 |
| 0.63 ... 1.00 | 100 | 20 | MS132-1.0KT | 1SAM340010R1005 | 0.256 |
| 1.00 ... 1.60 | 100 | 32 | MS132-1.6KT | 1SAM340010R1006 | 0.298 |
| 1.60 ... 2.50 | 100 | 50 | MS132-2.5KT | 1SAM340010R1007 | 0.280 |
| 2.50 ... 4.00 | 100 | 80 | MS132-4.0KT | 1SAM340010R1008 | 0.286 |
| 4.00 ... 6.30 | 100 | 126 | MS132-6.3KT | 1SAM340010R1009 | 0.289 |
| 6.30 ... 10.0 | 100 | 200 | MS132-10KT | 1SAM340010R1010 | 0.296 |
| 10.0 ... 16.0 | 100 | 320 | MS132-16KT | 1SAM340010R1011 | 0.316 |
| 16.0 ... 20.0 | 100 | 400 | MS132-20KT | 1SAM340010R1013 | 0.317 |
| 20.0 ... 25.0 | 50 | 500 | MS132-25KT | 1SAM340010R1014 | 0.316 |




MS132-KT > 10 A




MS132-KT < 10 A

Main dimensions mm, inches

# MS132-T, MS132-KT
Technical data

## Main circuit – Utilization characteristics according to IEC/EN

| Type | MS132-T / -KT |
|---|---|
| Standards | IEC/EN 60947–2, IEC/EN 60947-4-1, IEC/EN 60947-1 |
| Rated operational voltage Ue | 690 V AC |
| Rated frequency | 50/60 Hz |
| Operational frequency | 0 ... 400 Hz |
| Trip class | 10 |
| Number of poles | 3 |
| Duty time | 100% |
| Mechanical durability | 100000 cycles |
| Electrical durability | 50000 cycles |
| Rated impulse withstand voltage Uimp | 6 kV |
| Rated insulation voltage Ui | 690 V |
| Rated operational current Ie | See ordering details |
| Rated instantaneous short-circuit current setting Ii | See ordering details |
| Rated service short-circuit breaking capacity Ics | See table "Short-circuit breaking capacity and back-up fuses" |
| Rated ultimate short-circuit breaking capacity Icu | See table "Short-circuit breaking capacity and back-up fuses" |
| Suitable for use in IT networks | Yes |

## Short-circuit breaking capacity and back-up fuses

Ics Rated service short-circuit breaking capacity
Icu Rated ultimate short-circuit breaking capacity
Iq (Icc) Rated conditional short-circuit current
- No back-up fuse required, because short-circuit proof up to Icu (for Icu see table below)

| Type | 230 V AC | | | 400 V AC | | | 440 V AC | | | 500 V AC | | | 690 V AC | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A |
| MS132-0.16(K)T | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MS132-0.25(K)T | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MS132-0.4(K)T | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MS132-0.63(K)T | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MS132-1.0(K)T | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MS132-1.6(K)T | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MS132-2.5(K)T | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MS132-4.0(K)T | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 35 (1) | 20 | 20 | 35 (1) | 3 | 3 | 35 (1) |
| MS132-6.3(K)T | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 63 (1) | 20 | 20 | 63 (1) | 3 | 3 | 50 (1) |
| MS132-10(K)T | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 100 (1) | 20 | 20 | 100 (1) | 3 | 3 | 50 (1) |
| MS132-12T | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 100 (1) | 20 | 20 | 100 (1) | 3 | 3 | 63 (1) |
| MS132-16(K)T | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 125 (1) | 20 | 20 | 125 (1) | 3 | 3 | 63 (1) |
| MS132-20(K)T | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 125 (1) | 20 | 20 | 125 (1) | 3 | 3 | 80 (1) |
| MS132-25(K)T | 50 | 50 | 125 (1) | 50 | 50 | 125 (1) | 30 | 30 | 125 (1) | 10 | 10 | 125 (1) | 3 | 3 | 100 (1) |

(1) Maximum rated current of the back-up fuse for short circuit up to 100kA if Icc > Ics

# MS132-T, MS132-KT
Technical data

### Main circuit – Utilization characteristics according to UL

| Type | **MS132-T / -KT** |
|---|---|
| Standards | UL 60947-1, UL 60947-4-1 |
| Rated operational voltage Ue acc. to UL/CSA | 600 V AC |
| Trip class | 10 |
| Motor ratings (1) Full Load Amps (FLA) | see table UL current ratings |

(1) See product data sheets for UL/CSA single phase motor and general use (AC-1) ratings.

### UL/CSA ratings overview

| Type | **MS132-T / -KT** |
|---|---|
| Manual Controller for Control Transformer Protection | x |
| Manual Motor Controller | not applicable |
| Manual Motor Controller, Suitable as Motor Disconnect | not applicable |
| Manual Motor Controller, Suitable for use in Group Installations | not applicable |
| Manual Motor Controller, Suitable for Tap Conductor Protection in Group Installations | x |
| Manual self-protected Combination Motor Controller (Type E) | not applicable |
| Combination Motor Controller (Type F) | not applicable |

### UL current ratings, single-phase – MS132-T / -KT

| **Type** | **110 ... 120 V AC**<br>FLA | **220 ... 240 V AC**<br>FLA |
|---|---|---|
| MS132-0.16(K)T | 0.16 | 0.16 |
| MS132-0.25(K)T | 0.25 | 0.25 |
| MS132-0.4(K)T | 0.4 | 0.4 |
| MS132-0.63(K)T | 0.63 | 0.63 |
| MS132-1.0(K)T | 1 | 1 |
| MS132-1.6(K)T | 1.6 | 1.6 |
| MS132-2.5(K)T | 2.5 | 2.5 |
| MS132-4.0(K)T | 4 | 4 |
| MS132-6.3(K)T | 6.3 | 6.3 |
| MS132-10(K)T | 9.8 | 10 |
| MS132-12T | 9.8 | 12 |
| MS132-16(K)T | 16 | 12 |
| MS132-20(K)T | 20 | 17 |
| MS132-25(K)T | 24 | 17 |

### Manual controller for tap conductor protection and for control transformers – MS132-T / -KT

| **Type** | **Max. short-circuit current rating when used with upstream protection device** | |
|---|---|---|
| | 480Y / 277 V<br>kA | 600Y / 347 V<br>kA |
| MS132-0.16(K)T | 65 | 47 |
| MS132-0.25(K)T | 65 | 47 |
| MS132-0.4(K)T | 65 | 47 |
| MS132-0.63(K)T | 65 | 47 |
| MS132-1.0(K)T | 65 | 47 |
| MS132-1.6(K)T | 65 | 47 |
| MS132-2.5(K)T | 65 | 47 |
| MS132-4.0(K)T | 65 | 47 |
| MS132-6.3(K)T | 65 | 18 |
| MS132-10(K)T | 65 | 18 |
| MS132-12T | 30 | 18 |
| MS132-16(K)T | 30 | 18 |
| MS132-20(K)T | 30 | 18 |
| MS132-25(K)T | 30 | 18 |

# MS132-T, MS132-KT
Technical data

## General technical data

| Type | | | MS132-T / - KT |
|---|---|---|---|
| Pollution degree | | | 3 |
| Phase loss sensitivity | | | Yes |
| Disconnect function acc. to IEC/EN 60947-2 | | | Yes |
| Ambient air temperature | | | |
| | Operation | Open - compensated | -25 ... +60 °C |
| | | Open | -25 ... +70 °C |
| | | Enclosed (IB132) | 0 ... +40 °C |
| | Storage | | -50 ... +80 °C |
| Ambient air temperature compensation | | | Acc. to IEC/EN60947-4-1 |
| Maximum operating altitude permissible | | | 2000 m |
| Resistance to shock acc. to IEC 60068-2-27 | | | 25g / 11 ms |
| Resistance to vibrations acc. to IEC 60068-2-6 | | | 5g / 3 ... 150 Hz |
| Mounting position | | | Position 1-6 (optional for single mounting) |
| Mounting | | | DIN-rail (EN 60715) |
| Group mounting | | | - |
| Recommended screw for mounting plate | | | - |
| Screw torque for mounting plate | | | - |
| Minimum distance to other units same type | | Horizontal | 0 mm |
| | | Vertical | 150 mm |
| Minimum distance to electrical conductive board | | Horizontal, up to 400 V | 0 mm |
| | | Horizontal, up to 690 V | > 1.5 mm |
| | | Vertical | 75 mm |
| Degree of protection | | Housing | IP20 |
| | | Main circuit terminals | IP10 (Push-in Spring terminals: IP20) |

## Connecting characteristics - main circuit

| Type | | | MS132-T ≤ 10 A | MS132-T ≥ 12 A |
|---|---|---|---|---|
| Connecting capacity | | | | |
|  | Rigid | 1 or 2 x | 1 ... 4 mm² | 1 ... 2.5 mm²<br>2.5 ... 6 mm² |
|  | Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm² | 0.75 ... 6 mm² |
|  | Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 2.5 mm² | 0.75 ... 6 mm² |
|  | Flexible | 1 or 2 x | 0.75 ... 2.5 mm² | 1 ... 2.5 mm²<br>2.5 ... 6 mm² |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 16 ... 12 | AWG 16 ... 8 |
| Stripping length | | | 9 mm | 10 mm |
| Tightening torque | | | 0.8 ... 1.2 Nm / 10 ... 12 lb.in | 2.0 Nm / 18 lb.in |
| Recommended screwdriver | | | Pozidriv 2 | Pozidriv 2 |

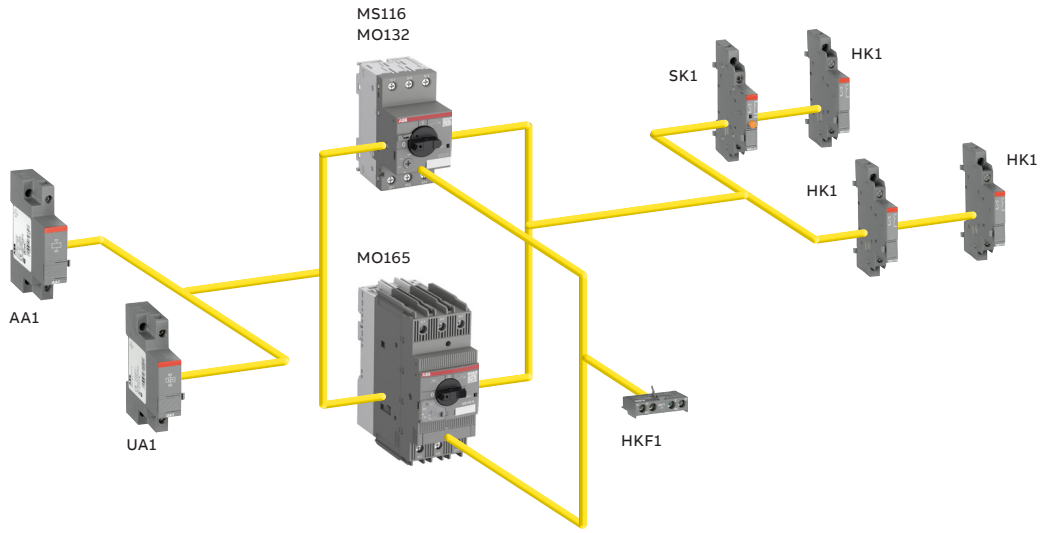
## Connecting characteristics - main circuit

| Type | | | MS132-KT with Push-in Spring terminals |
|---|---|---|---|
| Connecting capacity | | | |
|  | Rigid solid | 1 or 2 x | 1 ... 2.5 mm² |
|  | Rigid stranded | 1 or 2 x | 1 ... 6 mm² |
|  | Flexible with ferrule | 1 or 2 x | 1 (push-in) / 0.5 (spring) ... 4 mm² |
|  | Flexible with insulated ferrule | 1 x | 1 (push-in) / 0.5 (spring) ... 4 mm² |
| | | 1/2 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm² |
|  | Flexible | 1 or 2 x | 0.5 (spring) ... 4 mm² |
| | Stranded acc. to UL/CSA | 1/2 x | AWG 18 ... 10 (push-in) / AWG 18 ... 8 (spring) |
| | | 1 x | AWG 8 |
| Wire stripping length | | | 12 mm |
| Screwdriver | | | Flat Ø 3 mm x 0.5 mm |

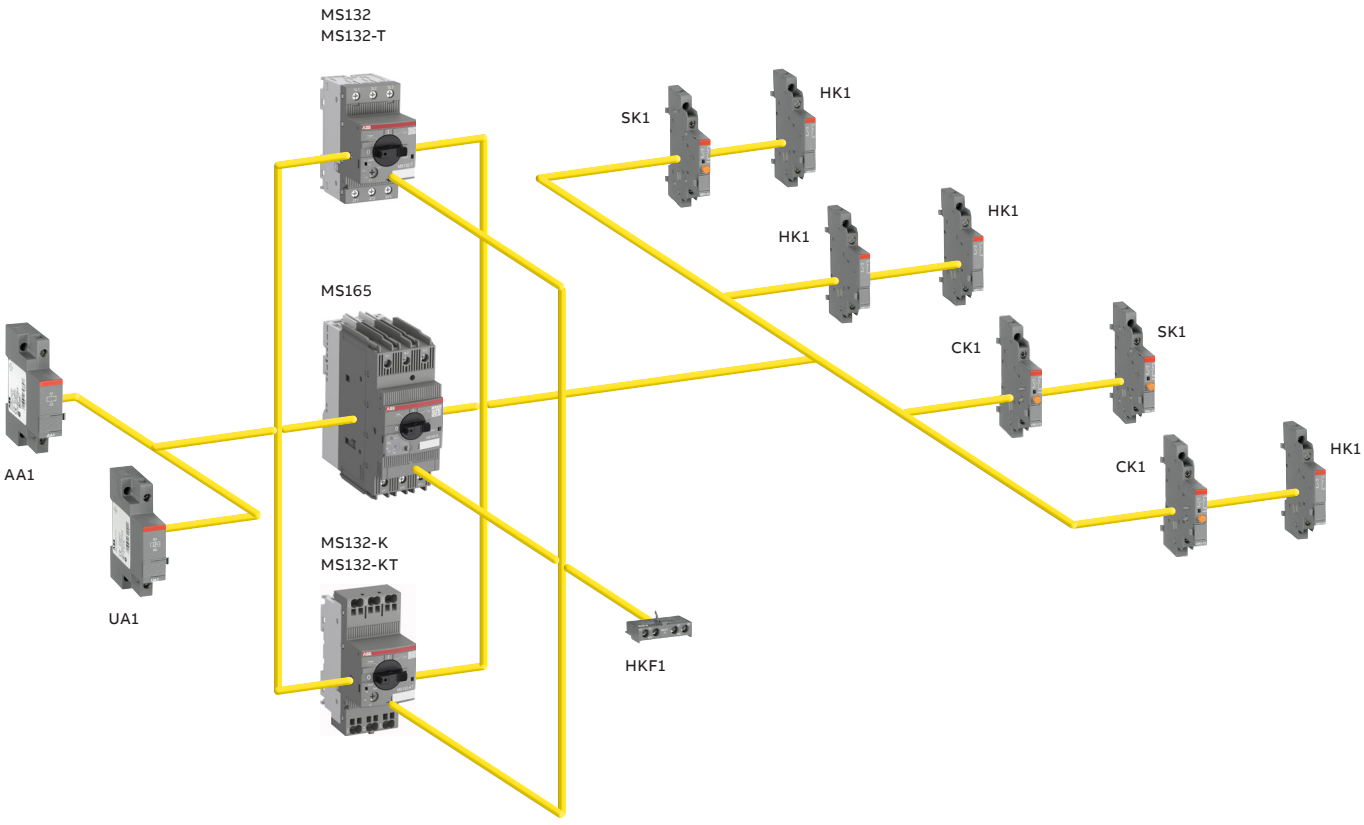
# Accessories

MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT

### Manual motor starters with accessories (MS116, MO132, MO165)




### Manual motor starters (MS132, MS165) and circuit breakers for transformer protection (MS132-T) with accessories




Note: The combination of MS132-K + UA1 + CK1 is not possible

# Accessories

## MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT



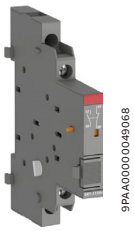

HKF1-11




HK1-11




SK1-11




SK1-11AR




CK1-11

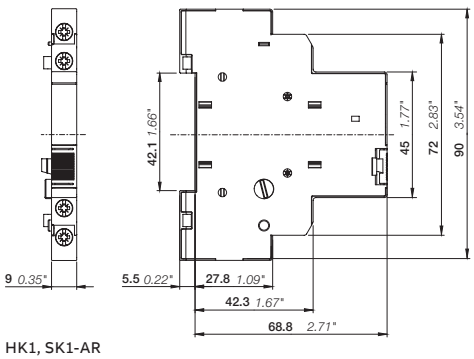
Manual motor starters and MS132-T can be equipped with auxiliary contacts for lateral/front mounting, signaling contacts for lateral mounting, undervoltage releases and shunt trips. Accessories can be fitted wiring free and without tools to the main device. A variety of combinations is possible as required for the specific application.

Auxiliary contacts HK1/HKF1 change position with the main contacts of the main device. Signaling contact CK1 signals tripping in case it was caused by short-circuit. Signaling contacts SK1/SK1-AR signal tripping regardless if it was caused by short-circuit or overload or electrical release (UA1 or AA1). With the SK1-AR, a red flag in a window on the front of the device indicates the tripping event, while for SK1 and CK1 the indication on the device itself is done with a protruding orange button. Another difference between SK1 and SK1-AR is that the contact positions of SK1-AR don't need to be manually reset after a tripping event, while for SK1 and CK1 this is done by pushing the orange button. The contacts of SK1-AR are reset to their original position when the manual motor starter is switched back on.

Undervoltage releases are used for remote tripping of the manual motor starters, especially for emergency stop circuits. Shunt trips release the manual motor starters used for remote tripping.

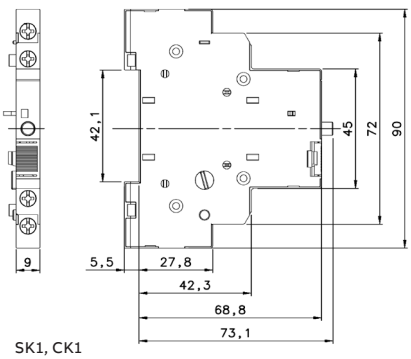
| Suitable for | Auxiliary contacts N.O. | Auxiliary contacts N.C. | Description | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|---|---|
| **Auxiliary contacts – mountable on the front** | | | | | | | |
| MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT | 1 | 1 | | HKF1-11 | 1SAM201901R1001 | 10 | 0.015 |
| | 1 | 0 | | HKF1-10 | 1SAM201901R1003 | 10 | 0.013 |
| | 0 | 1 | | HKF1-01 | 1SAM201901R1004 | 10 | 0.013 |
| | 2 | 0 | | HKF1-20 | 1SAM201901R1002 | 10 | 0.015 |
| **Auxiliary contacts – mountable on the right** | | | | | | | |
| MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT | 1 | 1 | max. 2 pieces | HK1-11 | 1SAM201902R1001 | 2 | 0.035 |
| | 2 | 0 | max. 2 pieces | HK1-20 | 1SAM201902R1002 | 2 | 0.035 |
| | 0 | 2 | max. 2 pieces | HK1-02 | 1SAM201902R1003 | 2 | 0.035 |
| MS116, MS132, MO132, MS132-T, MS132-K, MS132-KT | 2 | 0 | max. 2 pieces with leading contacts | HK1-20L | 1SAM201902R1004 | 2 | 0.035 |
| MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT | 1 | 1 | max. 2 pieces, terminal marking (13/14, 21/22) | HK1-11A | 1SAM201902R1011 | 2 | 0.035 |
| | 1 | 1 | max. 2 pieces, terminal marking (43/44, 31/32) | HK1-11B | 1SAM201902R1021 | 2 | 0.035 |
| | 2 | 0 | max. 2 pieces, terminal marking (13/14, 23/24) | HK1-20A | 1SAM201902R1012 | 2 | 0.035 |
| **Signaling contacts – mountable on the right** | | | | | | | |
| MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT | 1 | 1 | for tripped alarm, with manual reset | SK1-11 | 1SAM201903R1001 | 2 | 0.035 |
| | 2 | 0 | for tripped alarm, with manual reset | SK1-20 | 1SAM201903R1002 | 2 | 0.035 |
| | 0 | 2 | for tripped alarm, with manual reset | SK1-02 | 1SAM201903R1003 | 2 | 0.035 |
| | 1 | 1 | for tripped alarm | SK1-11AR | 1SAM201903R1004 | 2 | 0.036 |
| | 2 | 0 | for tripped alarm | SK1-20AR | 1SAM201903R1005 | 2 | 0.036 |
| | 0 | 2 | for tripped alarm | SK1-02AR | 1SAM201903R1006 | 2 | 0.036 |
| MS132, MS165, MS132-T, MS132-K, MS132-KT | 1 | 1 | for short-circuit alarm | CK1-11 | 1SAM301901R1001 | 2 | 0.035 |
| | 2 | 0 | for short-circuit alarm | CK1-20 | 1SAM301901R1002 | 2 | 0.035 |
| | 0 | 2 | for short-circuit alarm | CK1-02 | 1SAM301901R1003 | 2 | 0.035 |

Note: For BEA connecting links with AF, AS and B mini and M mini contactors please refer to chapters 3, 4 and 5.




HK1, SK1-AR

Main dimensions mm, inches




SK1, CK1

Main dimensions mm, inches

# Accessories

## MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT

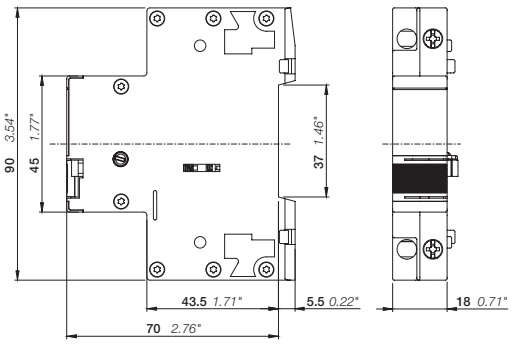



AA1-24




UA1-24

| Suitable for | Rated control supply voltage 50 Hz V AC | Rated control supply voltage 60 Hz V AC | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|---|
| **Shunt trips – mountable on the left** | | | | | | |
| MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT | 20 ... 24 | 20 ... 24 | AA1-24 | 1SAM201910R1001 | 1 | 0.100 |
| | 110 | 110 | AA1-110 | 1SAM201910R1002 | 1 | 0.100 |
| | 200 ... 240 | 200 ... 240 | AA1-230 | 1SAM201910R1003 | 1 | 0.100 |
| | 350 ... 415 | 350 ... 415 | AA1-400 | 1SAM201910R1004 | 1 | 0.100 |
| **Undervoltage releases – mountable on the left** | | | | | | |
| MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT | 20 | 24 | UA1-20 | 1SAM201904R1010 | 1 | 0.100 |
| | 24 | - | UA1-24 | 1SAM201904R1001 | 1 | 0.100 |
| | 48 | - | UA1-48 | 1SAM201904R1002 | 1 | 0.100 |
| | 60 | - | UA1-60 | 1SAM201904R1003 | 1 | 0.100 |
| | 110 | 120 | UA1-110 | 1SAM201904R1004 | 1 | 0.100 |
| | - | 208 | UA1-208 | 1SAM201904R1008 | 1 | 0.100 |
| | 230 | 240 | UA1-230 | 1SAM201904R1005 | 1 | 0.100 |
| | 400 | - | UA1-400 | 1SAM201904R1006 | 1 | 0.100 |
| | 415 | 480 | UA1-415 | 1SAM201904R1007 | 1 | 0.100 |
| | - | 575 | UA1-575 | 1SAM201904R1009 | 1 | 0.100 |




AA1, UA1

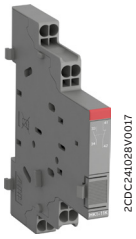
Main dimensions mm, inches

# Accessories with Push-in Spring terminals

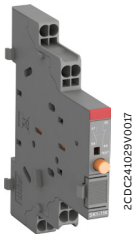
MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT



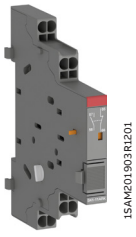

HKF1-11K




HK1-11K




SK1-11K

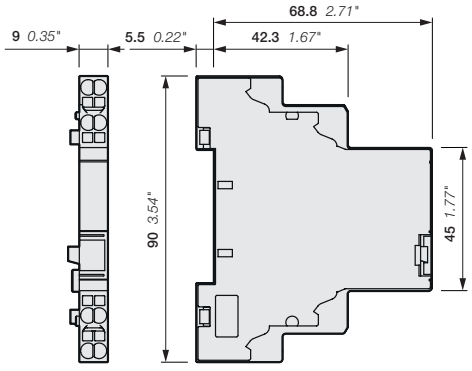



SK1-11ARK

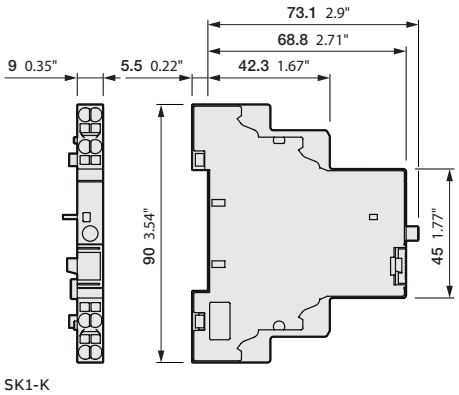
Manual motor starters and MS132-T can be equipped with auxiliary contacts for lateral/front mounting as well as signaling contacts for lateral mounting. Accessories can be fitted wiring free and without tools to the main device. This goes hand in hand with the Push-in Spring terminals of these accessories. Innovative Push-in Spring terminals enable tool-free wiring and eliminate the need for routine re-tightening. A variety of combinations is possible as required for the specific application. Auxiliary contacts HK1-K/HKF1-K change position with the main contacts of the main device. Signaling contacts SK1-K/SK1-ARK signal tripping regardless if it was caused by short-circuit or overload or electrical release (UA1 or AA1). With the SK1-ARK, a red flag in a window on the front of the device indicates the tripping event, while for SK1-K the indication on the device itself is done with a protruding orange button. Another difference between SK1-K and SK1-ARK is that the contact positions of SK1-ARK don't need to be manually reset after a tripping event, while for SK1-K this is done by pushing the orange button. The contacts of SK1-ARK are reset to their original position when the manual motor starter is switched back on.

| Suitable for | Auxiliary contacts N.O. | Auxiliary contacts N.C. | Description | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|---|---|
| **Auxiliary contacts - mountable on the front** | | | | | | | |
| MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT | 1 | 1 | | HKF1-11K | 1SAM201901R1201 | 10 | 0.016 |
| | 2 | 0 | | HKF1-20K | 1SAM201901R1202 | 10 | 0.016 |
| **Auxiliary contacts - mountable on the right** | | | | | | | |
| MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT | 1 | 1 | max. 2 pieces | HK1-11K | 1SAM201902R1201 | 2 | 0.035 |
| | 2 | 0 | max. 2 pieces | HK1-20K | 1SAM201902R1202 | 2 | 0.035 |
| | 0 | 2 | max. 2 pieces | HK1-02K | 1SAM201902R1203 | 2 | 0.035 |
| | 2 | 0 | with leading contacts | HK1-20LK | 1SAM201902R1204 | 2 | 0.035 |
| **Signaling contacts - mountable on the right** | | | | | | | |
| MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT | 1 | 1 | for tripped alarm, with manual reset | SK1-11K | 1SAM201903R1201 | 2 | 0.035 |
| | 2 | 0 | for tripped alarm, with manual reset | SK1-20K | 1SAM201903R1202 | 2 | 0.035 |
| | 0 | 2 | for tripped alarm, with manual reset | SK1-02K | 1SAM201903R1203 | 2 | 0.035 |
| | 1 | 1 | for tripped alarm | SK1-11ARK | 1SAM201903R1204 | 2 | 0.035 |
| | 2 | 0 | for tripped alarm | SK1-20ARK | 1SAM201903R1205 | 2 | 0.035 |
| | 0 | 2 | for tripped alarm | SK1-02ARK | 1SAM201903R1206 | 2 | 0.035 |

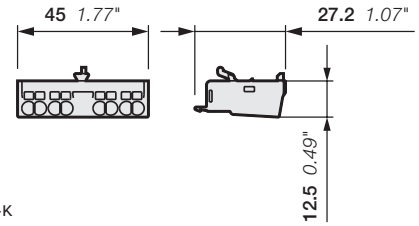
Note : For BEA..-4K Push-in Spring connecting links with AF09..K ... AF38..K please refer to chapter 3 - "Connection accessories for starting solutions with Push-in Spring terminals".




HK1-K, SK1-ARK




SK1-K




HKF1-K

Main dimensions mm, inches

# Accessories

MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT

## General technical data

| Type | | HK1, SK1 | CK1 | HKF1 |
|---|---|---|---|---|
| Standards | | IEC/EN 60947–1, IEC/EN 60947-5-1 | | |
| Rated operational voltage Ue | | 690 V AC / 600 V DC | | 250 V AC / 250 V DC |
| Conventional free-air thermal current Ith | | 6 A | | 5 A |
| Rated frequency | | 50/60 Hz | | |
| Rated impulse withstand voltage Uimp | | 6 kV | | |
| Rated insulation voltage Ui | | 690 V AC | | 250 V AC |
| Pollution degree | | 3 | | |
| Ambient air temperature | Operation | -25 ... +60 °C | | |
| | Storage | -50 ... +80 °C | | |
| Resistance to shock acc. to IEC 60068-2-27 | | 25g / 11 ms | | |
| Resistance to vibrations acc. to IEC 60068-2-6 | | 5g / 3 ... 150 Hz | | |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | | | | |
| | 24 V, 120 V | 6 A | | 3 A |
| | 240 V | 4 A | | 1.5 A |
| | 400 V | 3 A | | - |
| | 440 V, 690 V | 1 A | | - |
| Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | | | | |
| | 24 V | 2 A | | 1 A |
| | 125 V | 0.55 A | | 0.27 A |
| | 250 V | 0.27 A | | 0.11 A |
| | 440 V, 600 V | 0.15 A | | - |
| Minimum switching capacity | | 17 V / 5 mA | | |
| Short-circuit protective device | N.C., 95-96 | 10 A Type gG | | |
| | N.O., 97-98 | 10 A Type gG | | |
| Duty time | | 100 % | | |
| Mounting | | Right side of manual motor starters / MS132-T | | Front of manual motor starters / MS132-T |
| Mounting positions | | 1-6 | | |
| Mechanical durability | | 100000 cycles | 10000 cycles | - |
| Electrical durability | | 100000 cycles | 10000 cycles | - |

## Contact utilization characteristics according to UL/CSA

| Type | | HK1, SK1, CK1 | HKF1 |
|---|---|---|---|
| Standards | | UL 60947-1, UL 60947-5-1 (UL 508), CSA C22.2 No.60947-5-1 (CSA C22.2 No.14) | |
| Rated operational voltage Ue acc. to UL/CSA | | 600 V AC / 600 V DC | 250 V AC / 250 V DC |
| Pilot duty | | B600, Q600 | B300, R300 |
| AC thermal rated current | | 5 A | 5 A |
| | AC maximum volt-ampere making | 3600 VA | 3600 VA |
| | AC maximum volt-ampere breaking | 360 VA | 360 VA |
| | DC thermal rated current | 2.5 A | 1 A |
| DC maximum volt-ampere making-breaking | | 69 VA | 28 VA |

## Connecting characteristics - Auxiliary circuit

| Type | | | HK1, SK1, CK1 | HKF1 |
|---|---|---|---|---|
| Connecting capacity | | | | |
|  | Rigid | 1 or 2 x | 1 ... 1.5 mm² | 1 ... 2.5 mm² |
| | | | 0.5 (spring) / 1 (push-in) ... 2.5 mm² | |
|  | Flexible with ferrule | 1 or 2 x | 0.75 ... 1.5 mm² | |
| | | | 0.5 (spring) / 1 (push-in) ... 2.5 mm² | |
|  | Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 1.5 mm² | |
| | | | 0.5 (spring) / 1 (push-in) ... 1.5 mm² | |
|  | Flexible | 1 or 2 x | 0.75 ... 1.5 mm² | 0.75 ... 2.5 mm² |
| | | | 0.5 ... 2.5 mm² (with Push-in Spring terminals) | |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 16 ... 14 | |
| | | | AWG 20 ... 14 (with Push-in Spring terminals) | |
| Stripping length | | | 8 mm | |
| | | | 10 mm (with Push-in Spring terminals) | |
| Tightening torque | | | 0.8 ... 1.2 Nm / 7 lb.in | |
| Recommended screw driver | | | Pozidriv 2 | |
| | | | Flat Ø 3 mm x 0.5 mm (with Push-in Spring terminals) | |

# Accessories

MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT

## General technical data

| Type | | | UA1 | AA1 |
|---|---|---|---|---|
| Standards | | | IEC/EN 60947-1, IEC/EN 60947-5-1, UL 60947-1, UL 60947-5-1 (UL 508), CSA C22.2 No.60947-4-1 (CSA C22.2 No.14) | |
| Rated control supply voltage | | | see ordering details | AA1-24: 20-24 V 50/60 Hz; 20-70 V 50/60 Hz ON-Period = 5 s (1), 20-70 V DC ON-Period = 5 s (2)<br>AA1-100: 110 V 50/60 Hz; 110-200 V 50/60 Hz ON-Period = 5 s (1), 110-200 V DC ON-Period = 5 s (2)<br>AA1-230: 200-240 V 50/60 Hz, 200-350 V 50/60 Hz ON-Period = 5 s (1), 200-350 V DC ON-Period = 5 s (2)<br>AA1-400: 350-415 V 50/60 Hz, 350-500 V 50/60 Hz ON-Period = 5 s (1), 350-500 V DC ON-Period = 5 s (2) |
| Rated frequency | | | see ordering details | 50/60 Hz, DC |
| Operating voltage | Tripping | | 0.35 ... 0.7 x Us | 0.7 ... 1.1 x Us |
| | Coil operating voltage | | 0.85 ... 1.1 x Us | - |
| Power consumption | Holding | AC | on request | - |
| | | DC | on request | - |
| Rated impulse withstand voltage Uimp | | | 6 kV | 6 kV |
| Rated insulation voltage Ui | | | 690 V | 690 V |
| Pollution degree | | | 3 | 3 |
| Ambient air temperature | Operation | | -25 .... +60 °C | -25 .... +60 °C |
| | Storage | | -50 ...+80 °C | -50 ...+80 °C |
| Resistance to shock acc. to IEC 60068-2-27 | | | 15g / 11 ms | 15g / 11 ms |
| Resistance to vibrations acc. to IEC 60068-2-6 | | | 5g / 3 ... 150 Hz | 5g / 3 ... 150 Hz |
| Mounting | | | left side of manual motor starters / MS132-T (1) | left side of manual motor starters / MS132-T (1) |
| Mounting positions | | | - | - |

(1) The mechanical and electrical durability of manual motor starters in combination with UA1/AA1 is reduced. Values are provided on request.
(2)ON-Period: max. 5 s actuation time. Please consider 15 min OFF-period after max. 5 s ON-period, for voltages above the rated values.

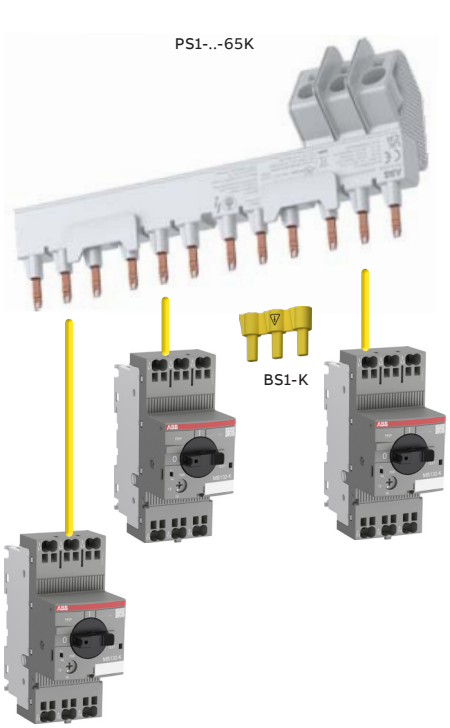
## Connecting characteristics - Auxiliary circuit

| Type | | | UA1 | AA1 |
|---|---|---|---|---|
| Connecting capacity | | | | |
| | Rigid | 1 or 2 x | 1 ... 4 mm² | |
| | Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm² | |
| | Flexible with insulated ferrule | 1 x | 0.75 ... 2.5 mm² | |
| | | 2 x | 0.75 ... 1.5 mm² | |
| | Flexible | 1 or 2 x | 0.75 ... 2.5 mm² | |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 16 ... 12 | |
| Stripping length | | | 10 mm | |
| Tightening torque | | | 0.8 ... 1.2 Nm / 7 lb.in | |
| Recommended screwdriver | | | Pozidriv 2 | |

# Accessories

## MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT

### Manual motor starters with three-phase busbar systems (MS116, MS132, MO132, MS132-T, MS132-K, MS132-KT)



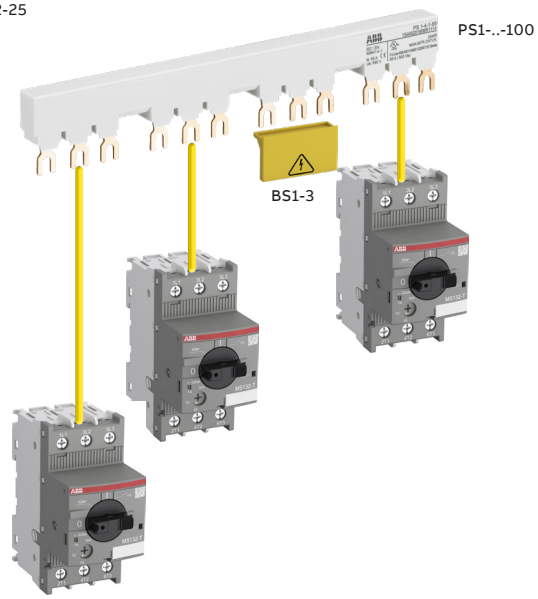










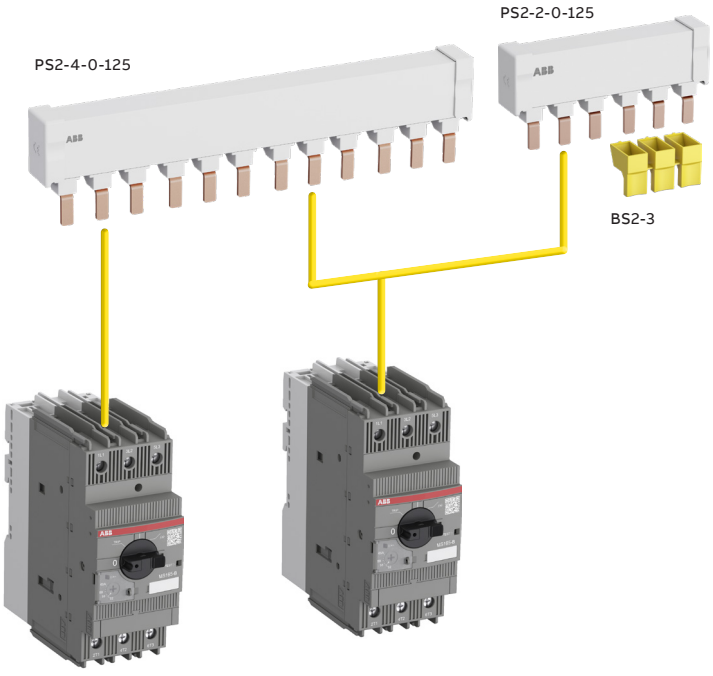


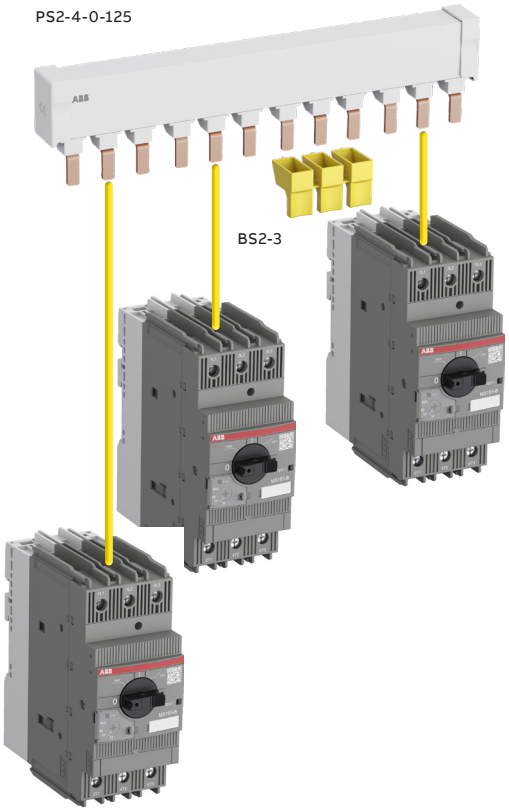

Three phase busbar with Push-in Spring terminals up to 65 A

Three-phase busbar up to 100 A

Note: feeder blocks are only suitable for screw versions.

### Manual motor starters with three-phase busbar systems (MS165, MO165)



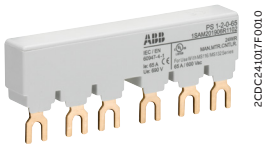




Three-phase busbar up to 125 A

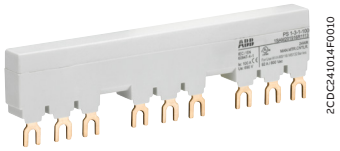
Three-phase busbar up to 125 A

# Accessories

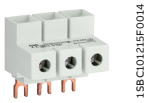
## MS116, MS132, MO132, MS132-T


2CDC241017F0010

PS1-2-0-65


2CDC241014F0010

PS1-3-1-100


1SBC101215F0014

S1-M3-35


1SBC101266F0014

S1-M2-25


2CDC241013V0019

TS1-M3-S1


2CDC241023F0013

SA2


SK0108B91

SA1


2CDC241004F0014

PB1-1-32


2CDC241005S0014

S1-PB1-25

### Three-phase busbars

Three-phase busbars ensure a quick and safe connection and are therefore a cost effective solution. A variety of different three-phase busbars up to 100 A are part of the assortment. Between 2 and 4 manual motor starters with none, one or two lateral auxiliary contacts can be connected. Different three-phase feeder terminals are available according to the application.

Phase connecting links and phase power infeed blocks are also available for single-phase applications.

| Suitable for | Rated operational current<br>A | Number of manual motor starters | Number of lateral auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|---|---|
| MS116, MS132, MO132, MS132-T | 65 | 2 | 0 | PS1-2-0-65 | 1SAM201906R1102 | 10 | 0.034 |
| | 65 | 3 | 0 | PS1-3-0-65 | 1SAM201906R1103 | 10 | 0.055 |
| | 65 | 4 | 0 | PS1-4-0-65 | 1SAM201906R1104 | 10 | 0.077 |
| | 65 | 5 | 0 | PS1-5-0-65 | 1SAM201906R1105 | 10 | 0.098 |
| | 65 | 2 | 1 | PS1-2-1-65 | 1SAM201906R1112 | 10 | 0.036 |
| | 65 | 3 | 1 | PS1-3-1-65 | 1SAM201906R1113 | 10 | 0.060 |
| | 65 | 4 | 1 | PS1-4-1-65 | 1SAM201906R1114 | 10 | 0.087 |
| | 65 | 5 | 1 | PS1-5-1-65 | 1SAM201906R1115 | 10 | 0.108 |
| | 65 | 2 | 2 | PS1-2-2-65 | 1SAM201906R1122 | 10 | 0.040 |
| | 65 | 3 | 2 | PS1-3-2-65 | 1SAM201906R1123 | 10 | 0.067 |
| | 65 | 4 | 2 | PS1-4-2-65 | 1SAM201906R1124 | 10 | 0.095 |
| | 65 | 5 | 2 | PS1-5-2-65 | 1SAM201906R1125 | 10 | 0.122 |
| | 100 | 3 | 0 | PS1-3-0-100 | 1SAM201916R1103 | 10 | 0.084 |
| | 100 | 4 | 0 | PS1-4-0-100 | 1SAM201916R1104 | 10 | 0.117 |
| | 100 | 5 | 0 | PS1-5-0-100 | 1SAM201916R1105 | 10 | 0.154 |
| | 100 | 3 | 1 | PS1-3-1-100 | 1SAM201916R1113 | 10 | 0.094 |
| | 100 | 4 | 1 | PS1-4-1-100 | 1SAM201916R1114 | 10 | 0.134 |
| | 100 | 5 | 1 | PS1-5-1-100 | 1SAM201916R1115 | 10 | 0.172 |
| | 100 | 3 | 2 | PS1-3-2-100 | 1SAM201916R1123 | 10 | 0.105 |

Note: Above busbars are only suitable for screw versions. For busbars with Push-in Spring terminals please see next page.

### Three-phase feeder terminals

| Suitable for | Rated operational current<br>A | Rated cross section<br>mm² | Mounting form | Type | Order code | Pkg qty | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|---|---|
| MS116, MS132, MO132 | 65 | 25 | Flat | S1-M1-25 | 1SAM201907R1101 | 10 | 0.038 |
| | 65 | 25 | High | S1-M2-25 | 1SAM201907R1102 | 10 | 0.051 |
| | 65 | 25 | UL/CSA Type E/F and IEC | S1-M3-25 | 1SAM201907R1103 | 10 | 0.042 |
| | 100 | 35 | UL/CSA Type E/F and IEC | S1-M3-35 | 1SAM201913R1103 | 10 | 0.060 |

| Suitable for | Description | Type | Order code | Pkg qty | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|
| **Terminal spacers, Type E/F** | | | | | |
| MS132 <10 A, MO132 < 10 A, MS132-T <10 A | UL/CSA Type E/F and IEC | TS1-M3-S1 | 1SAM301911R1001 | 2 | 0.012 |
| MS132 ≥ 12 A, MO132 ≥ 12 A, MS132-T ≥ 12 A | UL/CSA Type E/F and IEC | TS1-M3-S2 | 1SAM301912R1001 | 2 | 0.012 |

Note: For product availability, please consult your ABB local sales organization

### Additional accessories

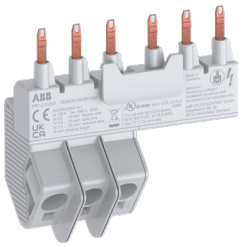
| | | | | | |
|---|---|---|---|---|---|
| MS116, MS132, MO132, MS132-T | Protection cover for busbars | BS1-3 | 1SAM201908R1001 | 50 | 0.003 |
| | Screw fixing kit | FS116 | 1SAM201909R1001 | 1 | 0.020 |
| | Padlock + two keys | SA2 | GJF1101903R0002 | 10 | 0.020 |
| MS116 | Lock handle | SA1 | GJF1101903R0001 | 10 | 0.003 |
| | Lock handle box SA1/SA2 | SA3 | GJF1101903R0003 | 10 | 0.050 |

### Accessories for single-phase connection (IEC only)

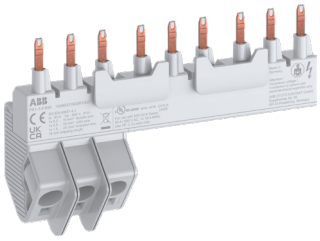
| | | | | | |
|---|---|---|---|---|---|
| MS116, MS132, MO132, MS132-T | Phase connecting link | PB1-1-32 | 1SAM201914R1001 | 1 | 0.009 |
| | Phase power infeed block | S1-PB1-25 | 1SAM201914R1002 | 1 | 0.013 |

# Accessories with Push-in Spring terminals

## MS132-K, MS132-KT



PS1-2-0-65K



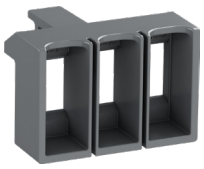
PS1-3-1-65K

### Three-phase busbars with Push-in Spring terminals

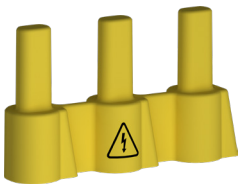
Three-phase busbars ensure a quick and safe connection and are therefore a cost effective solution. Busbars with Push-in Spring terminals enable tool-free wiring and eliminate the need for routine re-tightening. Between 2 and 5 manual motor starters with none or one lateral auxiliary contact can be connected. There is also a terminal spacer as well as a protection cover available for busbars with Push-in Spring technology.

| Suitable for | Rated operational current<br>A | Number of Manual motor starters | Number of lateral auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|---|---|
| MS132-K, MS132-KT | 65 | 2 | 0 | PS1-2-0-65K | 1SAM301903R1002 | 1 | 0.091 |
| | 65 | 3 | 0 | PS1-3-0-65K | 1SAM301903R1003 | 1 | 0.116 |
| | 65 | 4 | 0 | PS1-4-0-65K | 1SAM301903R1004 | 1 | 0.140 |
| | 65 | 5 | 0 | PS1-5-0-65K | 1SAM301903R1005 | 1 | 0.165 |
| | 65 | 2 | 1 | PS1-2-1-65K | 1SAM301903R1012 | 1 | 0.094 |
| | 65 | 3 | 1 | PS1-3-1-65K | 1SAM301903R1013 | 1 | 0.123 |
| | 65 | 4 | 1 | PS1-4-1-65K | 1SAM301903R1014 | 1 | 0.151 |
| | 65 | 4 | 1 | PS1-5-1-65K | 1SAM301903R1015 | 1 | 0.178 |

NOTE: For product availability, please consult your ABB local sales organization.



TS1-M3-K



BS1-K

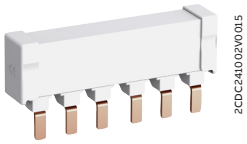


SA2

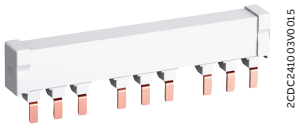
| Suitable for | Description | Type | Order code | Pkg qty | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|
| **Terminal spacers, Type E/F** | | | | | |
| MS132-K, MS132-KT | UL/CSA Type E/F and IEC | TS1-M3-K | 1SAM301913R1001 | 2 | 0.012 |
| **Additional accessories** | | | | | |
| MS132-K, MS132-KT | Protection cover for PS1-K busbars | BS1-K | 1SAM301904R1001 | 1 | 0.002 |
| | Padlock + two keys | SA2 | GJF1101903R0002 | 1 | 0.020 |

# Accessories

## MS165, MO165



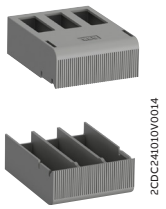

PS2-2-0-125




PS2-3-0-125




S2-M3-50




KA165




BS2-3




SA2

### Three-phase busbars

Three-phase busbars ensure a quick and safe connection and are therefore a cost effective solution. A variety of different three-phase busbars up to 125 A are part of the assortment. Between 2 and 4 manual motor starters with none, one or two lateral auxiliary contacts can be connected.

| Suitable for | Rated operational current<br>A | Number of Manual motor starters | Number of lateral auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|---|---|
| MS165, MO165 | 125 | 2 | 0 | PS2-2-0-125 | 1SAM401920R1002 | 10 | 0.100 |
| | 125 | 3 | 0 | PS2-3-0-125 | 1SAM401920R1003 | 10 | 0.162 |
| | 125 | 4 | 0 | PS2-4-0-125 | 1SAM401920R1004 | 10 | 0.226 |
| | 125 | 2 | 2 | PS2-2-2-125 | 1SAM401920R1022 | 10 | 0.117 |
| | 125 | 3 | 2 | PS2-3-2-125 | 1SAM401920R1023 | 10 | 0.197 |
| | 125 | 4 | 2 | PS2-4-2-125 | 1SAM401920R1024 | 10 | 0.277 |

Other busbar types on request.

### Feeder block

| Suitable for | Rated operational current<br>A | Rated cross section<br>mm² | Mounting form | Type | Order code | Pkg qty | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|---|---|
| MS165, MO165 | 125 | 50 | UL508A and IEC | S2-M3-50 | 1SAM401923R1003 | 1 | 0.172 |

### Additional accessories

| Suitable for | Description | Type | Order code | Pkg qty | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|
| MS165, MO165 | Terminal shroud | KA165 | 1SAM401922R1001 | 10 | 0.025 |
| | Protection cover for busbars | BS2-3 | 1SAM401921R1001 | 10 | 0.005 |
| | Padlock + two keys | SA2 | GJF1101903R0002 | 10 | 0.020 |

# Accessories

MS116, MS132, MS165, MO132, MO165, MS132-T

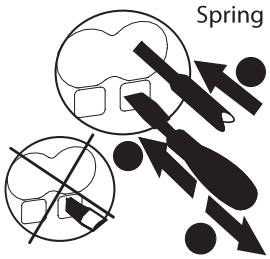
## General technical data

| Type | | PS1-xxx-65(K) | PS1-xxx-100 | S1-Mx-25 | S1-Mx-35 | PS2-xxx-125 | S2-M3-50 |
|---|---|---|---|---|---|---|---|
| Standards | | IEC/EN 60947-4-1, IEC/EN 60947-1, UL 60947-1, UL 60947-4-1 (UL 508), CSA C22.2 No.60947-4-1 (CSA C22.2 No.14) | | | | | |
| Rated operational voltage Ue | | 690 V AC / 250 V DC | | | | 690 V AC | |
| Rated operational voltage Ue acc. to UL/CSA | | 600 V AC | | | | | |
| Rated operational current Ie | | 65 A | 100 A | 65 A | 100 A | 125 A | 125 A |
| Rated operational current Ie acc. to UL/CSA | | 65 A | 92 A | 65 A | 92 A | 125 A | 120 A |
| Rated frequency | | 50/60 Hz | | | | | |
| Rated impulse withstand voltage Uimp | | 6 kV | | | | 8 kV | |
| Rated insulation voltage Ui | | 690 V AC | | | | | |
| Pollution degree | | 3 | | | | | |
| Ambient air temperature | Operation | -25 ... +70 °C | | | | -25 ... +40 °C | -25 ... +60 °C (1) |
| | Storage | -50 ... +80 °C | | | | | |
| Resistance to shock acc. to IEC 60068-2-27 | | 15g / 11 ms | | | | 25g / 11 ms | |
| Resistance to vibrations acc. to IEC 60068-2-6 | | 5g / 3 ... 150 Hz | | | | | |

(1) Applicable for single mounting. If S2-M3-50 is used with PS2-xxx-125, ambient air temperature for operation is: -25 ... +40°C

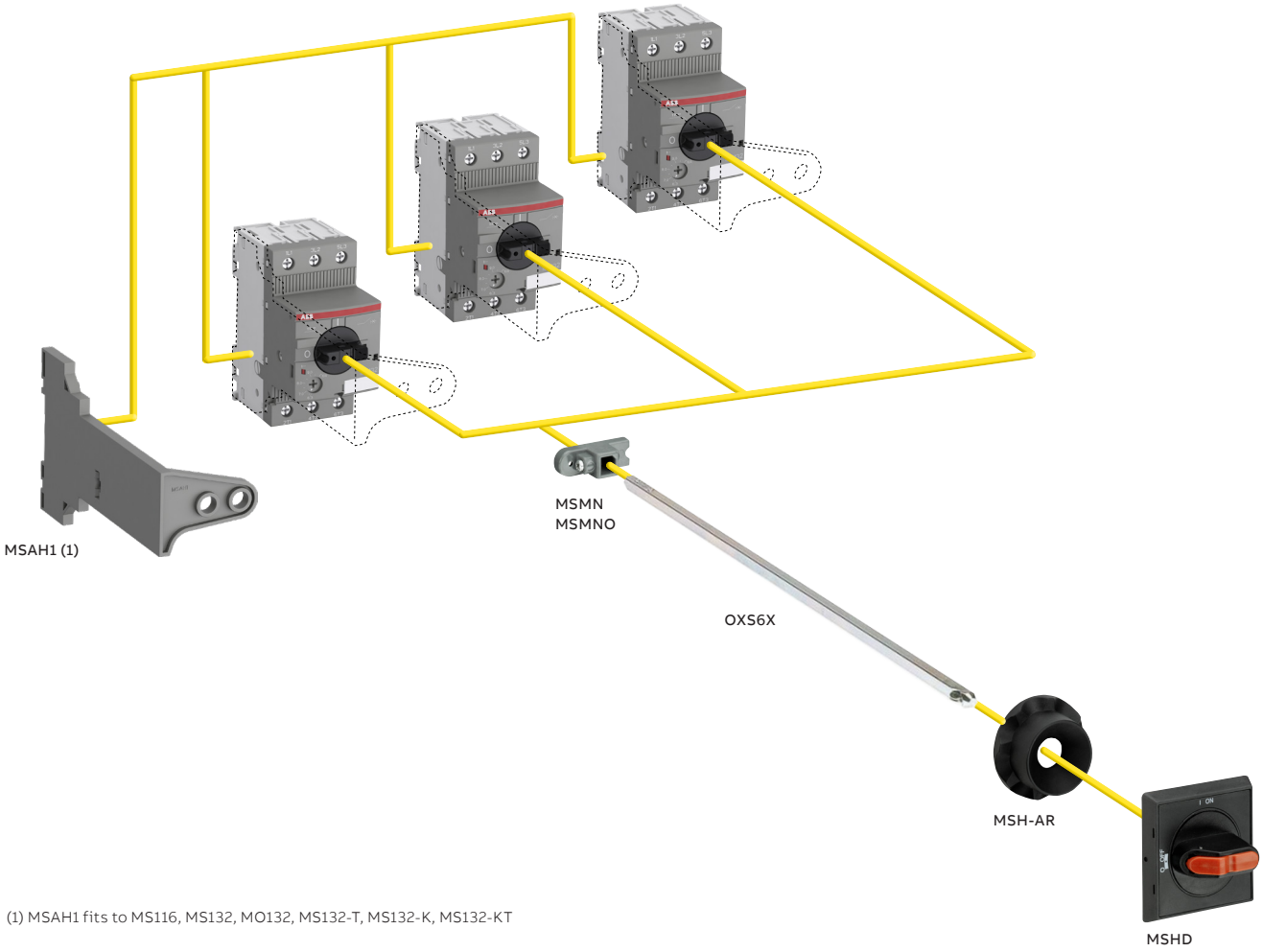
## Electrical connection – Main circuit

| Type | | | S1-M1-25 | S1-M2-25 | S1-M3-25 | S1-M3-35 | S2-M3-50 |
|---|---|---|---|---|---|---|---|
| Connecting capacity | | | | | | | |
| | Rigid | 1 x | 2.5 ... 25 mm² | 4 ... 25 mm² | 2.5 ... 25 mm² | 10 ... 35 mm² | 10 mm² |
| | Flexible with ferrule | 1 x | – | – | – | – | 10 ... 50 mm² |
| | Flexible with insulated ferrule | 1 x | – | – | – | – | 10 ... 50 mm² |
| | Flexible | 1 x | 2.5 ... 16 mm² | 4 ... 16 mm² | 2.5 ... 16 mm² | 10 ... 35 mm² | 10 ... 50 mm² |
| | Stranded acc. to UL/CSA | 1 x | AWG 14 ... 4 | AWG 12 ... 4 | AWG 14 ... 4 | AWG 8 ... 2 | AWG 8 ... 0 |
| | Flexible acc. to UL/CSA | 1 x | AWG 14 ... 6 | AWG 12 ... 6 | AWG 14 ... 6 | AWG 8 ... 2 | AWG 8 ... 0 |
| Stripping length | | | 10 mm | | | 12 mm | 16 mm |
| Tightening torque | | | 2.5 Nm / 22 lb.in | | | 4.5 Nm / 40 lb.in | 6 Nm / 54 lb.in |
| Recommended screwdriver | | | Pozidriv 2 | | | Hexagon SW4 | Hexagon SW5 |

| | | | PS1-xxx-65K with Push-in Spring terminals |
|---|---|---|---|
|  Push-in | | 1 x | 6 ... 25 mm² / AWG 8 ... 4 |
| | | 2 x | – |
| | | 1 x | 4 ... 16 mm² |
| | | 2 x | – |
| | | 1 x | 4 ... 16 mm² |
| | | 2 x | – |
| | | 1 x | 4 ... 16 mm² |
| | | 2 x | – |
| | | 1 x | 4 ... 6 mm² |
| | | 2 x | – |
|  Spring | | 1 x | 1.5 ... 25 mm² / AWG 18 ... 4 |
| | | 2 x | – |
| | | 1 x | 0.5 ... 16 mm² |
| | | 2 x | – |
| | | 1 x | 0.5 ... 16 mm² |
| | | 2 x | – |
| | | 1 x | 0.5 ... 16 mm² |
| | | 2 x | – |
| | | 1 x | 0.5 ... 16 mm² |
| | | 2 x | – |
| | | 1 x | 0.5 ... 6 mm² |
| | | 2 x | – |
| | | | fi 4 mm |
| | | | x 0.5 mm |
| | | | 16 mm |

# Accessories

## MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT




(1) MSAH1 fits to MS116, MS132, MO132, MS132-T, MS132-K, MS132-KT

# Accessories

## MS116, MS132, MO132, MS132-T, MS132-K, MS132-KT




IB132-Y




IB132-G




DMS132-Y



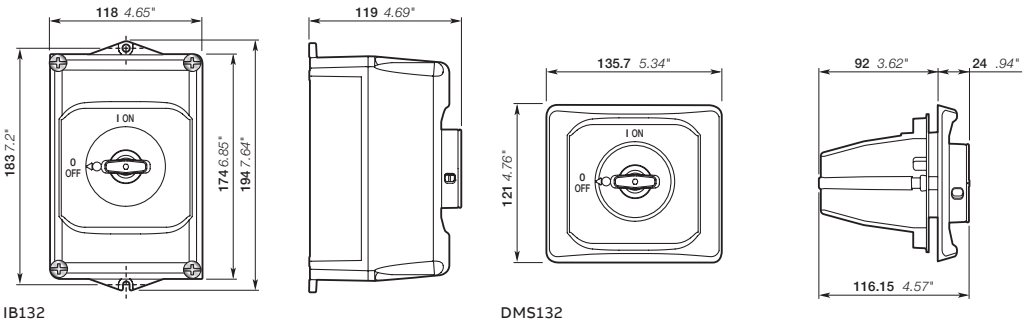

DMS132-G

IB132 are IP65 (NEMA Type 12) enclosures for single manual motor starter installation. Additional mounting of auxiliary and signaling contacts, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

DMS132 are IP65 (NEMA Type 12) door mounting kits for manual motor starter installation in any enclosure. Additional mounting of auxiliary, signaling, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

| Suitable for | Description | Color | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|---|
| **IP65 enclosures (NEMA Type 12)** | | | | | | |
| MS116, MS132, MO132 | Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm | Yellow/red | IB132-Y | 1SAM201911R1011 | 1 | 0.370 |
| | | Grey/black | IB132-G | 1SAM201911R1010 | 1 | 0.370 |
| **IP65 door mounting kits (NEMA Type 12)** | | | | | | |
| MS116, MS132, MO132 | Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm | Yellow/red | DMS132-Y | 1SAM201912R1011 | 1 | 0.170 |
| | | Grey/black | DMS132-G | 1SAM201912R1010 | 1 | 0.170 |

Indication I-O-T and ON-OFF-T.




IB132 DMS132

Main dimensions mm, inches

# Accessories

## MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K



2CDC241003F0011

MSHD-LB



2CDC241002S0011

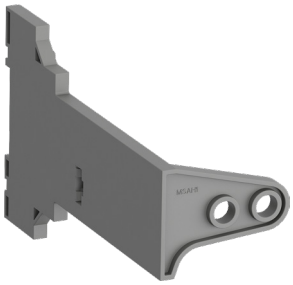
MSHD-LY


2CDC241004F0011

MSMN


2CDC241001F0012

MSH-AR


2CDC241017V0013

MSAH1

With this solution of door coupling rotary mechanisms it is possible to operate manual motor starters in the back of a switch cabinet from outside. The door coupling mechanism prevents opening of the door of a switch cabinet with the manual motor starter in ON position.

The complete mechanism includes handle, shaft, driver, shaft alignment ring and shaft supporter.

Most accessories fit for 6 mm shafts with a maximum length of 180 mm. The degree of protection for handles MSHD is IP64 (NEMA Type 1, 3R, 12).

| Suitable for | Description | Shaft length mm | Color | Type | Order code | Pkg qty pce | Weight (1 pce) kg |
|---|---|---|---|---|---|---|---|
| **Shafts** | | | | | | | |
| MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT | For MSHD handles. Shaft diameter 6 mm. Shaft extension for door coupling driver. | 30 | | MSOX-30 | 1SAM101924R0013 | 1 | 0.010 |
| | | 32 | | MSOX-32 | 1SAM101924R0003 | 1 | 0.010 |
| | | 85 | | OXS6X85 | 1SCA101647R1001 | 1 | 0.020 |
| | | 105 | | OXS6X105 | 1SCA108043R1001 | 1 | 0.020 |
| | | 130 | | OXS6X130 | 1SCA101655R1001 | 1 | 0.030 |
| | | 180 | | OXS6X180 | 1SCA101659R1001 | 1 | 0.040 |
| **IP64 handles (NEMA Type 1, 3R, 12)** | | | | | | | |
| MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT | Padlockable max. 3 padlocks with bail diameter 5 ... 8 mm, door interlock in ON position defeatable, for use with 6 mm OXS6...types up to 180 mm or driver shafts MSOX. | | Black | MSHD-LB (1) | 1SAM201920R1001 | 1 | 0.065 |
| | | | Yellow | MSHD-LY (1) | 1SAM201920R1002 | 1 | 0.065 |
| | | | Black | MSHD-LTB (2) | 1SAM201920R1011 | 1 | 0.065 |
| | | | Yellow | MSHD-LTY (2) | 1SAM201920R1012 | 1 | 0.065 |
| **Driver** | | | | | | | |
| MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT | Coupling driver for use with 6 mm OXS6... types up to 180 mm. | | | MSMN (3) | 1SAM101923R0002 | 1 | 0.002 |
| | | | | MSMNO (4) | 1SAM101923R0012 | 1 | 0.002 |
| **Shaft alignment ring** | | | | | | | |
| MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT | The MSH-AR supports the long shafts for alignment to the handle inlet. It makes closing panel doors more easy. Use for OXS6X shafts > 105 mm. | | | MSH-AR | 1SAM201920R1000 | 1 | 0.010 |
| **Shaft supporter** | | | | | | | |
| MS116, MS132, MO132, MS132-T, MS132-K, MS132-KT | With the MSAH it is possible to support the shaft in the extension of handle (MSHD). It is mandatory for the usage of OXS6X shafts >130 mm. | | | MSAH1 | 1SAM201909R1021 | 1 | 0.035 |

(1) Indication I-O and ON-OFF (recommended for MS116)
(2) Indication I-O and ON-OFF + Trip indication
(3) Coded - Positioning of ON indication dependent on mounting orientation of the MMS
(4) Uncoded - Positioning of ON indication independent of mounting orientation of the MMS.



**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**1SBL137001R1310**

# AF, EK contactors and NF contactor relays


**3/**4 **ABB Novolink™ smart modules for AF contactors**

**3/**30 **AF contactors for motor starting and power switching up to 2850 A**

**3/**31 **AF technology**

**3/**32 **Select AF contactor dedicated to your control circuit application**

**3/**33 **Select your AF coil interface for PLC**

**3/**34 **Contactors and motor protection**

**3/**36 **Just push it!**

**3/**39 **AF 3-pole contactors**

**3/**115 **Push-in Spring motor starting solution**

**3/**143 **AFS 3-pole contactors for safety applications**

**3/**183 **AF and EK 4-pole contactors**

**3/**221 **Push-in Spring 4-pole contactors**

**3/**233 **Contactors for DC switching**

**3/**259 **Contactors for capacitor switching**

**3/**277 **NF 4-pole and 8-pole contactor relays**

**3/**297 **Accessories for AF09 ... AF2850 3-pole contactors, AF09 ... AF370 4-pole contactors and NF contactor relays**

**3/**345 **Accessories for UA, UA..RA contactors and GAF contactors**

**3/**369 **Accessories for EK550, EK1000 4-pole contactors**

**3/**381 **Terminal marking and positioning, Dimensions**

**3/**455 **Other contactor application data**

**3/**474 **Voltage code table**

**3/**480 **Questionnaire for product specifications**

The all-new ABB Novolink™ devices help digitalize your motor starting solutions and gain insights into the connected loads. They're easy to design into existing wiring plans and connect to standard AF contactors.

Installation is fast and simple, thanks to reduced wiring and fewer components, so your engineering efforts are minimized.

Novolink devices enable predictive maintenance to reduce downtime, as well as increasing efficiencies and boosting cost savings. They're fully integrated into the B&R automation system. And the possibilities open up even more with full remote access to your data, creating new maintenance service and revenue opportunities.

So to simplify engineering, optimize operations, save time and cut costs, think Novolink.



For direct product details information, use product type or order code, ex:

new.abb.com/products/1SVM120012R0000

# ABB Novolink™ smart modules for AF contactors


**3/**4 **Motors - the key driver of world industry**

**3/**6 **From conventional to digital**

**3/**7 **Digital capabilities to deliver Industry 4.0**

**3/**8 **Novolink devices in low voltage motor applications**

**3/**9 **A closer look at smart devices**

**3/**10 **The link between motors and digitalization**

**3/**12 **Ease of design and commissioning**

**3/**15 **Innovation through digitalization**

**3/**16 **Optimized operations and maintenance**

**3/**18 **Smart and safe manufacturing with ABB safety products and B&R solutions**

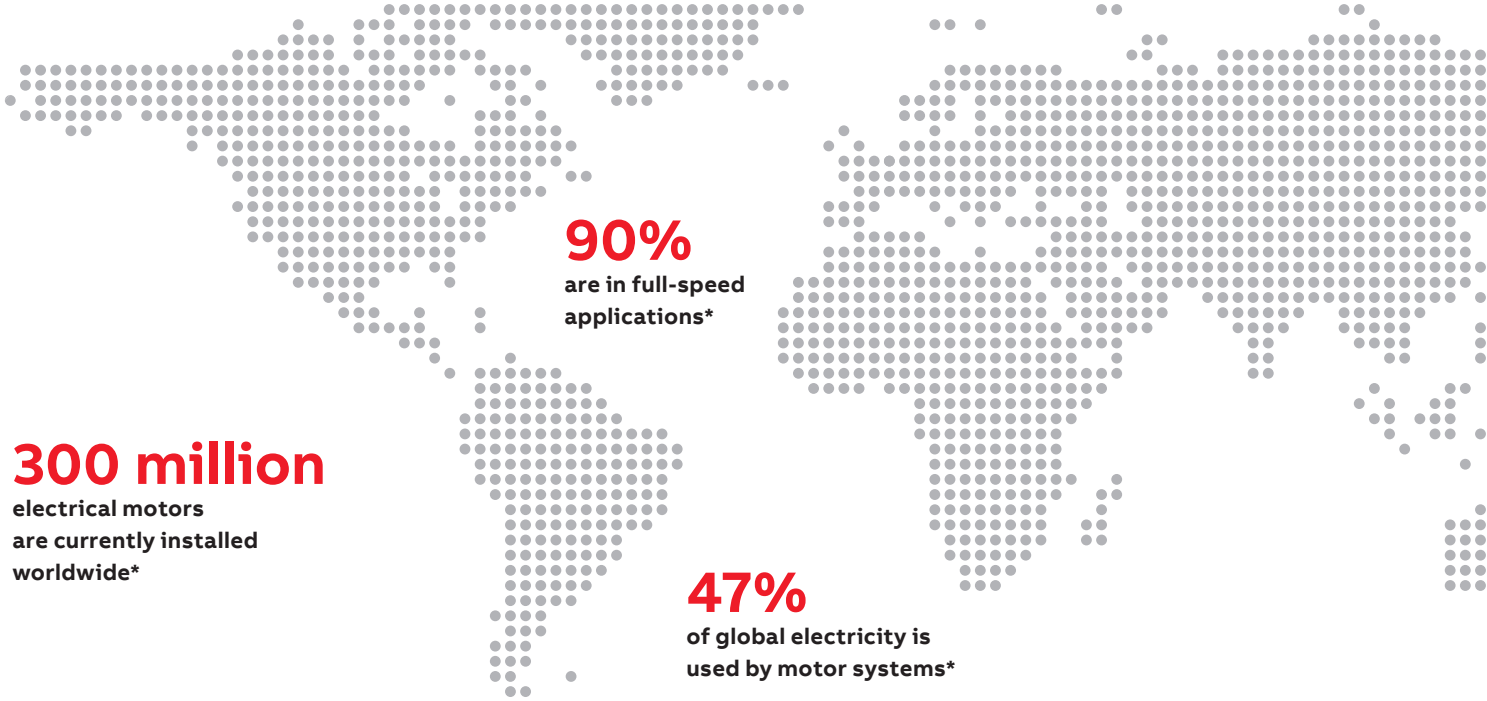
**3/**20 **Ordering details**

**3/**22 **Technical details**

**3/**26 **Technical diagrams**

# Motors - the key driver of world industry

Motors make the industrial world go round. With the latest digitalization innovations, the control of your motors can achieve even higher levels of efficiency with benefits such as real-time data monitoring and predictive analytics.



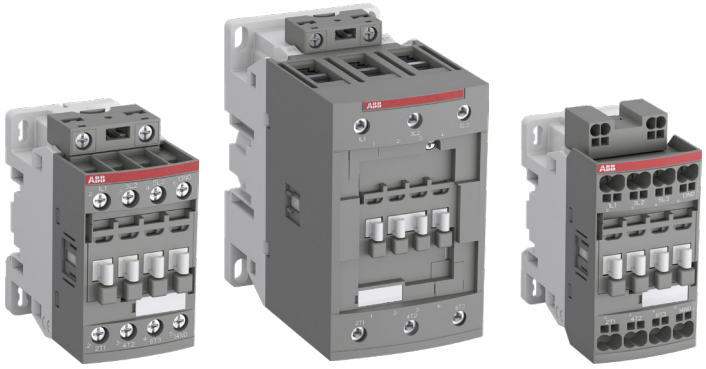
**90%**
**are in full-speed applications***

**300 million**
**electrical motors are currently installed worldwide***

**47%**
**of global electricity is used by motor systems***

# Zero
## need to replace existing AF contactors

ABB's market-leading contactors have an advanced, electronically-controlled magnet system that covers the complete power range. Our contactors are complemented by a full list of accessories. Novolink devices are compatible with 24 V DC coil contactors – from AF09 up to AF96 in screw & from AF09 up to AF38 in Push-In Spring.



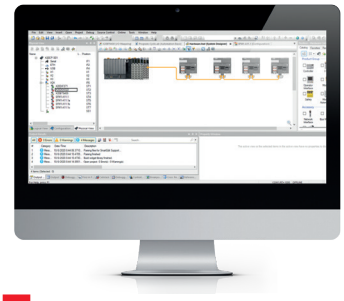
*own estimations

# Digitalize one of the best motor starting portfolios on the market

Decide for yourself how you want to digitize your motor starting solutions - with the new Novolink modules even advanced motor protection and equipment monitoring is fast and easy.



PLC



## Easy

**drag and drop integration in B&R automation studio.**

X2X





## Level 3

Advanced motor protection and connected equipment monitoring.

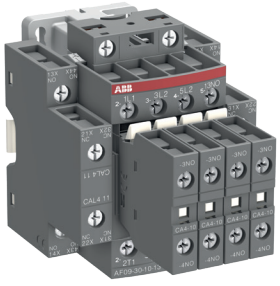
X2X

Binary I/O signals



## Level 2

Basic maintenance counters.
Integrated check-back monitoring.



## Level 1

Auxiliary contactors to build local control logic and realize connection to a PLC via I/O signals.

## The choice is yours: select and mix as needed

# From conventional to digital

With Novolinks' enhanced capabilities, you can move from corrective to predictive maintenance, continually optimizing your process.




**Limited to**
- Hard-wired remote control
- Protection and metering functions with conventional devices

**Collecting data**
- Measurements such as current, voltage, power
- Diagnosis information and maintenance counters

**Connection**
- Seamless integration into the B&R automation studio
- Built-in X2X communication

**Control & supervision**
- Remote control
- Condition monitoring

**Delivering solutions**
- Enabling predictive maintenance, data analysis and new business models
- Analyze and adapt throughout machine's lifecycle to improve long-term performance
- Cloud connectivity via B&R solutions for remote service and access

# Digital capabilities to deliver Industry 4.0

Digitalization is no longer optional. Novolink devices offer a smart, competitive edge, improving reliability and reducing maintenance costs.

Smart devices enhance traditional control gear with digital capabilities. They enable the predictive maintenance, remote control, fault diagnostics and data analytics required for Industry 4.0. Monitoring is taken to a new level, using collected information to analyze performance data – including current levels, operating cycles and load levels.

This allows operation and maintenance managers to effectively improve reliability and reduce maintenance costs. With B&R PLCs, monitoring can even be managed from a remote location, eliminating the need for maintenance personnel to conduct regular on-site checks.



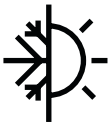
# Novolink devices in low voltage motor applications

Explore a world of potential, from control to distribution panels.

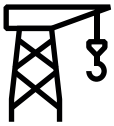
Novolink's ease of commissioning and functionality creates enormous opportunities for a wide range of industrial applications. Applications include:



Pump



HVAC



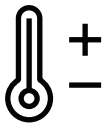
Hoisting



Agitator



Fans



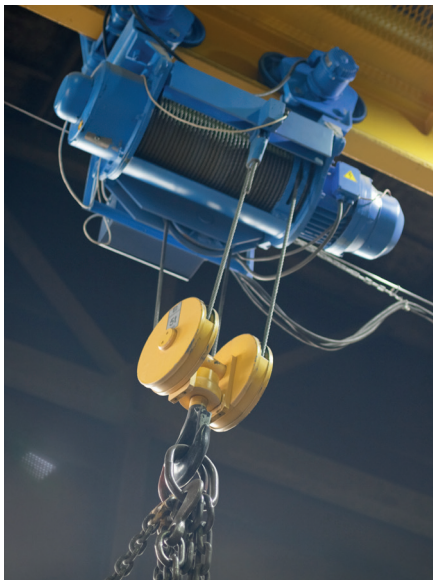
Heating



Lighting



Conveyors











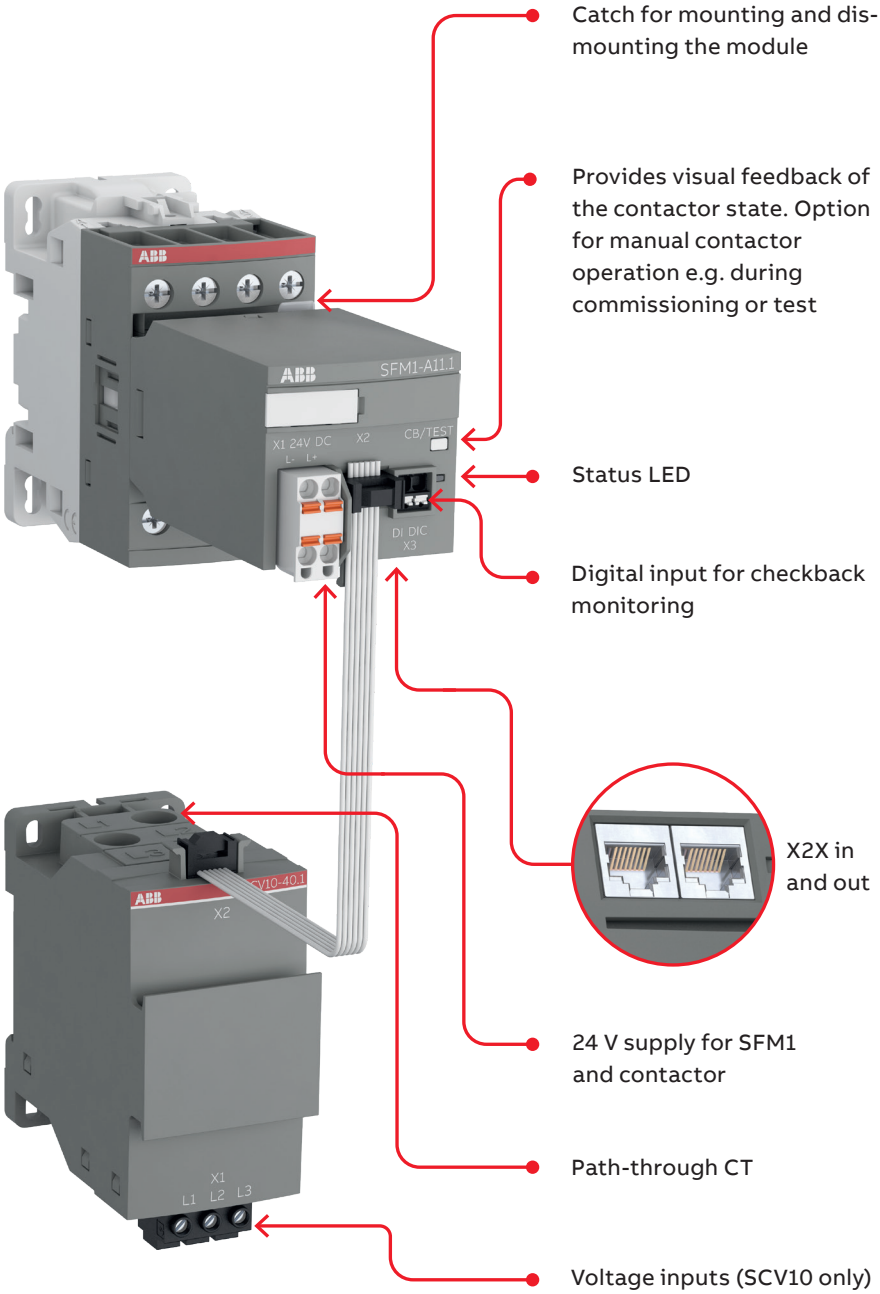
# A closer look at smart devices

**Smart function device SFM1**
This contactor module snaps onto contactors from AF09 to AF96 with 24 V DC operated coil. It is seamlessly integrated into the B&R automation system via the X2X bus.

- Provides relevant maintenance counters like motor operating hours, trip counters and more
- Allows monitoring of short circuit protection devices using a digital input
- Helps to detect problems in load, supply and feeder side in order to solve problems as quickly as possible

**Smart current voltage devices SCV10/ SC10**
These high-end motor protection devices provide an optional extension to the contactor module. They enable the status of the connected equipment to be assessed.

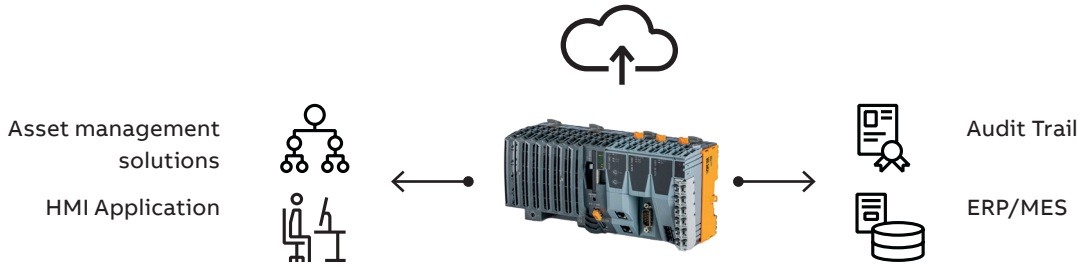
Both types:
- Measure phase currents, frequency, earth fault, total harmonic distortions and other relevant parameters
- Feature an advanced thermal model of the motor which is calculated for selectable trip classes from 5E - 30E
- Time to trip, time to cool and the actual thermal load level are available for optimized control
- Integrated current transformers up to 40 A nominal current




SCV10 only:
- Additional integrated voltage measurement up to 690 V AC
- Cos-phi and real power allows to monitor and protect pumps and other connected loads

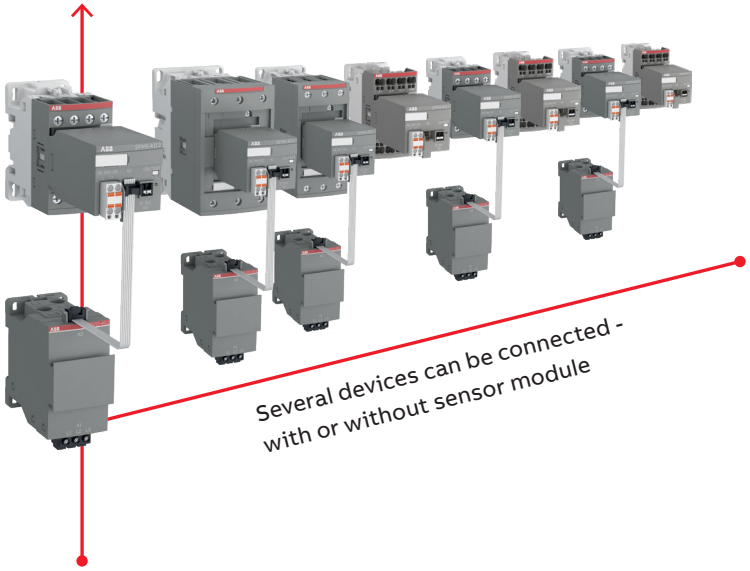
# The link between motors and digitalization

By effortlessly connecting the factory floor to the cloud,
Novolink is essential to increase overall equipment effectiveness.




**100%**

**Data availability**




**1st**

**entirely B&R compatible motor starting solution**





**Engineering efficiency** - only two configurable components cover a wide range of applications, reducing devices where otherwise auxiliary devices are needed.



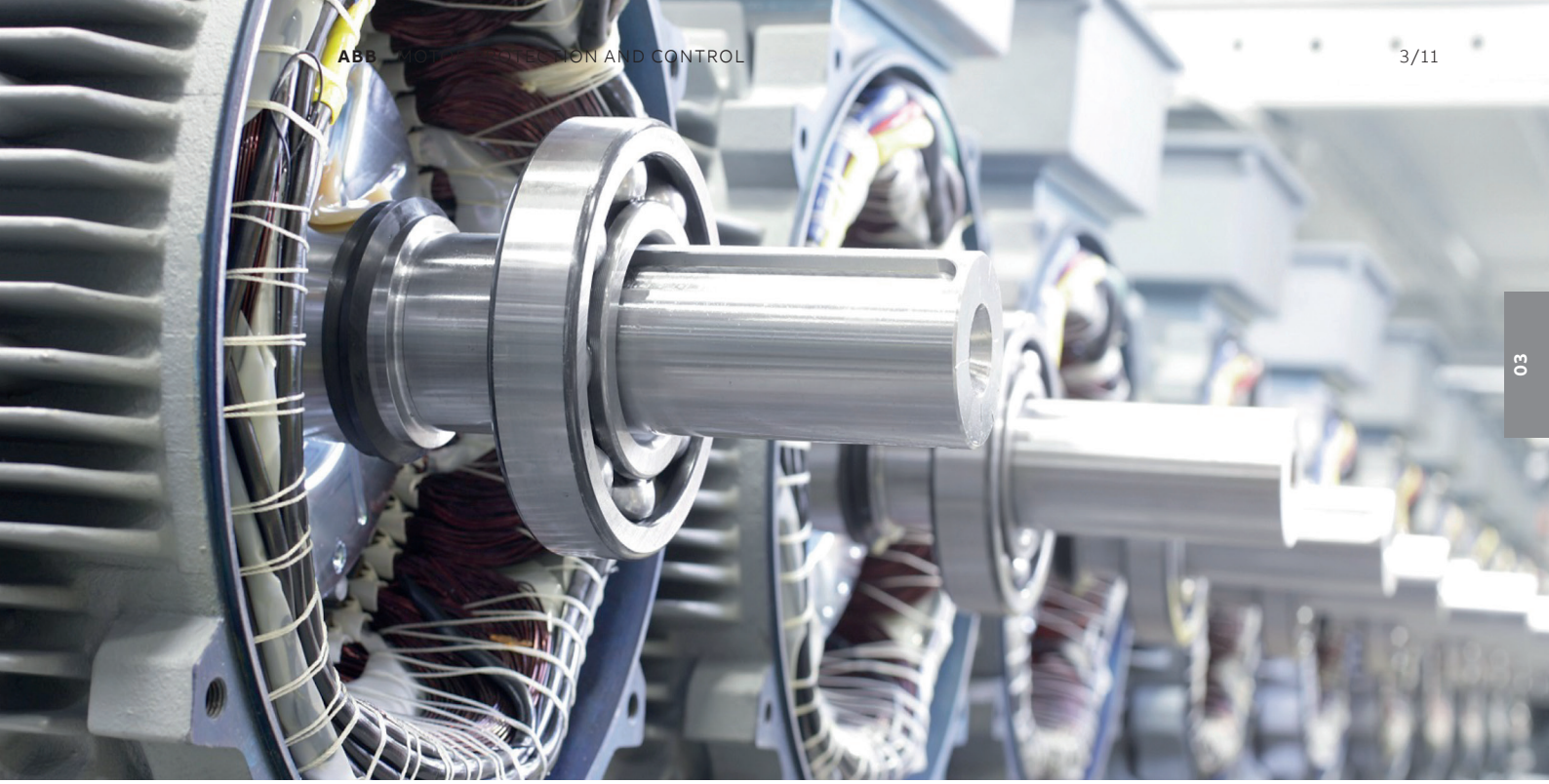
**Preventive machine maintenance** uses live data from relevant motor parameters



Digitalization allows **remote contactor control and condition monitoring**



**Speed of installation**
Reduction of control side wiring. Integration of multiple functions into one device. Reduction of required PLC I/O signals.

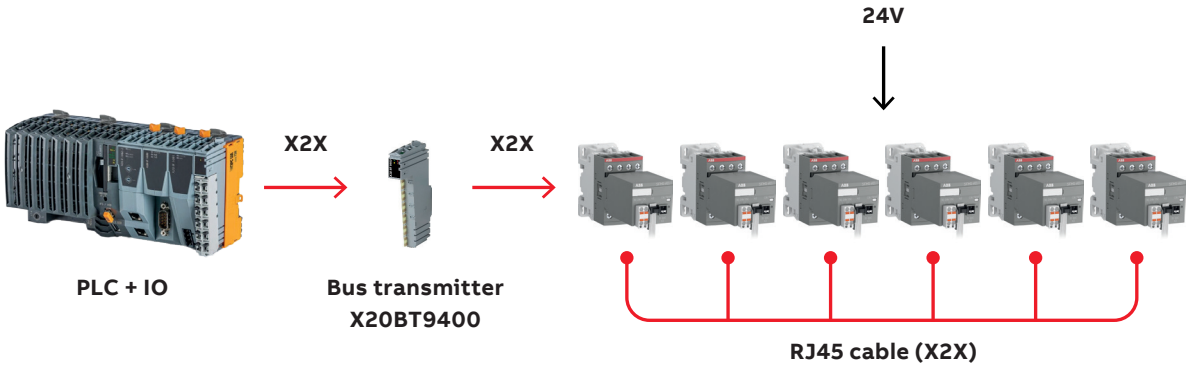




**B&R advanced application integration**
Data from the Novolink devices can be used directly with a wide range of B&R system applications including SCADA, HMI application, audit trail, ERP/MES and cloud infrastructure.

**Transform your existing portfolio with the B&R Automation Studio**
The B&R Automation Studio offers an integrated software development environment with tools for every project phase. This includes a wide selection of diagnostics for system optimization. You can access extensive target system information via the web with the System Diagnostics Manager. Better still, the controller, drive, communication and visualization are all configurable in one environment, reducing integration time and maintenance costs.

**Effortless commissioning with B&R PLCs**
Novolink devices can connect easily to X2OBT9400 with ready-made SFM-CAB-RJTB cables. On one side, the SFM-CAB-RJTB cable has a cable shield clamp which connects to the terminal block (containing all the required wires), while the other side has an RJ45 plug which connects to the SFM1 module. Novolink devices can be connected in a daisy chain with multiple devices working in a sequence by simply using standard Ethernet cables.



# Ease of design and commissioning

A closer look at the key benefits

**Reduced number of components and simplified wiring**
In an increasingly fast-paced world, the need for rapid, effective integration with existing systems is essential.

Simply mount the device on an AF contactor to digitalize operations, without increasing the width of your contactor. Novolink devices are cost-effective and even allow for the retrofitting of an existing 24 V DC supplied AF contactor. In such a case often only the control wiring needs to be changed.

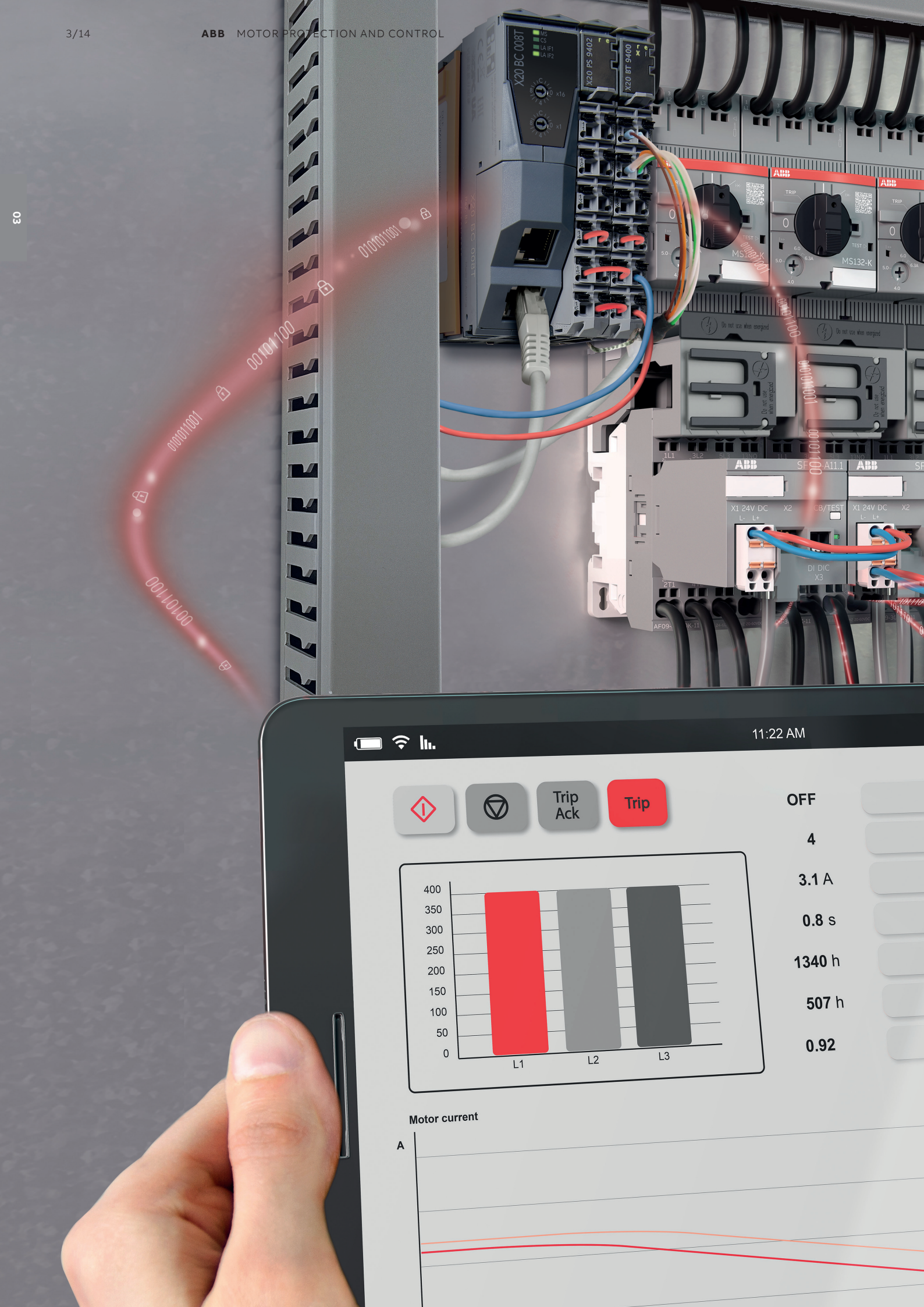
**Reduced engineering efforts**
An industrial environment is a complex space, which is why Novolink devices were expertly engineered to streamline high-grade motor monitoring and protection. Its out-of-the-box functionality ensures simplicity on the factory floor and beyond.

The standard controls are ready to use without additional engineering and there is no need for expensive specialist cabling or additional training. Programming is drastically simplified because all data is available from a single node representing the feeder. Your motor protection is customizable to the need of your application.

**Transform your existing portfolio**
Novolink uses standard components like AF contactors, to take your existing solution to another level of innovation. With no need for extensive training, the Novolink opens up new possibilities for your expertise.




11:22 AM
Trip Ack
Trip
OFF
4
3.1 A
0.8 s
1340 h
507 h
0.92
External trip
Trip counter
Startup current
Startup time
Operation hours
Stand-still hours
Cos phi
400
350
300
250
200
150
100
50
0
L1
L2
L3
Motor current
A
5
English


11:22 AM
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L1
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Motor current
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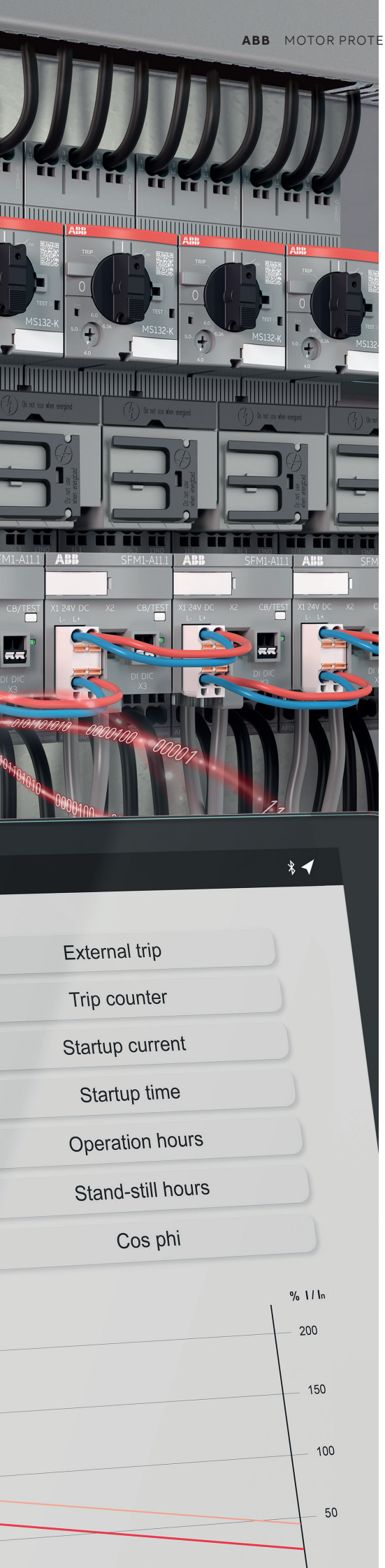



# Innovation through digitalization

Guiding you on your journey to a digital future

**Enhanced analytics for improved performance**
Optimize the performance of your machine in real time with data-driven decision making.

The Novolink's fully digitalized approach means that data trends can be analyzed over the long term so processes can be adapted to maximize performance.

**Create new business models**
With Novolink, you can offer clients digital services like cloud-based predictive maintenance to pinpoint potential faults with speed and accuracy. An increase in overall equipment effectiveness provides added value for your customers.

Enhanced analytics brings machine builders and OEMs closer to their customers and enables more efficient re-stocking via online data.

**100% data availability**
Through integrated connectivity and seamless integration into B&R solutions, relevant information can be derived from raw data.

Integration into other systems is easily possible with B&Rs OPC-UA server solutions and other gateways.

# Optimized operations and maintenance

Increase your efficiency through innovation

**Reduce downtime**
Use Novolink's remote monitoring capabilities to reduce costs and increase overall uptime. Operatives can immediately isolate problem areas (such as a malfunctioning load) and suggest solutions before disruption is caused. For ease of use, all control, monitoring and diagnostic signals are fully visible and there is clear fault localization.

**Service-on-demand**
Avoid unnecessary scheduled servicing by moving from fixed service cycles with Novolink devices. Advanced diagnostic capabilities make it easier to address issues on demand, from switching off idle processes to saving energy through optimizing parameters. You can combine real-time diagnostics with long-term data trend analysis to unlock new service modules.

**Enable preventive maintenance**
Getting ahead of faults and problems is key to consistent uptimes, maintaining the longevity of equipment and ensuring the ongoing flow of production.

With Novolink, you can set thresholds and receive pre-warnings before equipment failure to reduce energy consumption through optimized operation parameters.




11:22 AM
Trip
Trip Ack.
OFF
4
3.1 A
0.8 s
1340 h
507 h
0.92
External trip
Trip counter
Startup current
Startup time
Operation hours
Stand-still hours
Cos phi
Motor current
A
English

# Smart and safe manufacturing with ABB safety products and B&R solutions

B&R provides industrial automation solutions and is the global center for machine and factory automation within ABB since 2017. B&R offers PLCs with integrated safety for processing lines or machines automated with B&R

**Compatible safety products from ABB Jokab Safety**

The safety products from ABB Jokab Safety are tested, verified and certified to be connected directly to the B&R safety system. This makes ABB able to offer well-tried and proven safety solutions together with B&R.



Sensors,
switches and locks



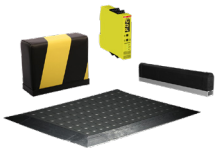
Optical safety devices



Control
devices



Emergency stops
and pilot devices



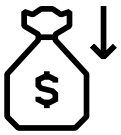
Pressure
sensitive devices



Tina
adapters



**Safe solutions**
Reaches the highest level of safety (up to PL e/Cat 4). Certified, verified and reliable safety solutions. Extensive fault detection. Several different types of safety sensors and devices available to suit all safety needs.



**The advantages of DYNlink**
The DYNlink signal significantly reduces the required number of cables and safe input channels which leads to more cost-effective solutions.

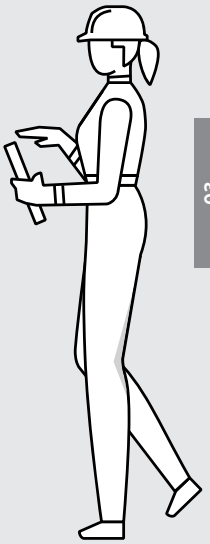


**Developed with installation in mind**
Easy connection with M12 connectors. A wide range of adapters and connectors to simplify wairing.
Minimum amount of cabling simplifies installation.

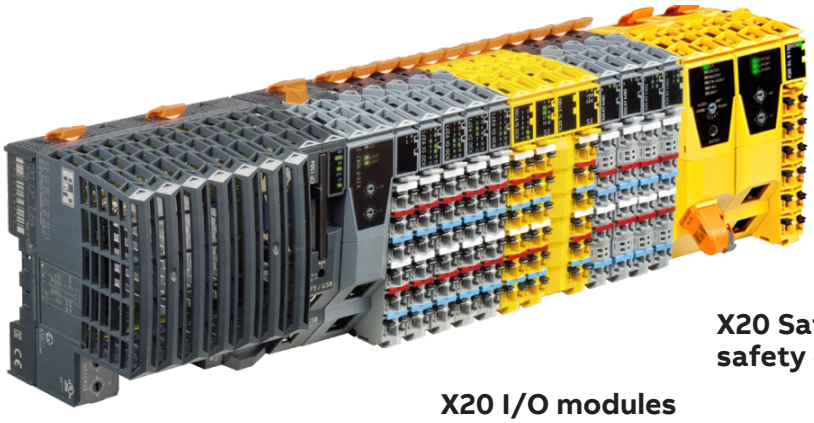


**Do you think about safety?**

ABB does - find more information on the ABB Jokab Safety offer, details about the products and their applications online.







X20 SafeLOGIC safety controller

X20 I/O modules

X20 CPU

**B&R safety controller**

In order to supervise ABB safety sensors using B&R controllers the following units are required:

- SafeLOGIC safety controller
- X20 CPU (since the SafeLOGIC is not a standalone PLC)
- Safe X20 I/O modules (to connect the safety devices)



**Dry contacts (potential free/zero volt)**
B&R supports all ABB Jokab Safety products with dry contacts. For this use case, the B&R safe I/O module provides a unique pulse signal which ensures best cable diagnostic.

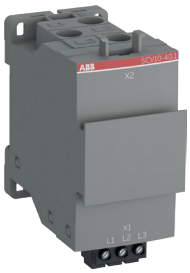


**OSSD**
B&R supports all ABB Jokab Safety products with OSSD interface. For this use case, the B&R safe I/O module provides a filter to avoid influencing the application by the OSSD low phase.



**DYNlink**
B&R supports all ABB Jokab Safety products with DYNlink interface. (Available and TÜV-certified in B&R mapp Safety from version 5.12)

# Ordering details



SCV10-40.1



SC10-40.1



SFM1-A11.1



SFM-CAB-RJTB.1-500



SFM-CAB-S.1-50



SFM-CAB-S.1-25

**Description**

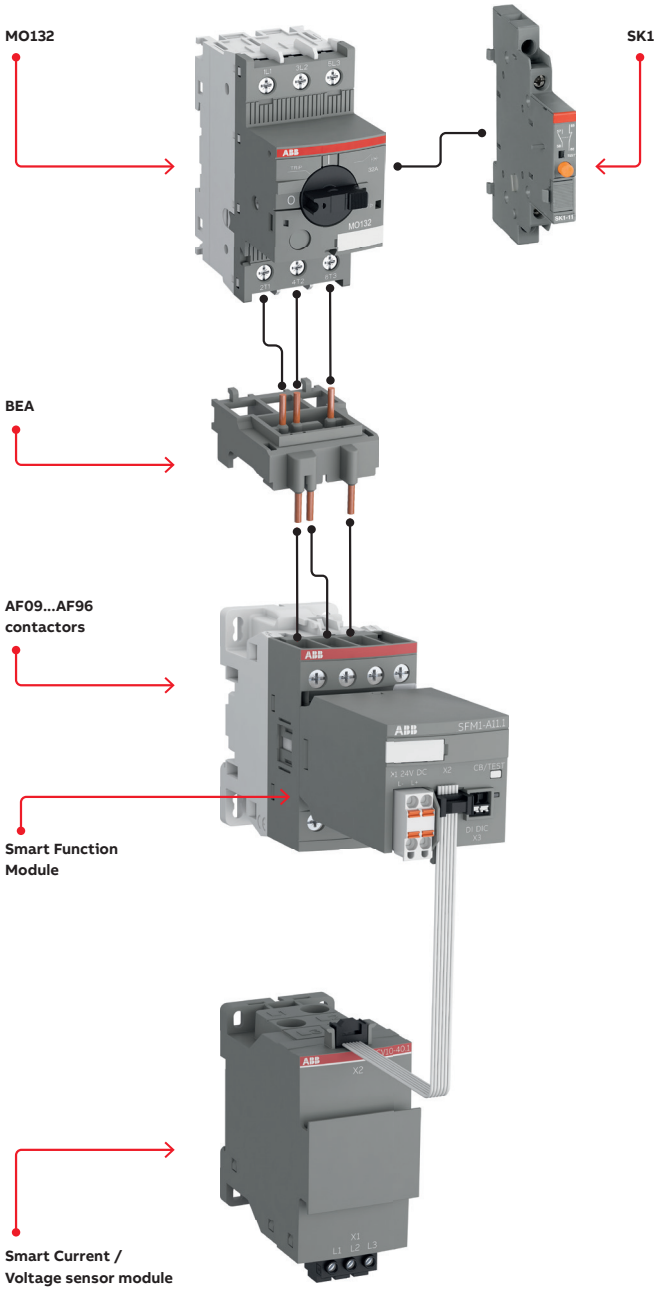
ABB`s Novolink devices consist of the smart function module SFM1 and the sensor module SCV10-40. They allow the remote control and monitoring of AF contactors via X20 bus from within a B&R PLC. The sensor module SCV10-40 is optional and can be connected to the SFM1 module and provides functions for motor and application protection. It provides data for measuring voltage, current, frequency and further derived physical quantities such as cos phi, real power etc.

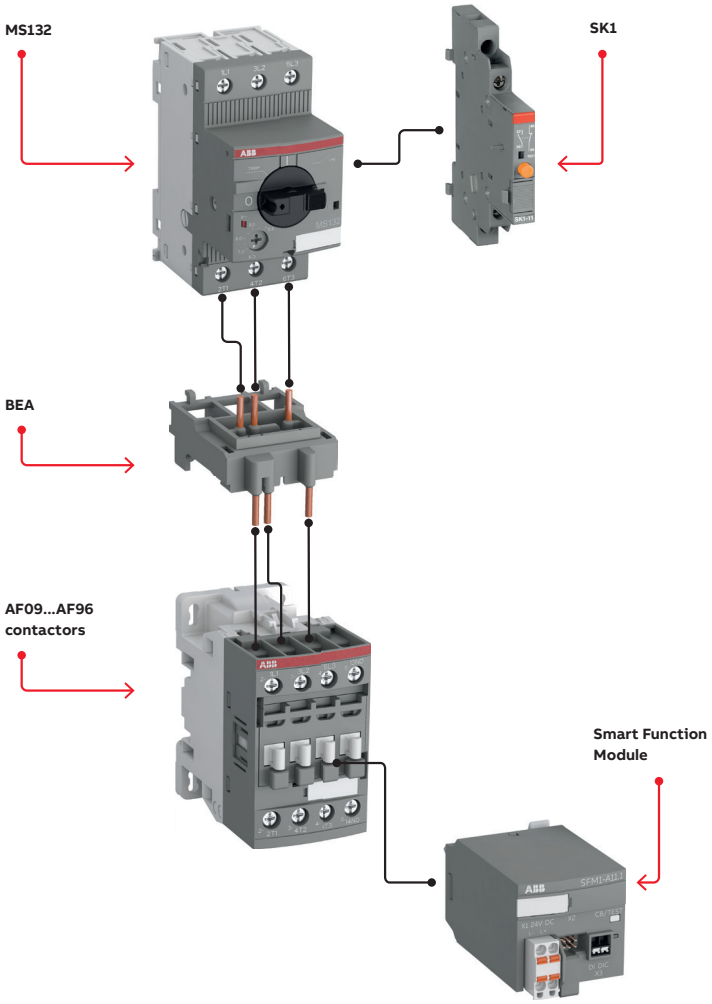
The SFM1 can be snapped onto AF09...AF96 contactors with 24 V DC coil voltage. The module is equipped with two X2X interfaces for incoming and outgoing connections (daisy chain). The module and contactor are supplied via 24 V DC that are also used for the SCV10-40 module.

—

**Ordering details**

| Description | Type | Order code | Weight (1 pc) kg (lb) |
|---|---|---|---|
| Connection cable from PLC to first SFM1 module | SFM-CAB-RJTB.1-500 | 1SVM823000R0500 | 0.192 kg (0.423 lb) |
| Connection cable from SFM1 to SCV10, length 50 cm | SFM-CAB-S.1-50 | 1SVM811000R0050 | 0.015 kg (0.0331 lb) |
| Connection cable from SFM1 to SCV10, length 25 cm | SFM-CAB-S.1-25 | 1SVM811000R0025 | 0.008 kg (0.0176 lb) |
| Smart current and voltage sensor module | SCV10-40.1 | 1SVM320010R0000 | 0.23 kg (0. 507 lb) |
| Smart current sensor module | SC10-40.1 | 1SVM310010R0000 | 0.195 kg (0.429 lb) |
| Smart function module | SFM1-A11.1 | 1SVM120012R0000 | 0.11 kg (0.243 lb) |


MO132
SK1
BEA
AF09...AF96
contactors
Smart Function
Module
Smart Current /
Voltage sensor module


MS132
SK1
BEA
AF09...AF96
contactors
Smart Function
Module

# Technical details
## Smart function module

Data at $T_a$ = 25 °C and rated values, unless otherwise indicated

### Smart function module

| | | |
|---|---|---|
| **X2X Interface (X4, X5)** | | |
| Rated control supply voltage $U_s$ | according to B&R X20 system specification | |
| Rated control supply voltage $U_s$ tolerance | according to B&R X20 system specification | |
| Typical current / power consumption<br>(delivered by X2X link power supply output from X20BT9400) | 30 mA / 600 mW | |
| Recommended RJ45 cable | Cat 5e SF/UTP AWG 26 / 1:1 connection<br>Cat 6 S/FTP AWG 27 / 1:1 connection | |
| Max. distance between nodes<br>Max. distance from X20-BT9400 to first SFM1 | 20 m | |
| Max. number of nodes on one X20-BT9400 | 8 | |
| Max. length of total network from start to last module with 8 modules | 160 m | |
| Grounding | according to B&R X20 system specification, the accessory SFM-CAB-RJTB provides the required grounding of shield | |
| Minimum cycle time<br>The minimum cycle time defines how far the bus cycle can be reduced without communication errors occurring. Note that very fast cycles decrease the idle time available for handling monitoring, diagnostics and acyclic commands. | 300 us | |
| **Contactor supply circuit SFM1 (X1)** | | |
| Rated control supply voltage $U_s$ | 24 V DC | |
| Rated control supply voltage $U_s$ tolerance | 22 … 31.2 V incl. ripple<br>It must be ensured that the minimum supply voltage is available at the last contactor in a supply chain. | |
| Typical current / power consumption (AF coil current not considered) | 20 mA / 480 mW (SCV40-10 module)<br>20 mA / 480 mW (SC40-10 module) | |
| Reverse polarity protection | no | |
| Short circuit protection of contactor control outputs | yes | |
| Max. load current for AF contactor | coordinated with supported AF contactor types | |
| Min. power failure buffering time | 10 ms | |
| **Digital Input (X3)** | | |
| Number of digital inputs | 1 | |
| Supply for digital inputs | internal | |
| Isolation | no | |
| Input signal bounce suppression | configurable (see module parameters) | |
| Typical input current at nominal supply | 7.5 mA | |
| Max. voltage loss at closed external auxiliary contact | max. 2 V | |
| Max. cable length | 10 m | |
| **General data** | | |
| MTBF | on request | |
| Duty time | 100 % | |
| Dimensions | see dimensional drawings | |
| Weight | 0.11 kg | |
| Mounting | Snapping on AF09 – AF96 | |
| | AF09(Z)...-nn | AF40...-11 |
| | AF12(Z)...-nn | AF52...-11 |
| | AF16(Z)...-nn | AF65...-11 |
| | AF26(Z)...-nn | AF80...-11 |
| | AF30(Z)...-nn | AF96...-11 |
| | AF38(Z)...-nn | |
| | nn = 11, 21, 30 | |
| Mounting position | on AF contactor. 1-4, 5: max. current = AC-3 current of contactor | |
| Minimum distance to other units | 0 mm for side to side mounting<br>5 mm to metal parts (e.g. control panel wall) | |
| Material of housing | UL 94 V0 | |
| Degree of protection | IP20 | |

# Technical details
## Smart voltage and current sensor modules

| Electrical connection X1, X3 | | X1 | X3 |
|---|---|---|---|
| Push-In | 1x | 0.2...2.5 mm²<br>24...12 AWG | 0.2...1.5 mm²<br>24...16 AWG |
| | 1x | 0.25...2.5 mm² | 0.2...1.5 mm² |
| | 1x | 0.25...2.5 mm² | 0.2...0.75 mm² |
| | 1x | 0.2...2.5 mm²<br>24...12 AWG | 0.2...1.5 mm²<br>24...16 AWG |
| Spring | 1x | 0.2...2.5 mm²<br>24...12 AWG | 0.2...1.5 mm²<br>24...16 AWG |
| | 1x | 0.25...2.5 mm² | 0.2...1.5 mm² |
| | 1x | 0.25...2.5 mm² | 0.2...0.75 mm² |
| Screwdriver type | | 0.6 x 3.5 mm | 0.4 x 2.5 mm |
| Tightening torque | | 10 mm | 8 mm |
| **Electrical connection X2** | | use ready-made cables, see accessories. | |
| Max cable length | | 0.5 m | |
| Basic insulation | | 300 V | |

Ensure safe distance from motor wires and other high voltage cables.

### Smart voltage and current sensor modules

| Input circuit | | SCV10-40 | SC10-40 |
|---|---|---|---|
| Nominal frequency | | 50/60 Hz (45 ... 65 Hz) | |
| Measurement method | | true RMS (up to 13th harmonics) | |
| Number of phases | | 1/3 | |
| Nominal measuring range current | | 0.2 to 40 A AC | |
| Measured current range | | 0.2 x $I_e$ ... 15 x $I_e$ | |
| Nominal voltage range | 3 phase | 150 to 690 V AC ± 10 % | - |
| | 1 phase | 90 to 400 V AC ±10 % | - |
| Measurement accuracy given at Ta=25 °C, 50/60 Hz | $I_{rms}$ (range 0.2 * $I_e$ ≤ 0.75*$I_e$) | ±3 % | |
| | $I_{rms}$ (range 0.75 * $I_e$ ≤ 2*$I_e$) | ±1,5 % | |
| | $I_{rms}$ (range >2 * $I_e$ ≤ 15*$I_e$) | ±3 % | |
| | $U_{rms}$ | ±1.5 % | - |
| | power factor ≥ 0.5 (inductive) | typ. ±1.5% ($I_{rms}$ > 3 A) | - |
| | apparent power | typ. ±3 % | - |
| | active power (cos phi > 0.5) | typ. ±5 % | - |
| | frequency (50/60 Hz) | ±1.5 % | - |
| | current imbalance | typ ±10 % (condition: $I_{mot}$ > 150 mA) | |
| | voltage imbalance | ±10 % | - |
| | voltage total harmonic distortion (THD) | ±5 % | - |
| | current total harmonic distortion (THD) | ±10 % (condition: $I_{mot}$ > 1A) | |
| Measurement range of earth fault current | | > 20% of $I_e$ | |
| Earth fault current | | $I_e$ < 1.0 A : ±25 % (condition: $I_{mot}$ > 100 mA and $I_{earth}$ > 80 mA)<br>$I_e$ >1.0 A : ±10 % (condition: $I_{mot}$ > 200 mA and $I_{earth}$ > 200 mA) | |
| Supported network types | | 1/3 phase, grounded networks | |
| Trip classes, selectable by parameter | | 5E, 10E, 20E, 30E | |
| Tripping time for phase loss | | determined by parameter CurrPhaseLossDelayPar.<br>adjustable from 0 ... 25.5 s | |
| Load per phase | | approx. 30 mΩ | |
| Short-circuit protection | | provided by external short-circuit protection device, e. g. MO, MCB, MCCB or fuse. Refer also to ABB coordination tables available here: www.lowvoltage-tools.abb.com/soc/ | |
| Max cross-section of wires. Use isolated wires only! | | 16 mm² | |

# Technical details

## Smart voltage and current sensor modules

| **Input circuit** | | **SCV10-40** | **SC10-40** |
|---|---|---|---|
| Conductor holes in the current transformers | | 13 mm | |
| Performance under short-circuit conditions<br>Coordination type 2<br>$I_q$: Rated conditional short circuit current | Iq | 100 kA | 80 kA |
| | | 500 V AC | 690 V AC |
| | fuse | 200 A gG | 200 A gG |
| Additional information relating to cULus approval | | suitable for use on circuits capable of delivering not more than 100 kA rms, symmetrical, 600 V AC maximum, when protected by 100 A, class K5/RK5 fuses, use fuses only | |
| **Electrical connection X1** | | | |
| Connecting capacity | 1x | 0.2...2.5 mm²<br>24...12 AWG | |
| | 1x | 0.2...2.5 mm²<br>24...12 AWG | |
| | 1x | 0.2...2.5 mm² | |
| | 1x | 0.2...2.5 mm² | |
| Stripping length |  | 8 mm | |
| Screwdriver type |  | 0.6 x 3.5 mm | |
| Tightening torque | | 0.5...0.6 Nm | |
| **General data** | | | |
| MTBF | | on request | |
| Duty time | | 100 % | |
| Dimensions | | see dimensional drawings | |
| Weight | | 0.23 kg | |
| Mounting | | DIN rail (IEC/EN 60715), snap-on mounting without any tool<br>screw mounting with mounting clips<br>screw mounting with screws (M4) | |
| Mounting position | | any | |
| Minimum distance to other units | | - | |
| Material of housing | | UL 94 V2 | |
| Degree of protection | | IP20 | |

# Technical details
## Common technical data

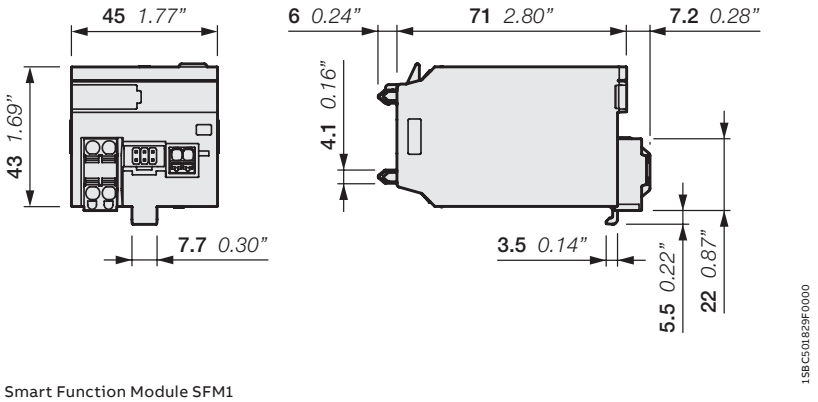
### Common technical data

| | | | | |
|---|---|---|---|---|
| **Environmental data (common)** | | | | |
| | | | **SFM1** | **SCV10-40/ SC10-40** |
| Ambient temperature ranges | | operation | -25 to +60°C | |
| | | storage | -40 to +70°C | |
| Damp heat, cyclic (IEC/EN 60068-2-30) | | | 6 x 24 h cycle, 55 °C, 95 % RH | |
| Climatic class IEC/EN 60721-3-3 | | | 3K3 (no condensation, no ice formation) Relative humidity 5 % - 95 %, no condensation | |
| Vibration, sinusoidal | | | 4 g, 5-300 Hz | |
| Shock | | | 15 g, 11 ms | |
| **Isolation data of contactor module in combination with contactor (and sensor module)** | | | | |
| Rated insulation voltage $U_i$ | | acc. to IEC 60947-4-1 | 690 V | |
| | | acc. to UL / CSA | 600 V | |
| Rated impulse withstand voltage $U_{imp}$ SFM: Control supply, bus / mains contactor SCN: X2 (voltage input) to control supply, bus | | | 6 kV | |
| Basic insulation | | | according to technical data of contactor | |
| Protective separation pollution degree 3 | | | L/N: 277 V AC L/L: 480 V AC | |
| Protective separation pollution degree 2 | | | L/N: 400 V AC L/L: 690 V AC | |
| Pollution degree | | | 3 | |
| Overvoltage category | | | III | |
| Installation altitude without derating | | | max. 2000 m | |
| Deratings at high altitudes | | | on request | |
| **Standards / Directives** | | | | |
| Standards | | | IEC/EN 60947-1:2020 (Ed. 6.0) / EN 60947-1:2007 + A1:2011 + A2:2014 IEC/EN 60947-4-1:2019 UL 60947-4-1:2014 (Ed. 3) UL 60947-1:2013 (Ed. 5) | |
| Low Voltage Directive | | | no. 2014/35/EU | |
| EMC directive | | | no. 2014/30/EU | |
| RoHS directive | | | no. 2011/65/EU incl. 2015/863/EU | |
| **Electromagnetic compatibility** | | | | |
| Emission requirements | radio interference voltage | EN 61000-6-4 | X | |
| | | EN 61000-6-3 | | X |
| | radio interference field strength | CISPR 11 | class A | class B |
| Immunity requirements | electrostatic discharge | EN 61000-4-2 | 6 kV contact 8 kV air | |
| | radiated, radio frequency electromagnetic field amplitude modulated | EN 61000-4-3 | 10 V/m (80-6000 MHz) | |
| | electrical fast transients (burst) | EN 61000-4-4 | 2 kV (power supply lines) 1 kV (signal lines) | |
| | surge, unsymmetrical / symmetrical | EN 61000-4-5 | 1 kV / 0.5 kV (DC-supply) 2 kV / 1 kV (measurement lines) | |
| | conducted disturbance, induced by radio frequency, common mode, amplitude modulated | EN 61000-4-6 | 10 V | |
| **Performance data** | | | | |
| Cycle time in contactor module: “switch on signal” received via X2X until contactor control voltage set to 24 V DC | | | typ. 5 ms | |
| Update rate of measurement values provided from sensor module and available for X2X communication | | | typ. 25 ms | |

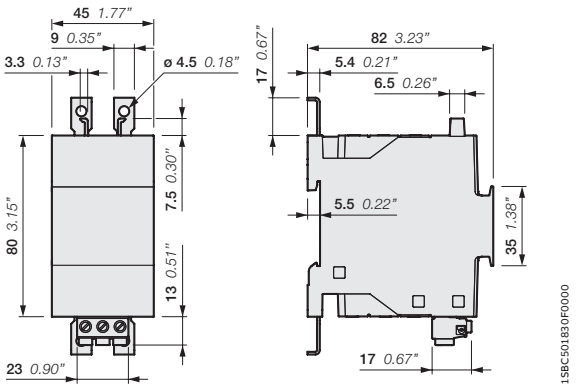
According to the current interpretation of applicable Chinese law the Novolink devices described in this document are imported as industrial automation equipment (they cannot be used without a PLC) and do not need CCC certification.

# Technical diagrams

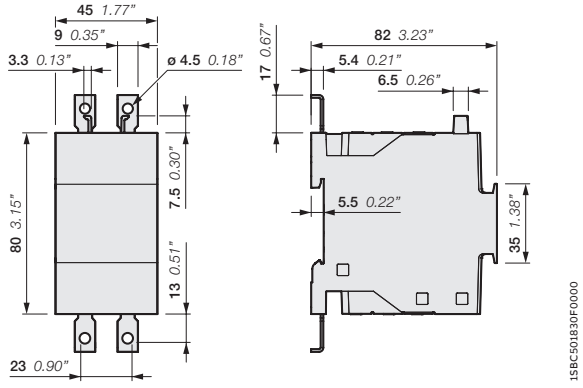
## Dimensional drawings
in **mm** and inches



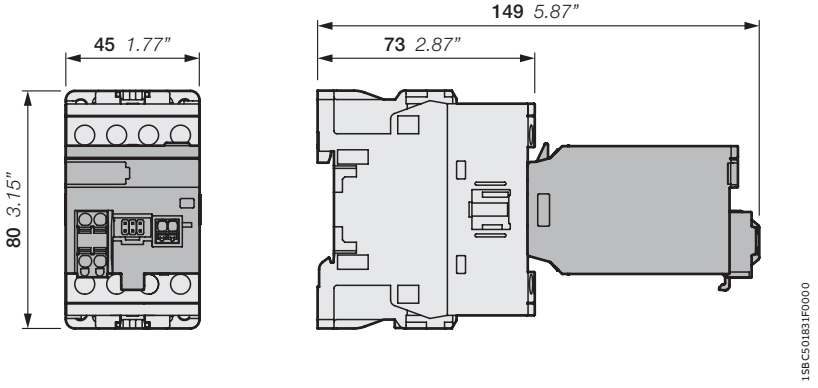

Smart Function Module SFM1




Smart Current and Voltage Sensor Module SCV10-40



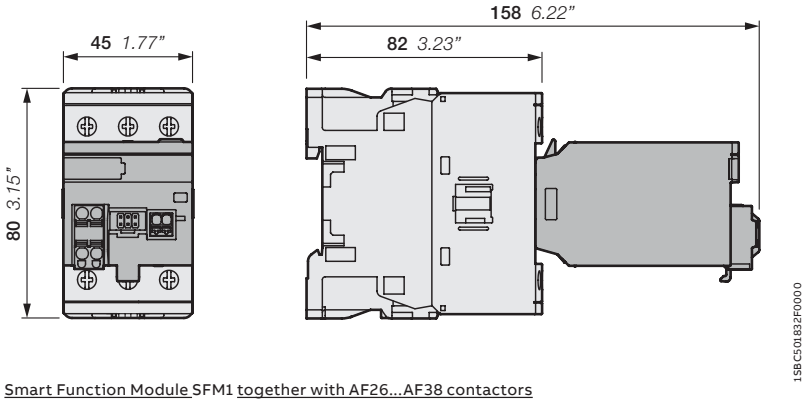

Smart Current Sensor Module SC10-40



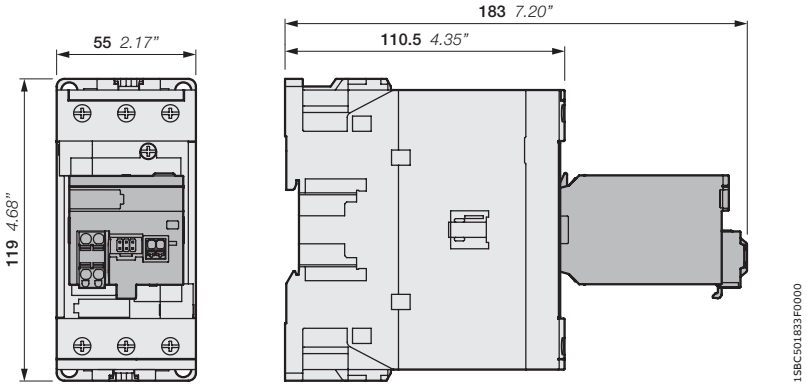

Smart Function Module SFM1 together with AF09...AF16 contactors

# Technical diagrams

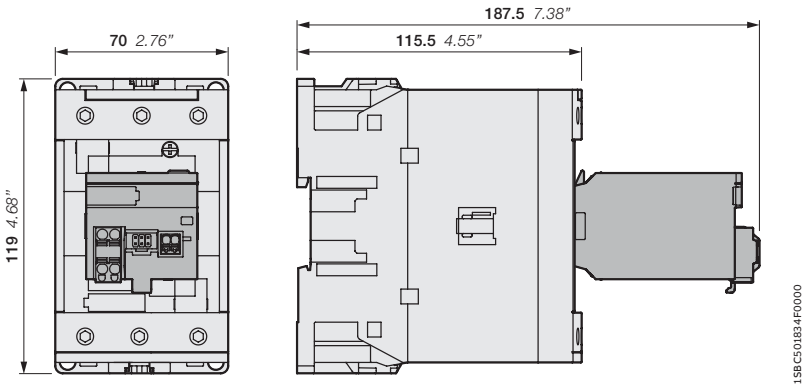
## Dimensional drawings
in **mm** and inches




Smart Function Module SFM1 together with AF26...AF38 contactors



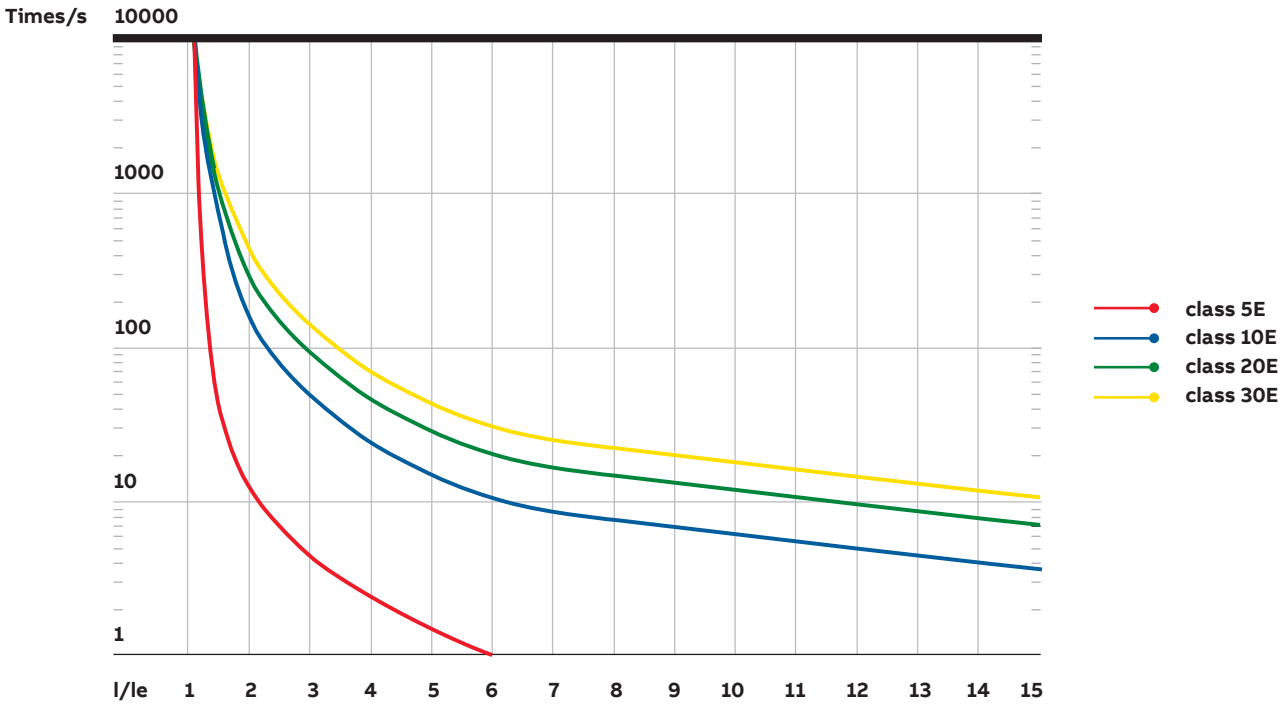

Smart Function Module SFM1 together with AF40...AF65 contactors



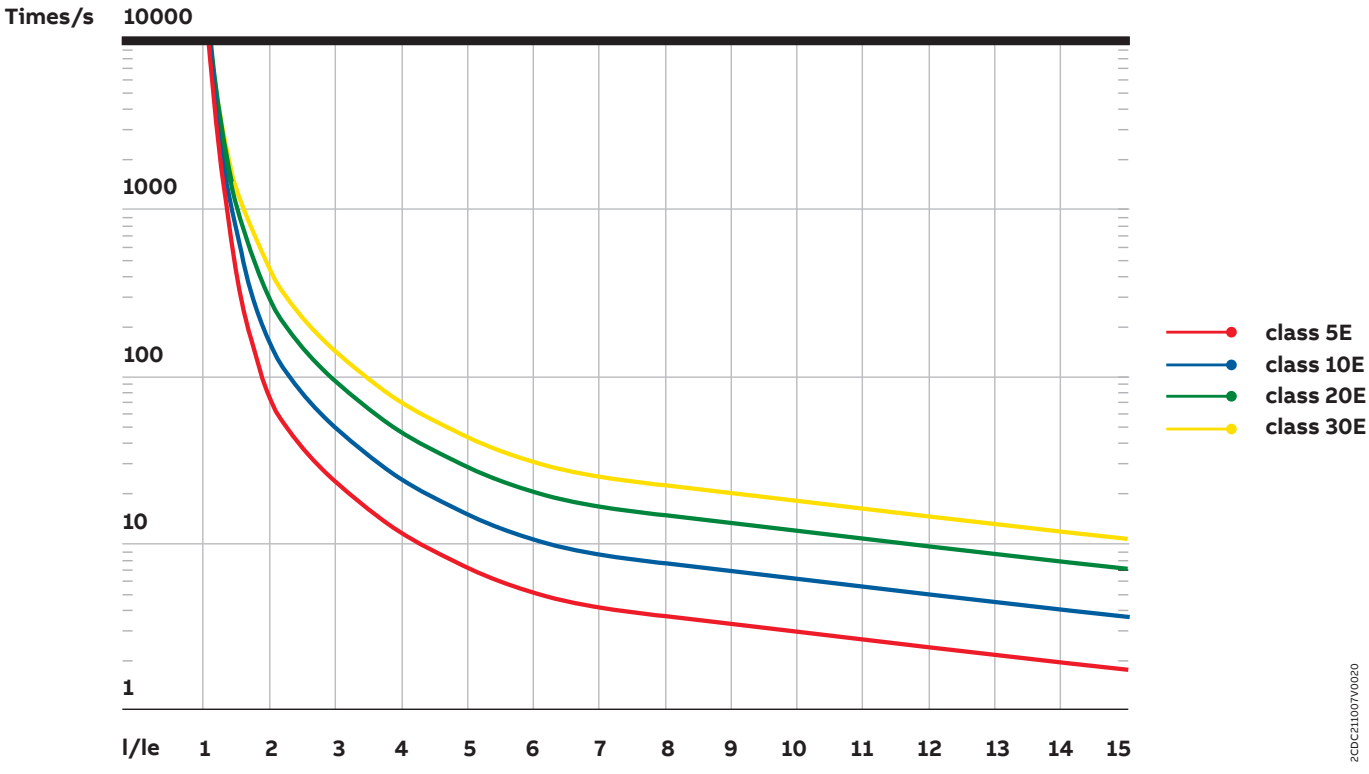

Smart Function Module SFM1 together with AF80, AF96 contactors

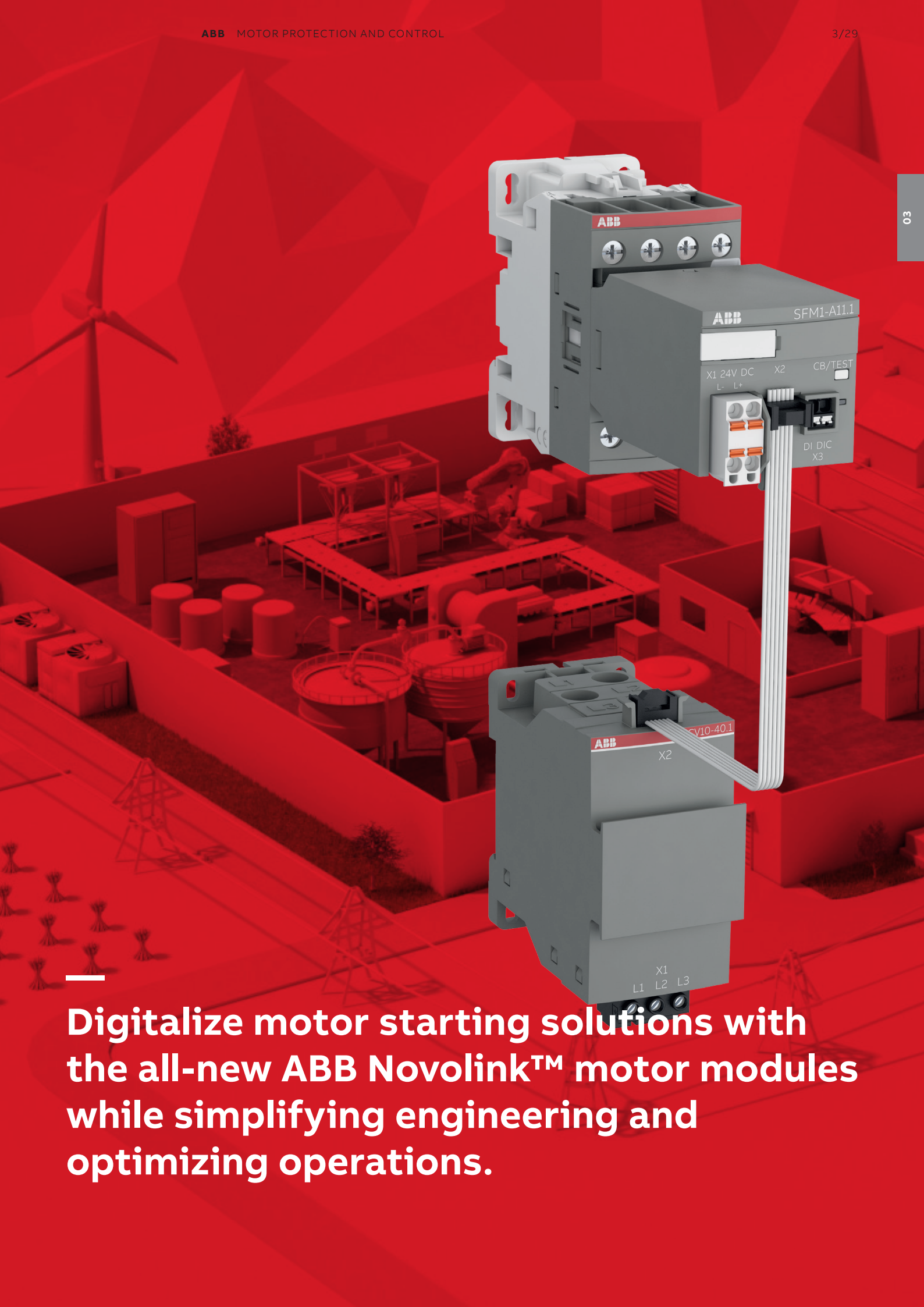
# Technical diagrams

## Tripping curves for warm motor for three-phase and single-phase symmetrical loads




## Tripping curves for cold motor for three-phase and single-phase symmetrical loads






# Digitalize motor starting solutions with the all-new ABB Novolink™ motor modules while simplifying engineering and optimizing operations.

# AF contactors for motor starting and power switching up to 2850 A




The latest technology of electronically controlled coil is our standard. It offers multiple benefits over conventional alternatives, and together with ABB's wide product offering, it is an optimal configuration, every time.

## Optimized logistics

**Cut your costs**

With its contactor and motor protection range, ABB has managed to reduce the number of contactor coils to just four.
Total number of product variants has been reduced by up to 90%. This simplifies the customers' logistics while cutting storage and administration costs.

## Continuous operation

**Secure uptime**

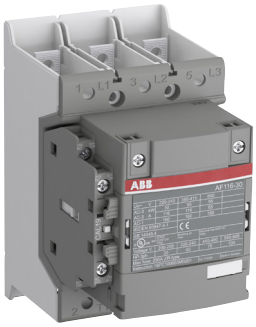
Prevent stoppages caused by voltage fluctuations. The AF contactor ensures distinct operation in unstable networks and signifies a major advance in motor control and power switching.
Voltage sags, dips and surges pose no threat. The AF contactor secures your uptime.

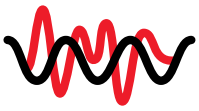
## Speed up your projects

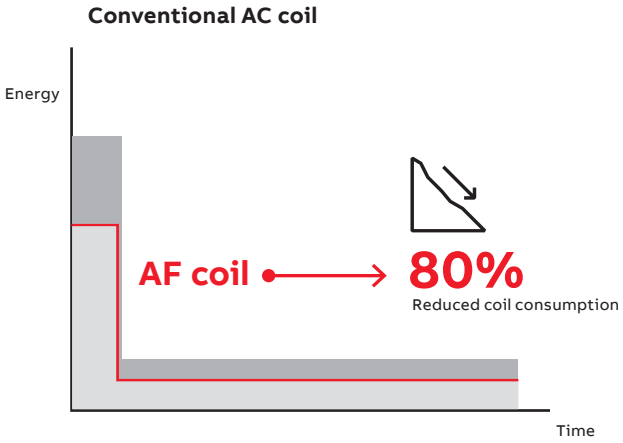
**Simplify design**

Use the same part number in Europe, Asia and North America as one contactor coil now handles 100 V – 250 V AC / DC, 50 / 60 Hz.
By reducing contactor coil energy consumption by up to 80%, panels can be built smaller and transformers more compact.

# AF technology
## Main Benefits

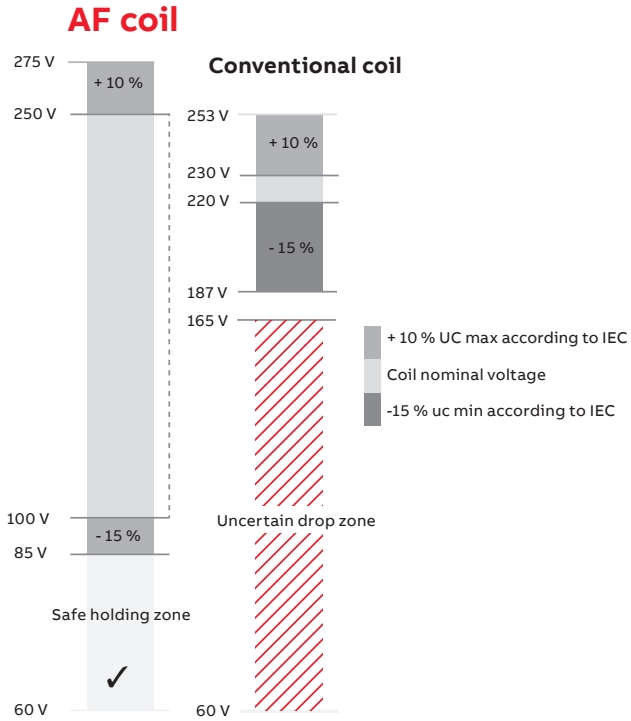


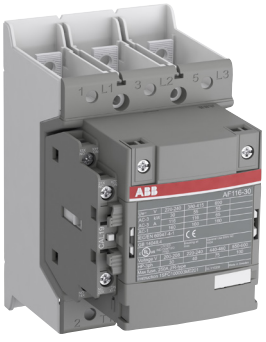


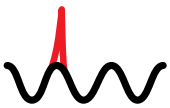



**Reliable in all networks**
The electronic system within the AF contactor continuously monitors the current and voltage apply to the coil. The contactor is safely operated in an always optimized condition and hum free.

**Reduced coil consumption**
AF coil and energy consumption is reduced up to 80%. This allows a reduction of the temperature rise, the size of control transformers and size of cabinets.





**Wide control voltage range**

With conventional contactor technology, different contactors are needed for different network voltages. Thanks to the wide operating range of the AF contactor, it can operate just as well in Europe as in Asia or North America. The core coil of the AF contactor range covers 100-250 V AC / DC, 50 / 60 Hz.

**Built-in surge suppression**

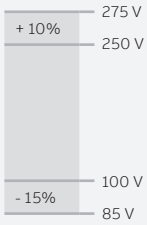
With conventional contactor technology, it is recommended to use an external surge suppressor, an accessory that could cost as much as half of the contactor. With the AF technology, the surges are handled by the contactor and never reach the control circuit. One less product and one less complication to worry about.

# Select AF contactor dedicated to your control circuit application



**Direct coil control**
Contactor coils are operated directly with an auxiliary contact or PLC-output or indirectly through an interface relay. For direct coil control, the switching capacity of coil operating device (auxiliary contact, solid state PLC-output, ...) must be verified versus the coil consumption at closing and at holding.

## AF09...AF2850 - 4 to 400kW - AC / DC operated




| AF09...AF370 | | Coil code |
|---|---|---|
| 24...60 V AC / 20...60 V DC | | 11 |
| 48...130 V | AC / DC | 12 |
| 100...250 V | AC / DC | 13 |
| 250...500 V | AC / DC | 14 |
| **AF400...AF1250** | | |
| 24...60 V | DC | 68 |
| 48...130 V | AC / DC | 69 |
| 100...250 V | AC / DC | 70 |
| 250...500 V | AC / DC | 71 |
| **AF1350...AF2850** | | |
| 100...250 V | AC / DC | 70 |

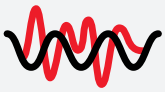
- AC / DC operation
- Wide control voltage range
- With built-in surge protection

## AF09Z...AF38Z designed for PLC - 4 to 18.5 kW - 24 V DC operated

| Voltage range | Coil code |
|---|---|
| 24 V DC | 30 |

- Allow direct control by 24 V DC ≥ 250 mA PLC-output
- Pull-in consumption 6 W 250 mA
- Holding consumption 1.7 W
- N.O. contact opening time 29 ms and closing time 53 ms
- With built-in surge protection

## AF09Z...AF38Z for specific applications - 4 to 18.5 kW - AC / DC operated

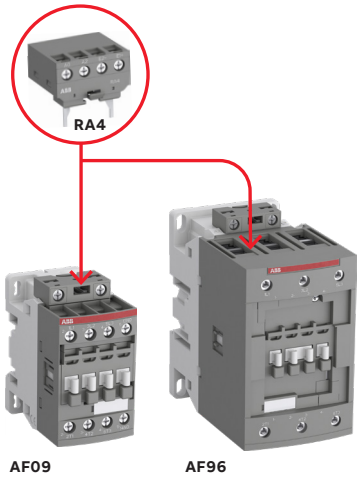


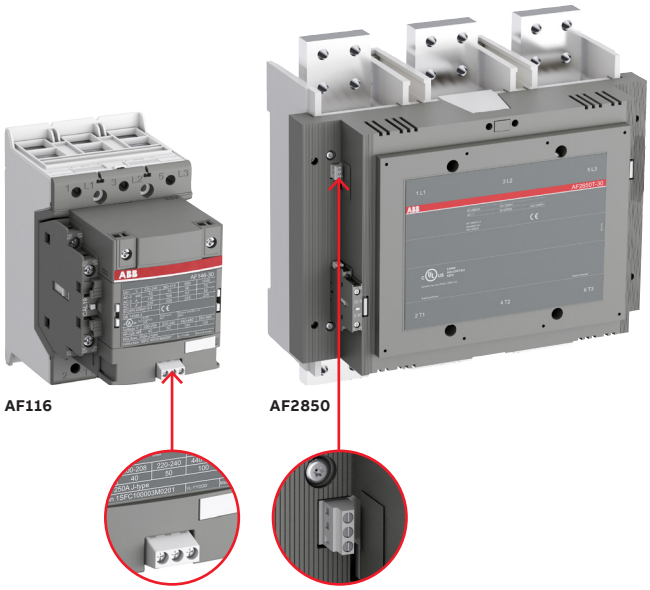
| Voltage range | | Coil code |
|---|---|---|
| 12...20 V | DC | 20 |
| 24...60 V | AC / DC | 21 |
| 48...130 V | AC / DC | 22 |
| 100...250 V | AC / DC | 23 |

- Coil 20 covers 12 ... 20 V DC applications
- Coil 21 allows direct control by 24 V DC ≥ 500 mA PLC-output
- Coil 21, 22 and 23 can withstand short voltage sags and dips with reference to SEMI F47 conditions of use
- With built-in surge protection

# Select your AF coil interface for PLC
## For contactors up to 2850 A AC-1 / General use

Coil interfaces are offered to operate all contactor size up to AF2850 with very low PLC output signals. They allow a galvanic isolation between the PLC circuit and the contactor coil circuit.

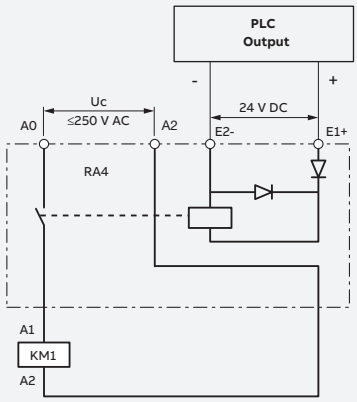


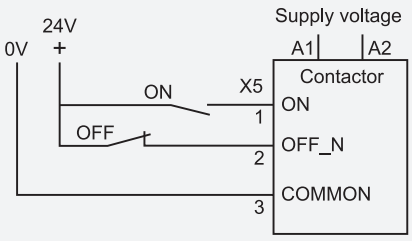

**Interface relay**
For control with 24 V DC ≥ 20 mA PLC output. RA4 interface relay can be used for rated control circuit voltages Uc 24 ... 250 V 50/60Hz with the standard AF contactors up to 45 kW - 400 V / 60hp - 480 V and with NF contactor relays.

**Built-in PLC interface**
For control with 24 V DC ≥ 10 mA PLC output. The built-in PLC interface operates the AF contactor coil with 24...500 AC and 20...500 DC voltage. Available for AF contactors from 55 kW - 400 V / 75 hp up to 560 kW - 400 V /900 hp 480 V and up to 2850 A AC-1 / General use.
Dedicated coil code from AF116 up to AF370 and standard feature from AF400 up to AF2850.

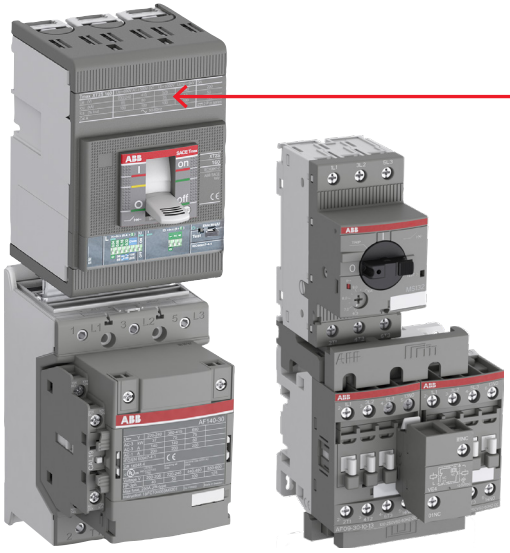
**Control circuit with interface relay**



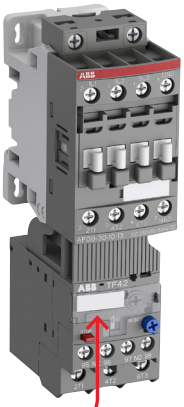

**Control inputs with PLC plug**



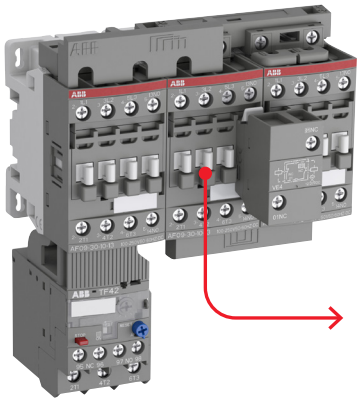
# Contactors and motor protection
## Advanced but simple



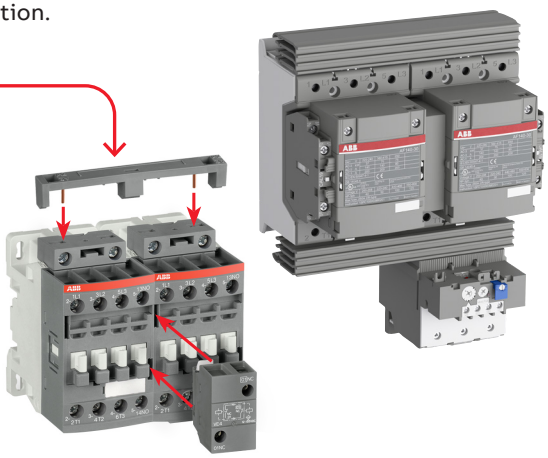
**Easy, fast and secure starters assembly**
The AF contactor range is perfect for motor starting applications and for solutions where space is limited. You can create any motor starting type and save assembly time with a complete range of accessories and connection sets.



**Protect from overload in all conditions**
Select thermal overload relays (trip class 10) or electronic overload relays (trip class 10E, 20E, 30E in the same product) to protect your motors against overload and phase failure.



**Compact size**
The AF contactor is compact in size and has had its width reduced by up to 30% thanks to an 80% coil consumption reduction.



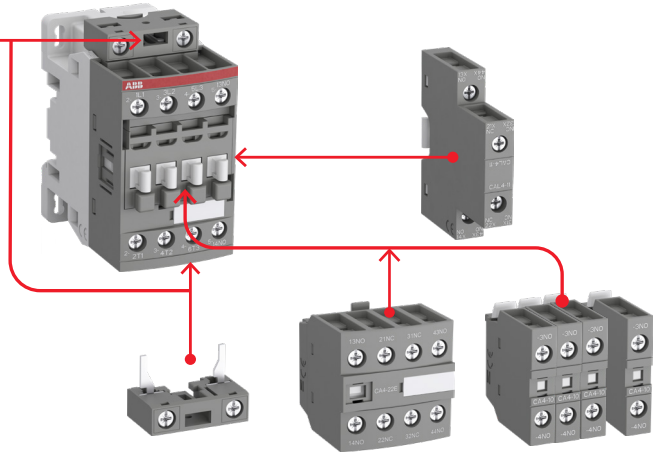
**Save space**
Interlocking reversing pairs require no spacing between contactors, meaning you can fit more functionality into cabinets or other enclosures.

# Contactors and motor protection
Flexible and safe

## Easy to use accessories

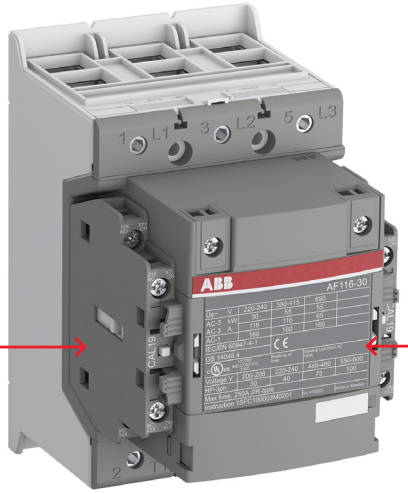
### Up to 96 A

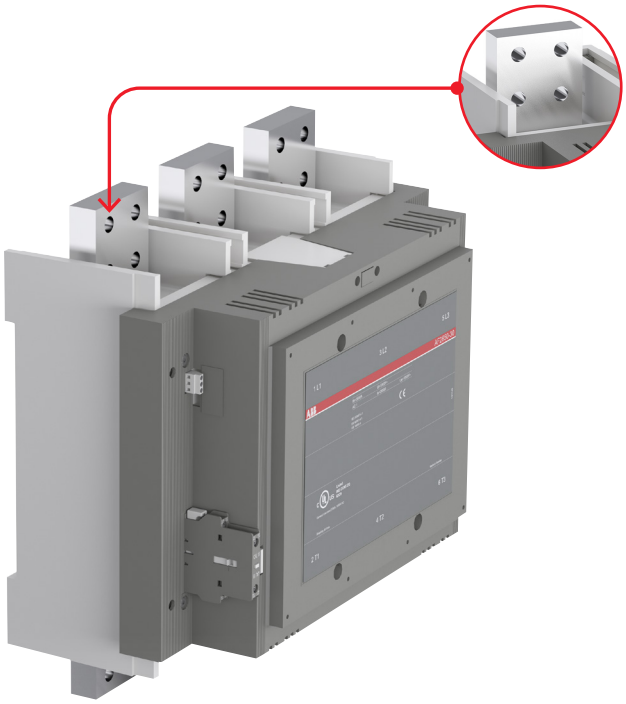
**Great flexibility for coil terminal access**
Contactors offer free choice of coil terminal access from top, bottom, both top and bottom or front.



**Easy to use accessories**
1-pole, 2-pole and 4-pole auxiliary contact blocks, front or side mounted, are available for a great flexibility.

### Up to 2850 A



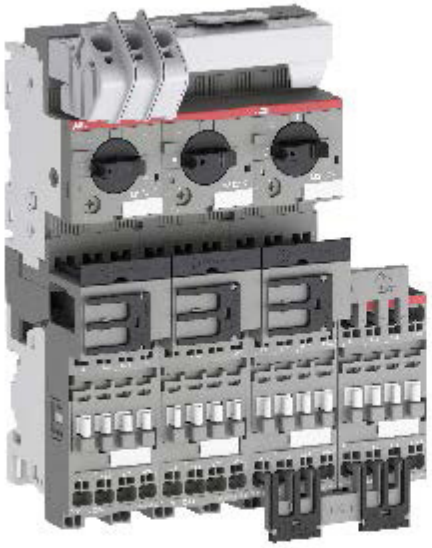



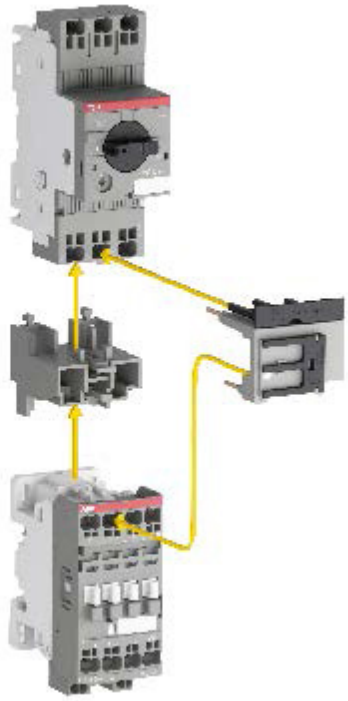
**2 side mounted auxiliary contact blocks**
AF116 ... AF2850 contactors can take up to 2 side mounted auxiliary contact blocks without adding to its width. Coil connection terminals, mechanical and electrical interlocks and electronic timers are easily connected through the snap-to-connect function.

**Simple connection and maintenance**
The main terminals of AF116 ... AF2850 contactors are at the contactors' back to facilitate your bus bars connections. It also allows easy contact inspection and maintenance from AF400 and above.

# **Just push it!**
# The next evolution in motor starter solutions is here.

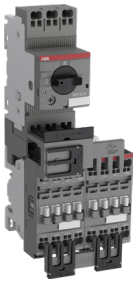
So up to 18.5 kW, one push is all you need!



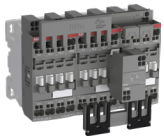




—
Direct on-line Starter



—
Reversing Starter



—
Star-Delta Starter

—
Save up to 50% wiring time with Push-in Spring compared to conventional spring solutions. And the connections are just as reliable. So for speed, ease and reliability, just push it.

## Also available with Push-in technology



—
**Sentry safety relays**



—
**Monitoring relays**

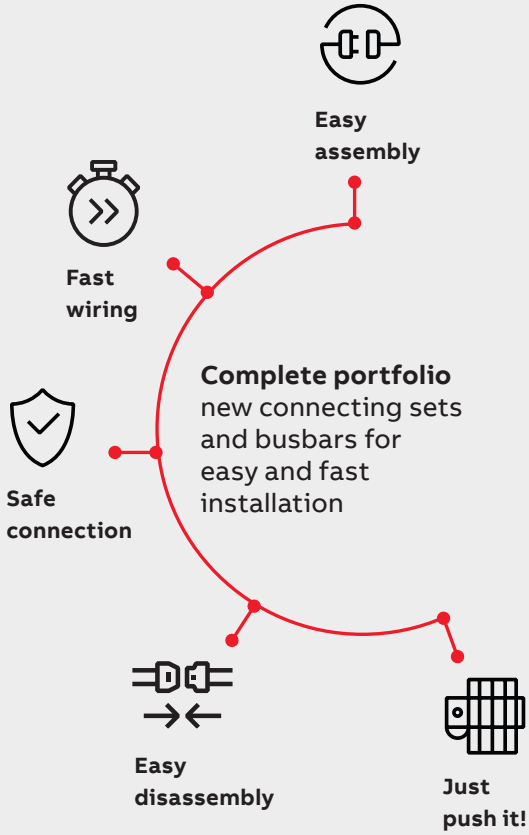


—
**Time relays**



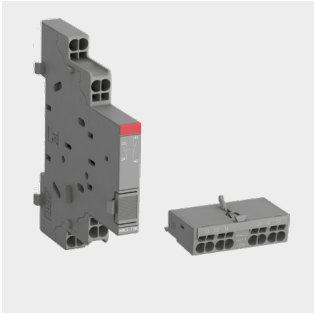
## Benefits / Features

- Fast and intuitive wiring
- Tool-free mounting
- Vibration & shock proof
- Robust design for higher up-time
- Future proof connection technology
- Terminals accessible from the front
- One-hand mounting
- 2-in-1 Push-in Spring
- Higher connection capacity
- No mounting plate required for starters
- Enabled for automated wiring

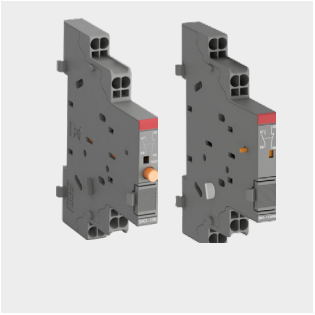




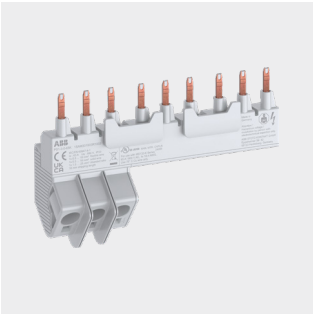

—
CA4..K, CAL4-11K 1, 2 and 4 pole auxiliary contacts



—
HK1-K, HKF1-K auxiliary contacts



—
SK1-K and SK1-ARK signaling contacts



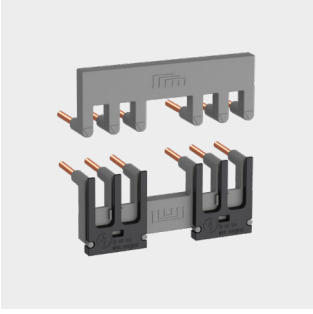
—
PS1-...-65K busbars for 2, 3, 4 or 5 manual motor starters



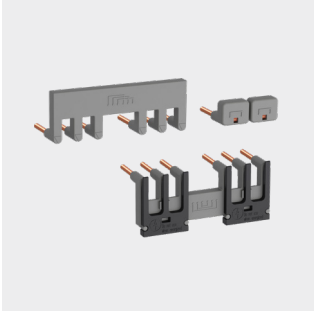
—
TS1-M3-K terminal spacer for UL Type E/F combination motor controllers



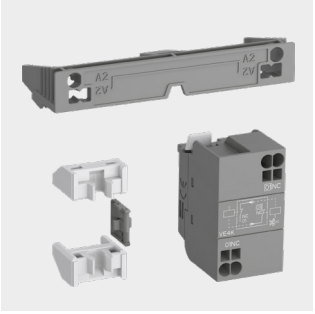
—
BEA16-4KF and BEA38-4KF connecting links with manual motor starters



—
BER16-4KF and BER38-4KF connection sets for reversing starters



—
BEY16-4KF and BEY38-4KF connection sets for Star-Delta starters



—
VEM4K mechanical and electrical interlock set



**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**1SBL137001R1310**

# AF 3-pole contactors




**3/**40 **Overview**

**Ordering details**

**4 to 200 kW**

**3/**42 AF09 ... AF38 AC / DC operated
**3/**43 AF09Z ... AF38Z 24 V DC operated designed for PLC
**3/**44 AF09Z ... AF38Z AC / DC operated for specific applications
**3/**45 AF40 ... AF96 AC / DC operated
**3/**46 AF09 … AF96 Contactors and main accessories
**3/**47 AF116 ... AF146 AC / DC operated
**3/**49 AF116 ... AF146 AC operated for faster opening utilization
**3/**50 AF190 ... AF370 AC / DC operated
**3/**52 AF190 ... AF370 AC operated for faster opening utilization
**3/**53 AF116 ... AF370 Contactors and main accessories

**4 to 560 kW (up to 2850 A AC-1) - with 1 N.O. + 1 N.C.**

**3/**54 AF26 ... AF38 AC / DC operated
**3/**55 AF26Z ... AF38Z AC / DC operated for specific applications
**3/**56 AF26 ... AF38 Contactors and main accessories
**3/**57 AF40 ... AF96 AC / DC operated
**3/**58 AF40 ... AF96 Contactors and main accessories
**3/**59 AF116 ... AF146 AC / DC operated
**3/**61 AF116 ... AF146 AC operated for faster opening utilization
**3/**62 AF190 ... AF370 AC / DC operated
**3/**64 AF190 ... AF370 AC / DC operated for faster opening utilization
**3/**65 AF116 ... AF370 Contactors and main accessories
**3/**66 AF400 ... AF750 AC / DC operated
**3/**67 AF1250 ... AF2850 AC / DC operated
**3/**68 AF1350T ... AF2850T AC / DC operated
**3/**69 AF400 ... AF2850 Main accessories

**4 to 560 kW (up to 2850 A AC-1) - with 2 N.O. + 2 N.C.**

**3/**70 AF09 ... AF38 AC / DC operated
**3/**71 AF09Z ... AF38Z AC / DC operated for specific applications
**3/**72 AF40 ... AF96 AC / DC operated
**3/**73 AF09 … AF96 Contactors and main accessories
**3/**74 AF116 ... AF146 AC / DC operated
**3/**76 AF116 ... AF146 AC / DC operated for faster opening utilization
**3/**77 AF190 ... AF370 AC / DC operated
**3/**79 AF190 ... AF370 AC / DC operated for faster opening utilization
**3/**80 AF116 ... AF370 Contactors and main accessories
**3/**81 AF400 ... AF750 AC / DC operated
**3/**82 AF1250 ... AF2850 AC / DC operated
**3/**83 AF400 ... AF2850 Contactors and main accessories

**3/**84 **Technical data**

**3/**108 **Electrical durability**

# 3-pole contactors, for motor control and power switching






| AC / DC Control supply | | | | Type | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IEC | AC-3 | Rated operational power | 220 - 230 - 240 V | kW | 2.2 | 3 | 4 | 6.5 | 9 | 11 | 11 | 15 | 18.5 | 22 | 30 |
| | | θ ≤ 60 °C for AF09 ... AF370 | 380 - 400 V | kW | 4 | 5.5 | 7.5 | 11 | 15 | 18.5 | 18.5 | 22 | 30 | 37 | 45/55 |
| | | θ ≤ 55 °C for AF400 ... AF2650 | 415 V | kW | 4 | 5.5 | 9 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 |
| | | | 440 V | kW | 4 | 5.5 | 9 | 15 | 18.5 | 22 | 22 | 30 | 37 | 45 | 55 |
| | | | 500 V | kW | 5.5 | 7.5 | 9 | 15 | 18.5 | 22 | 22 | 30 | 37 | 45 | 55 |
| | | | 690 V | kW | 5.5 | 7.5 | 9 | 15 | 18.5 | 22 | 22 | 30 | 37 | 45 | 55 |
| | | | 1000 V | kW | — | — | — | — | — | — | — | — | — | 35 | 40 |
| | | Rated operational current | 380 - 400 V | A | 9 | 12 | 18 | 26 | 32 | 38 | 40 | 53 | 65 | 80 | 105 |
| | AC-1 | Rated operational current | θ ≤ 40 °C, 690 V | A | 25 | 28 | 30 | 45 | 50 | 50 | 70 | 100 | 105 | 125 | 130 |
| UL / CSA | 1-phase motor rating | | 120 V | hp | 0.75 | 1 | 1.5 | 2 | 2 | 2 | 3 | 3 | 5 | 7.5 | 7.5 |
| | | | 240 V | hp | 1.5 | 2 | 3 | 3 | 5 | 5 | 7.5 | 10 | 15 | 15 | 20 |
| | 3-phase motor rating | | 200 - 208 V | hp | 2 | 3 | 5 | 7.5 | 10 | 10 | 10 | 15 | 20 | 25 | 30 |
| | | | 220 - 240 V | hp | 2 | 3 | 5 | 7.5 | 10 | 10 | 15 | 20 | 25 | 30 | 40 |
| | | | 440 - 480 V | hp | 5 | 7.5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 60/75 |
| | | | 550 - 600 V | hp | 7.5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 75 | 75 |
| | General use rating | | 600 V | A | 25 | 28 | 30 | 45 | 50 | 50 | 60 | 80 | 90 | 105 | 115 |
| NEMA | NEMA Size | | | | 00 | 0 | — | 1 | — | — | 2 | — | — | 3 | — |

## Main accessories

| | | | | | |
|---|---|---|---|---|---|
| Auxiliary contact blocks | Front mounting | CA4-10 (1 x N.O.)<br>CA4-01 (1 x N.C.) | | | |
| | Side mounting | CAL4-11 (1 x N.O. + 1 x N.C.) | | | |
| Timers | Electronic | TEF4-ON<br>TEF4-OFF | | | |
| Interlocking units | Mechanical | VM4 | | VM96-4 | |
| | Mechanical / Electrical | VEM4 | | | |
| Connection sets | For reversing contactors | BER16-4 | BER38-4 | BER65-4 | BER96-4 |
| Surge suppressors | | Built-in surge protection | | | |

## Overload relays



| | | | | | |
|---|---|---|---|---|---|
| Thermal relays | Class 10<br>(Class 10A for TF140, TA200DU) | TF42 (0.10...38 A) | | TF65 (22...67 A) | TF96 (40...96 A) |
| Electronic relays | Class 10E, 20E, 30E | EF19 (0.10...18.9 A) | EF19 (0.10...18.9 A)<br>EF45 (9...45 A) | EF65 (20...70 A) | EF96 (36...100 A) |

## Manual motor starters



| | | | | |
|---|---|---|---|---|
| | Thermal / magnetic protection<br>Class 10 | MS116 (0.10...32 A)<br>Ics up to 50 kA for class 10 A | | MS165 (10...80 A)<br>Ics up to 100 kA (1) |
| | | MS132 (0.10...32 A)<br>Ics up to 100 kA | | |
| | Magnetic only types | MO132 (0.16...32 A)<br>Ics up to 100 kA | | MO165 (16...80 A)<br>Ics up to 100 kA (1) |
| Accessories | For contactor mounting | BEA16-4 | BEA38-4 | BEA65-4 (2) |

(1) MS165/MO165 are suitable for use with AF09 ... AF30 for North american applications.
(2) BEA65-4 suitable for MS165 and MO165 only.
(3) −5 ... +40 °C for TA200-V1000








| | AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 | AF2850 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 30 | 37 | 45 | 55 | 55 | 75 | 90 | 110 | 110 | 132 | 160 | 220 | — | 257 | 315 | — | — | — |
| | 55 | 75 | 75 | 90 | 110 | 132 | 160 | 200 | 200 | 250 | 315 | 400 | — | 475 | 560 | — | — | — |
| | 55 | 75 | 75 | 90 | 110 | 132 | 160 | 200 | 220 | 250 | 355 | 425 | — | 500 | 630 | 630 | — | — |
| | 75 | 90 | 90 | 110 | 132 | 160 | 160 | 200 | 220 | 250 | 355 | 450 | — | 560 | 710 | 710 | — | — |
| | 75 | 90 | 90 | 110 | 132 | 160 | 200 | 250 | 250 | 315 | 400 | 520 | — | 560 | 710 | — | — | — |
| | 55 | 75 | 90 | 132 | 160 | 200 | 250 | 315 | 315 | 355 | 500 | 600 | — | 800 | 1000 | 1000 | — | — |
| | — | — | 75 | 110 | 132 | 160 | 185 | 200 | 220 | 280 | 355 | 400 | — | 560 | 600 | 630 | — | — |
| | 116 | 140 | 146 | 190 | 205 | 265 | 305 | 370 | 400 | 460 | 580 | 750 | — | 860 | 1060 | 1060 | — | — |
| | 160 | 200 | 225 | 275 | 350 | 400 | 500 | 600 | 600 | 700 | 800 | 1050 | 1260 | 1350 | 1650 | 2050 | 2650 | 2850 |
| | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| | 30 | 40 | 40 | 50 | 60 | 75 | 100 | 125 | 125 | 150 | 200 | 250 | — | — | — | — | — | — |
| | 40 | 50 | 50 | 60 | 75 | 100 | 125 | 150 | 150 | 200 | 250 | 300 | — | 400 | 450 | — | — | — |
| | 75 | 100 | 100 | 125 | 150 | 200 | 250 | 300 | 350 | 400 | 500 | 600 | — | 800 | 900 | — | — | — |
| | 100 | 125 | 125 | 150 | 200 | 250 | 300 | 350 | 400 | 500 | 600 | 700 | — | 1000 | 1150 | — | — | — |
| | 160 | 200 | 200 | 250 | 300 | 350 | 400 | 520 | 550 | 650 | 750 | 900 | 1210 | 1350 | 1650 | 2100 | 2700 | 2850 |
| | — | 4 | — | — | — | 5 | — | — | — | 6 | — | 7 | — | — | 8 | — | — | — |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | |
| | CAL19-11 (1 x N.O. + 1 x N.C.) | | | | | | | | CAL18-11 (1 x N.O. + 1 x N.C.) | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | VM19 (for same size contactors) | | | | | | | | VM750H<br>VM750V | | | | | VM1650H | | | | |
| | | | | | | | | | | | | | | | | | | |
| | BER140-4 | | | BER205-4 | | BER370-4 | | | BEM460-30 | | BEM750-30 | | | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TF140DU (66...142 A) θ ≤ 55 °C | | | TA200DU<br>(66...200 A)<br>θ ≤ 55 °C(3) | | | | | | | | | | | | | | |
| | EF146 (54...150 A) | | | EF205 (63...210 A) | | EF370 (115...380 A) | | | EF460 (150...500 A) | | EF750 (250...800 A) | | | EF1250DU (350...1250 A) | | | | |

03

# AF09 ... AF38 3-pole contactors

## 4 to 18.5 kW

## AC / DC operated




AF09-30-10



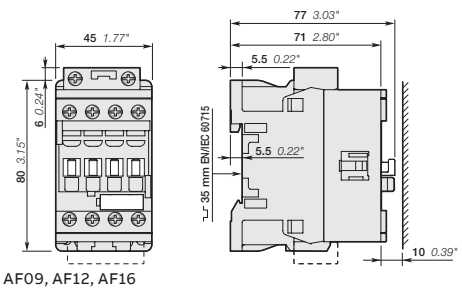

AF26-30-00

AF09 ... AF38 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

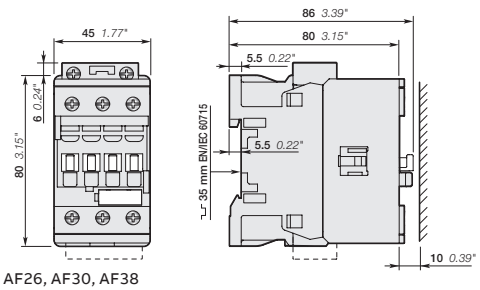
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 4 | 25 | 5 | 25 | 24...60 | 20...60 (1) | 1 0 | AF09-30-10-11 | 1SBL137001R1110 | 0.270 |
| | | | | | | 0 1 | AF09-30-01-11 | 1SBL137001R1101 | 0.270 |
| | | | | 48...130 | 48...130 | 1 0 | AF09-30-10-12 | 1SBL137001R1210 | 0.270 |
| | | | | | | 0 1 | AF09-30-01-12 | 1SBL137001R1201 | 0.270 |
| | | | | 100...250 | 100...250 | 1 0 | AF09-30-10-13 | 1SBL137001R1310 | 0.270 |
| | | | | | | 0 1 | AF09-30-01-13 | 1SBL137001R1301 | 0.270 |
| | | | | 250...500 | 250...500 | 1 0 | AF09-30-10-14 | 1SBL137001R1410 | 0.310 |
| | | | | | | 0 1 | AF09-30-01-14 | 1SBL137001R1401 | 0.310 |
| 5.5 | 28 | 7.5 | 28 | 24...60 | 20...60 (1) | 1 0 | AF12-30-10-11 | 1SBL157001R1110 | 0.270 |
| | | | | | | 0 1 | AF12-30-01-11 | 1SBL157001R1101 | 0.270 |
| | | | | 48...130 | 48...130 | 1 0 | AF12-30-10-12 | 1SBL157001R1210 | 0.270 |
| | | | | | | 0 1 | AF12-30-01-12 | 1SBL157001R1201 | 0.270 |
| | | | | 100...250 | 100...250 | 1 0 | AF12-30-10-13 | 1SBL157001R1310 | 0.270 |
| | | | | | | 0 1 | AF12-30-01-13 | 1SBL157001R1301 | 0.270 |
| | | | | 250...500 | 250...500 | 1 0 | AF12-30-10-14 | 1SBL157001R1410 | 0.310 |
| | | | | | | 0 1 | AF12-30-01-14 | 1SBL157001R1401 | 0.310 |
| 7.5 | 30 | 10 | 30 | 24...60 | 20...60 (1) | 1 0 | AF16-30-10-11 | 1SBL177001R1110 | 0.270 |
| | | | | | | 0 1 | AF16-30-01-11 | 1SBL177001R1101 | 0.270 |
| | | | | 48...130 | 48...130 | 1 0 | AF16-30-10-12 | 1SBL177001R1210 | 0.270 |
| | | | | | | 0 1 | AF16-30-01-12 | 1SBL177001R1201 | 0.270 |
| | | | | 100...250 | 100...250 | 1 0 | AF16-30-10-13 | 1SBL177001R1310 | 0.270 |
| | | | | | | 0 1 | AF16-30-01-13 | 1SBL177001R1301 | 0.270 |
| | | | | 250...500 | 250...500 | 1 0 | AF16-30-10-14 | 1SBL177001R1410 | 0.310 |
| | | | | | | 0 1 | AF16-30-01-14 | 1SBL177001R1401 | 0.310 |
| 11 | 45 | 15 | 45 | 24...60 | 20...60 (1) | 0 0 | AF26-30-00-11 | 1SBL237001R1100 | 0.310 |
| | | | | 48...130 | 48...130 | 0 0 | AF26-30-00-12 | 1SBL237001R1200 | 0.310 |
| | | | | 100...250 | 100...250 | 0 0 | AF26-30-00-13 | 1SBL237001R1300 | 0.310 |
| | | | | 250...500 | 250...500 | 0 0 | AF26-30-00-14 | 1SBL237001R1400 | 0.350 |
| 15 | 50 | 20 | 50 | 24...60 | 20...60 (1) | 0 0 | AF30-30-00-11 | 1SBL277001R1100 | 0.310 |
| | | | | 48...130 | 48...130 | 0 0 | AF30-30-00-12 | 1SBL277001R1200 | 0.310 |
| | | | | 100...250 | 100...250 | 0 0 | AF30-30-00-13 | 1SBL277001R1300 | 0.310 |
| | | | | 250...500 | 250...500 | 0 0 | AF30-30-00-14 | 1SBL277001R1400 | 0.350 |
| 18.5 | 50 | 25 | 50 | 24...60 | 20...60 (1) | 0 0 | AF38-30-00-11 | 1SBL297001R1100 | 0.310 |
| | | | | 48...130 | 48...130 | 0 0 | AF38-30-00-12 | 1SBL297001R1200 | 0.310 |
| | | | | 100...250 | 100...250 | 0 0 | AF38-30-00-13 | 1SBL297001R1300 | 0.310 |
| | | | | 250...500 | 250...500 | 0 0 | AF38-30-00-14 | 1SBL297001R1400 | 0.350 |

(1) AF..-30-..-11 not suitable for direct control by PLC-output.




AF09, AF12, AF16



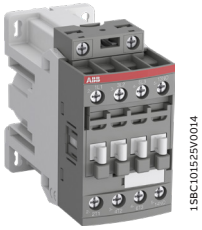

AF26, AF30, AF38

Main dimensions mm, inches

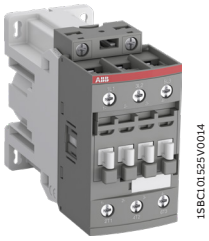
# AF09Z ... AF38Z 3-pole contactors

## 4 to 18.5 kW

## 24 V DC operated designed for PLC




AF09Z-30-10



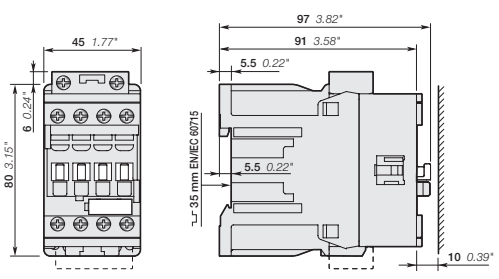

AF26Z-30-00

AF09Z ... AF38Z contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

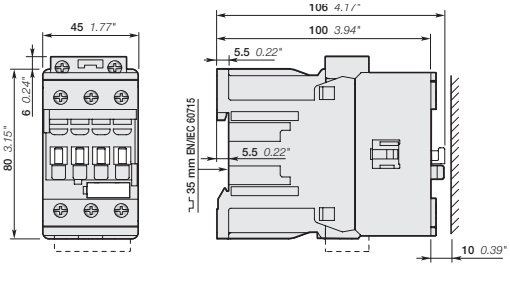
- control circuit: 24 V DC operated with electronic coil interface allowing low holding consumption up to 1.7 W and reduced panel energy consumption
  - allow direct control by PLC-output ≥ 250 mA 24 V DC
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | Pkg (1 pce) |
| kW | A | hp | A | V DC | | | | kg |
| 4 | 25 | 5 | 25 | 24 | 1 0 | AF09Z-30-10-30 | 1SBL136001R3010 | 0.430 |
| | | | | | 0 1 | AF09Z-30-01-30 | 1SBL136001R3001 | 0.430 |
| 5.5 | 28 | 7.5 | 28 | 24 | 1 0 | AF12Z-30-10-30 | 1SBL156001R3010 | 0.430 |
| | | | | | 0 1 | AF12Z-30-01-30 | 1SBL156001R3001 | 0.430 |
| 7.5 | 30 | 10 | 30 | 24 | 1 0 | AF16Z-30-10-30 | 1SBL176001R3010 | 0.430 |
| | | | | | 0 1 | AF16Z-30-01-30 | 1SBL176001R3001 | 0.430 |
| 11 | 45 | 15 | 45 | 24 | 0 0 | AF26Z-30-00-30 | 1SBL236001R3000 | 0.480 |
| 15 | 50 | 20 | 50 | 24 | 0 0 | AF30Z-30-00-30 | 1SBL276001R3000 | 0.480 |
| 18.5 | 50 | 25 | 50 | 24 | 0 0 | AF38Z-30-00-30 | 1SBL296001R3000 | 0.480 |

Note: AF..Z contactors with DC control voltage 24 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.




AF09Z, AF12Z, AF16Z




AF26Z, AF30Z, AF38Z

Main dimensions mm, inches

03

# AF09Z ... AF38Z 3-pole contactors

## 4 to 18.5 kW

## AC / DC operated for specific applications




AF09Z-30-10



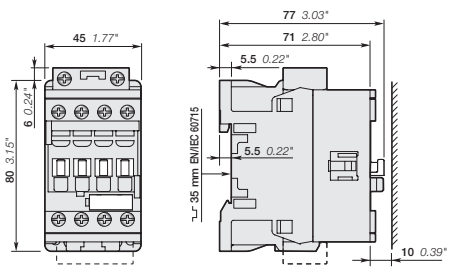

AF26Z-30-00

AF09Z ... AF38Z contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

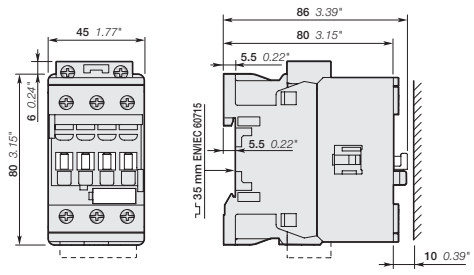
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - can manage large control voltage variations
  - allow direct control by PLC-output ≥ 24 V DC 500 mA
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 4 | 25 | 5 | 25 | - | 12...20 | 1 0 | AF09Z-30-10-20 | 1SBL136001R2010 | 0.310 |
| | | | | | | 0 1 | AF09Z-30-01-20 | 1SBL136001R2001 | 0.310 |
| | | | | 24...60 | 20...60 | 1 0 | AF09Z-30-10-21 | 1SBL136001R2110 | 0.310 |
| | | | | | | 0 1 | AF09Z-30-01-21 | 1SBL136001R2101 | 0.310 |
| | | | | 48...130 | 48...130 | 1 0 | AF09Z-30-10-22 | 1SBL136001R2210 | 0.310 |
| | | | | | | 0 1 | AF09Z-30-01-22 | 1SBL136001R2201 | 0.310 |
| | | | | 100...250 | 100...250 | 1 0 | AF09Z-30-10-23 | 1SBL136001R2310 | 0.310 |
| | | | | | | 0 1 | AF09Z-30-01-23 | 1SBL136001R2301 | 0.310 |
| 5.5 | 28 | 7.5 | 28 | - | 12...20 | 1 0 | AF12Z-30-10-20 | 1SBL156001R2010 | 0.310 |
| | | | | | | 0 1 | AF12Z-30-01-20 | 1SBL156001R2001 | 0.310 |
| | | | | 24...60 | 20...60 | 1 0 | AF12Z-30-10-21 | 1SBL156001R2110 | 0.310 |
| | | | | | | 0 1 | AF12Z-30-01-21 | 1SBL156001R2101 | 0.310 |
| | | | | 48...130 | 48...130 | 1 0 | AF12Z-30-10-22 | 1SBL156001R2210 | 0.310 |
| | | | | | | 0 1 | AF12Z-30-01-22 | 1SBL156001R2201 | 0.310 |
| | | | | 100...250 | 100...250 | 1 0 | AF12Z-30-10-23 | 1SBL156001R2310 | 0.310 |
| | | | | | | 0 1 | AF12Z-30-01-23 | 1SBL156001R2301 | 0.310 |
| 7.5 | 30 | 10 | 30 | - | 12...20 | 1 0 | AF16Z-30-10-20 | 1SBL176001R2010 | 0.310 |
| | | | | | | 0 1 | AF16Z-30-01-20 | 1SBL176001R2001 | 0.310 |
| | | | | 24...60 | 20...60 | 1 0 | AF16Z-30-10-21 | 1SBL176001R2110 | 0.310 |
| | | | | | | 0 1 | AF16Z-30-01-21 | 1SBL176001R2101 | 0.310 |
| | | | | 48...130 | 48...130 | 1 0 | AF16Z-30-10-22 | 1SBL176001R2210 | 0.310 |
| | | | | | | 0 1 | AF16Z-30-01-22 | 1SBL176001R2201 | 0.310 |
| | | | | 100...250 | 100...250 | 1 0 | AF16Z-30-10-23 | 1SBL176001R2310 | 0.310 |
| | | | | | | 0 1 | AF16Z-30-01-23 | 1SBL176001R2301 | 0.310 |
| 11 | 45 | 15 | 45 | - | 12...20 | 0 0 | AF26Z-30-00-20 | 1SBL236001R2000 | 0.350 |
| | | | | 24...60 | 20...60 | 0 0 | AF26Z-30-00-21 | 1SBL236001R2100 | 0.350 |
| | | | | 48...130 | 48...130 | 0 0 | AF26Z-30-00-22 | 1SBL236001R2200 | 0.350 |
| | | | | 100...250 | 100...250 | 0 0 | AF26Z-30-00-23 | 1SBL236001R2300 | 0.350 |
| 15 | 50 | 20 | 50 | - | 12...20 | 0 0 | AF30Z-30-00-20 | 1SBL276001R2000 | 0.350 |
| | | | | 24...60 | 20...60 | 0 0 | AF30Z-30-00-21 | 1SBL276001R2100 | 0.350 |
| | | | | 48...130 | 48...130 | 0 0 | AF30Z-30-00-22 | 1SBL276001R2200 | 0.350 |
| | | | | 100...250 | 100...250 | 0 0 | AF30Z-30-00-23 | 1SBL276001R2300 | 0.350 |
| 18.5 | 50 | 25 | 50 | - | 12...20 | 0 0 | AF38Z-30-00-20 | 1SBL296001R2000 | 0.350 |
| | | | | 24...60 | 20...60 | 0 0 | AF38Z-30-00-21 | 1SBL296001R2100 | 0.350 |
| | | | | 48...130 | 48...130 | 0 0 | AF38Z-30-00-22 | 1SBL296001R2200 | 0.350 |
| | | | | 100...250 | 100...250 | 0 0 | AF38Z-30-00-23 | 1SBL296001R2300 | 0.350 |

Note: Only AF..Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.




AF09Z, AF12Z, AF16Z

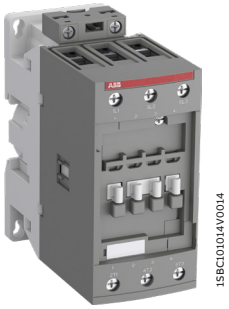



AF26Z, AF30Z, AF38Z

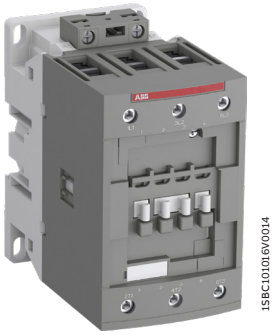
# AF40 ... AF96 3-pole contactors

18.5 to 45 kW

AC / DC operated




AF40-30-00



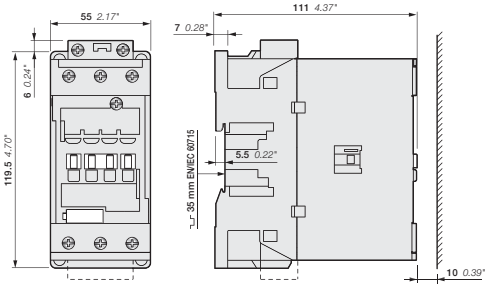

AF80-30-00

AF40 ... AF96 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

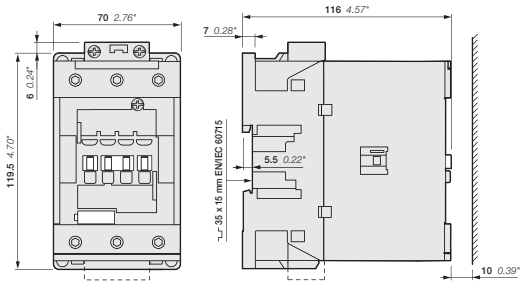
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 18.5 | 70 | 30 | 60 | 24...60 | 20...60 (1) | 0 0 | AF40-30-00-11 | 1SBL347001R1100 | 0.970 |
| | | | | 48...130 | 48...130 | 0 0 | AF40-30-00-12 | 1SBL347001R1200 | 0.970 |
| | | | | 100...250 | 100...250 | 0 0 | AF40-30-00-13 | 1SBL347001R1300 | 0.950 |
| | | | | 250...500 | 250...500 | 0 0 | AF40-30-00-14 | 1SBL347001R1400 | 0.950 |
| 22 | 100 | 40 | 80 | 24...60 | 20...60 (1) | 0 0 | AF52-30-00-11 | 1SBL367001R1100 | 0.970 |
| | | | | 48...130 | 48...130 | 0 0 | AF52-30-00-12 | 1SBL367001R1200 | 0.970 |
| | | | | 100...250 | 100...250 | 0 0 | AF52-30-00-13 | 1SBL367001R1300 | 0.950 |
| | | | | 250...500 | 250...500 | 0 0 | AF52-30-00-14 | 1SBL367001R1400 | 0.950 |
| 30 | 105 | 50 | 90 | 24...60 | 20...60 (1) | 0 0 | AF65-30-00-11 | 1SBL387001R1100 | 0.970 |
| | | | | 48...130 | 48...130 | 0 0 | AF65-30-00-12 | 1SBL387001R1200 | 0.970 |
| | | | | 100...250 | 100...250 | 0 0 | AF65-30-00-13 | 1SBL387001R1300 | 0.950 |
| | | | | 250...500 | 250...500 | 0 0 | AF65-30-00-14 | 1SBL387001R1400 | 0.950 |
| 37 | 125 | 60 | 105 | 24...60 | 20...60 (1) | 0 0 | AF80-30-00-11 | 1SBL397001R1100 | 1.220 |
| | | | | 48...130 | 48...130 | 0 0 | AF80-30-00-12 | 1SBL397001R1200 | 1.220 |
| | | | | 100...250 | 100...250 | 0 0 | AF80-30-00-13 | 1SBL397001R1300 | 1.170 |
| | | | | 250...500 | 250...500 | 0 0 | AF80-30-00-14 | 1SBL397001R1400 | 1.170 |
| 45/55 | 130 | 60/75 | 115 | 24...60 | 20...60 (1) | 0 0 | AF96-30-00-11 | 1SBL407001R1100 | 1.220 |
| | | | | 48...130 | 48...130 | 0 0 | AF96-30-00-12 | 1SBL407001R1200 | 1.220 |
| | | | | 100...250 | 100...250 | 0 0 | AF96-30-00-13 | 1SBL407001R1300 | 1.170 |
| | | | | 250...500 | 250...500 | 0 0 | AF96-30-00-14 | 1SBL407001R1400 | 1.170 |

(1) For control by PLC-output, use RA4 interface relay.




AF40, AF52, AF65

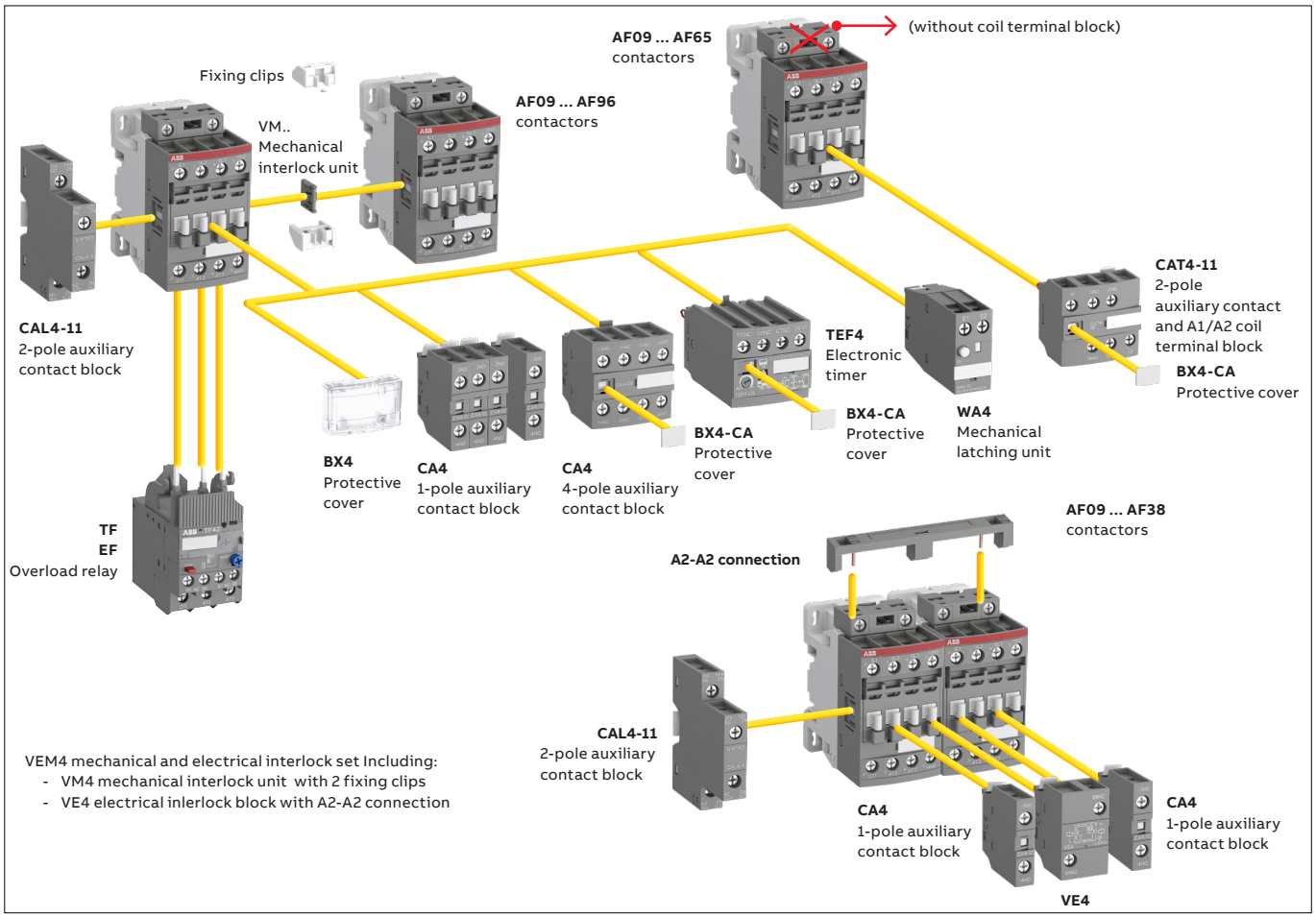



AF80, AF96

Main dimensions mm, inches

# AF09 ... AF96 3-pole contactors

## Contactors and main accessories




**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories Auxiliary contact blocks | | | Electronic timer | Mechanical latching unit | Electrical and mechanical interlock set (between 2 contactors) | Side-mounted accessories Auxiliary contact blocks | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-pole CA4 | 2-pole CAT4-11 | 4-pole CA4 | TEF4 | WA4 (2) | VEM4 | 2-pole CAL4-11 Left side | 2-pole CAL4-11 Right side |
| **AF09(Z) ... AF38(Z) (1)** | | | | | | | | | | |
| AF09 ... AF16 | 3 0 | 0 1 | 4 max. | or 1 | or 1 | or 1 | or 1 | – | + 1 | – |
| AF09 ... AF16 | 3 0 | 1 0 | 2 max. | or 1 | – | or 1 | or 1 | – | + 1 | + 1 |
| AF26 ... AF38 | 3 0 | 0 0 | 3 max. | – | – | – | – | + 1 (3) | + 1 | or 1 |
| **AF09Z ... AF38Z 24 V DC designed for PLC - coil 30 (1)** | | | | | | | | | | |
| AF09Z ... AF16Z | 3 0 | 0 1 | 4 max. | – | or 1 | or 1 | – | – (3) | or 1 | + 1 |
| AF09Z ... AF16Z | 3 0 | 1 0 | 2 max. | – | – | or 1 | – | – (3) | + 1 | or 1 |
| AF26Z ... AF38Z | 3 0 | 0 0 | – | – | – | 1 | – | – | + 1 | + 1 |
| **AF40 ... AF96** | | | | | | | | | | |
| AF40 ... AF65 | 3 0 | 0 0 | 4 max. | or 1 | or 1 | or 1 | or 1 | – | + 1 | + 1 |
| AF80, AF96 | 3 0 | 0 0 | 4 max. | – | or 1 | or 1 | or 1 | – | + 1 | + 1 |

(1) Including add-on and built-in contacts : 4 N.C. auxiliary contacts max on positions 1, 2, 3, 4 and 3 N.C. auxiliary contacts max. on positions 1 ±30°, 5.
(2) Use WA4 for AF09...AF65 and WA4-96 for AF80, AF96.
Accept 1-pole CA4 auxiliary contacts (1 block on each side of the mechanical latch) in respect to the total number of built-in or additional N.C. auxiliary contacts.
For WA4 accessory use with contactor coil 30, please consult your ABB local sales organization.
(3) VEM4 not suitable for AF..Z contactors with DC control voltages 12...20 V DC (coil 20) and 24 V DC (coil 30). Use VM4 side-mounted mechanical interlock unit.

### Overload relays fitting details (4)

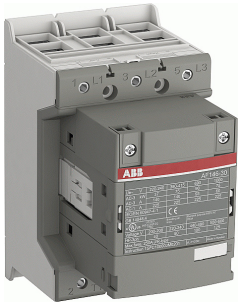
| Contactor types | Thermal overload relays | Electronic overload relays |
|---|---|---|
| AF09 ... AF38 | TF42 (0.10...38 A) | EF19 (0.10...19 A) |
| AF26 ... AF38 | TF42 (0.10...38 A) | EF45 (9...45 A) |
| AF40 ... AF65 | TF65 (22...67 A) | EF65 (20...70 A) |
| AF80, AF96 | TF96 (40...96 A) | EF96 (36...100 A) |

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.
(4) Direct mounting - No kit required.

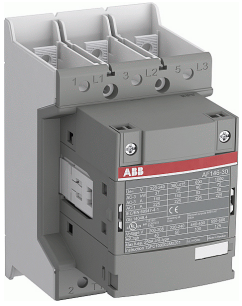
# AF116 ... AF146 3-pole contactors

55 to 75 kW

AC / DC operated




AF146-30-00



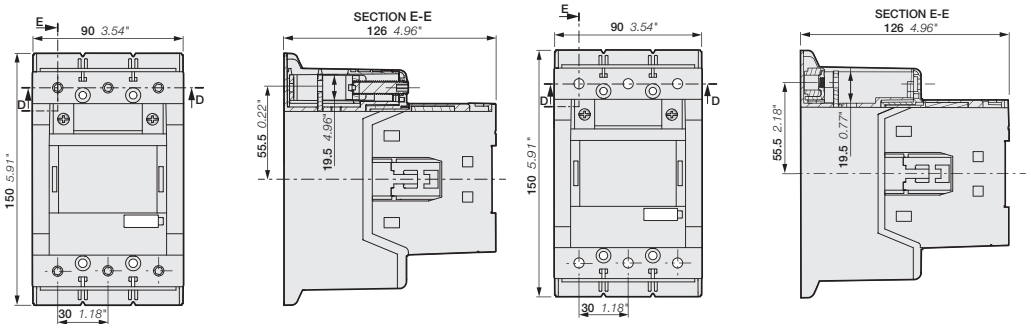

AF146-30-00B

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power | current | 3-phase motor rating | General use rating | | | | | | Pkg (1 pce) |
| 400 V | θ ≤ 40 °C | 480 V | 600 V AC | | | | | | |
| AC-3 | AC-1 | | | | | | | | |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| **For connection with built-in cable clamps** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 0 0 | AF116-30-00-11 | 1SFL427001R1100 | 1.750 |
| | | | | 48...130 | 48...130 | 0 0 | AF116-30-00-12 | 1SFL427001R1200 | 1.750 |
| | | | | 100...250 | 100...250 | 0 0 | AF116-30-00-13 | 1SFL427001R1300 | 1.750 |
| | | | | 250...500 | 250...500 | 0 0 | AF116-30-00-14 | 1SFL427001R1400 | 1.750 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 0 0 | AF140-30-00-11 | 1SFL447001R1100 | 1.750 |
| | | | | 48...130 | 48...130 | 0 0 | AF140-30-00-12 | 1SFL447001R1200 | 1.750 |
| | | | | 100...250 | 100...250 | 0 0 | AF140-30-00-13 | 1SFL447001R1300 | 1.750 |
| | | | | 250...500 | 250...500 | 0 0 | AF140-30-00-14 | 1SFL447001R1400 | 1.750 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 0 0 | AF146-30-00-11 | 1SFL467001R1100 | 1.750 |
| | | | | 48...130 | 48...130 | 0 0 | AF146-30-00-12 | 1SFL467001R1200 | 1.750 |
| | | | | 100...250 | 100...250 | 0 0 | AF146-30-00-13 | 1SFL467001R1300 | 1.750 |
| | | | | 250...500 | 250...500 | 0 0 | AF146-30-00-14 | 1SFL467001R1400 | 1.750 |
| **With bar connections** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 0 0 | AF116-30-00B-11 | 1SFL427002R1100 | 1.500 |
| | | | | 48...130 | 48...130 | 0 0 | AF116-30-00B-12 | 1SFL427002R1200 | 1.500 |
| | | | | 100...250 | 100...250 | 0 0 | AF116-30-00B-13 | 1SFL427002R1300 | 1.500 |
| | | | | 250...500 | 250...500 | 0 0 | AF116-30-00B-14 | 1SFL427002R1400 | 1.500 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 0 0 | AF140-30-00B-11 | 1SFL447002R1100 | 1.500 |
| | | | | 48...130 | 48...130 | 0 0 | AF140-30-00B-12 | 1SFL447002R1200 | 1.500 |
| | | | | 100...250 | 100...250 | 0 0 | AF140-30-00B-13 | 1SFL447002R1300 | 1.500 |
| | | | | 250...500 | 250...500 | 0 0 | AF140-30-00B-14 | 1SFL447002R1400 | 1.500 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 0 0 | AF146-30-00B-11 | 1SFL467002R1100 | 1.500 |
| | | | | 48...130 | 48...130 | 0 0 | AF146-30-00B-12 | 1SFL467002R1200 | 1.500 |
| | | | | 100...250 | 100...250 | 0 0 | AF146-30-00B-13 | 1SFL467002R1300 | 1.500 |
| | | | | 250...500 | 250...500 | 0 0 | AF146-30-00B-14 | 1SFL467002R1400 | 1.500 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.




AF116, AF140, AF146-30-00

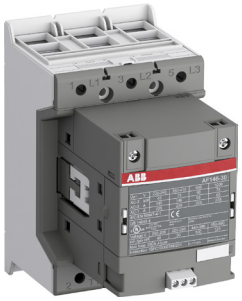
AF116, AF140, AF146-30-00B

Main dimensions mm, inches

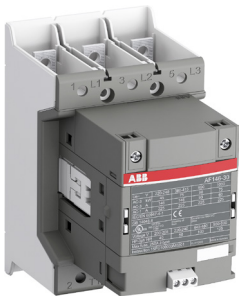
# AF116 ... AF146 3-pole contactors with built-in PLC interface

55 to 75 kW

AC / DC operated




AF146-30-00




AF146-30-00B

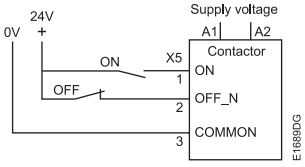
AF116 ... AF146 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range, only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...250 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request)
  - opening time below 20 ms.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

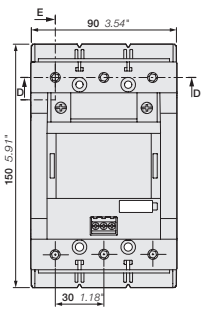
| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| **For connection with built-in cable clamps** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 0 0 | AF116-30-00-31 | 1SFL427001R3100 | 1.750 |
| | | | | 48...130 | 48...130 | 0 0 | AF116-30-00-32 | 1SFL427001R3200 | 1.750 |
| | | | | 100...250 | 100...250 | 0 0 | AF116-30-00-33 | 1SFL427001R3300 | 1.750 |
| | | | | 250...500 | 250...500 | 0 0 | AF116-30-00-34 | 1SFL427001R3400 | 1.750 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 0 0 | AF140-30-00-31 | 1SFL447001R3100 | 1.750 |
| | | | | 48...130 | 48...130 | 0 0 | AF140-30-00-32 | 1SFL447001R3200 | 1.750 |
| | | | | 100...250 | 100...250 | 0 0 | AF140-30-00-33 | 1SFL447001R3300 | 1.750 |
| | | | | 250...500 | 250...500 | 0 0 | AF140-30-00-34 | 1SFL447001R3400 | 1.750 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 0 0 | AF146-30-00-31 | 1SFL467001R3100 | 1.750 |
| | | | | 48...130 | 48...130 | 0 0 | AF146-30-00-32 | 1SFL467001R3200 | 1.750 |
| | | | | 100...250 | 100...250 | 0 0 | AF146-30-00-33 | 1SFL467001R3300 | 1.750 |
| | | | | 250...500 | 250...500 | 0 0 | AF146-30-00-34 | 1SFL467001R3400 | 1.750 |
| **With bar connections** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 0 0 | AF116-30-00B-31 | 1SFL427002R3100 | 1.500 |
| | | | | 48...130 | 48...130 | 0 0 | AF116-30-00B-32 | 1SFL427002R3200 | 1.500 |
| | | | | 100...250 | 100...250 | 0 0 | AF116-30-00B-33 | 1SFL427002R3300 | 1.500 |
| | | | | 250...500 | 250...500 | 0 0 | AF116-30-00B-34 | 1SFL427002R3400 | 1.500 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 0 0 | AF140-30-00B-31 | 1SFL447002R3100 | 1.500 |
| | | | | 48...130 | 48...130 | 0 0 | AF140-30-00B-32 | 1SFL447002R3200 | 1.500 |
| | | | | 100...250 | 100...250 | 0 0 | AF140-30-00B-33 | 1SFL447002R3300 | 1.500 |
| | | | | 250...500 | 250...500 | 0 0 | AF140-30-00B-34 | 1SFL447002R3400 | 1.500 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 0 0 | AF146-30-00B-31 | 1SFL467002R3100 | 1.500 |
| | | | | 48...130 | 48...130 | 0 0 | AF146-30-00B-32 | 1SFL467002R3100 | 1.500 |
| | | | | 100...250 | 100...250 | 0 0 | AF146-30-00B-33 | 1SFL467002R3300 | 1.500 |
| | | | | 250...500 | 250...500 | 0 0 | AF146-30-00B-34 | 1SFL467002R3400 | 1.500 |

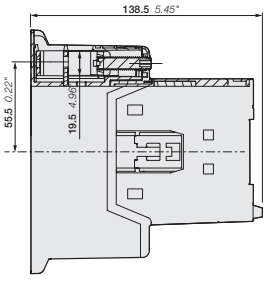
(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AF116 ... AF146 are equipped with low voltage inputs for control, for example by a PLC.

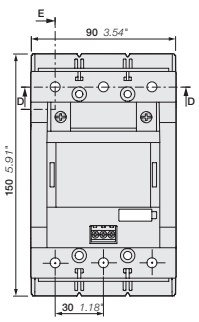


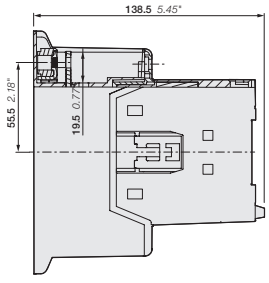

Control inputs




AF116, AF140, AF146-30-00




AF116, AF140, AF146-30-00B

Main dimensions mm, inches

# AF116 ... AF146 3-pole contactors

55 to 75 kW

AC operated- optimized for short operation times




AF146-30-00



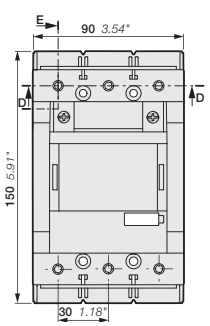

AF146-30-00B

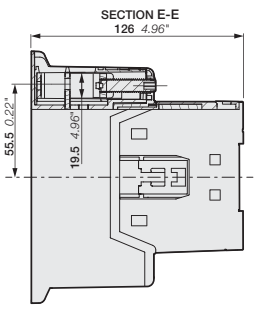
AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC. These contactors are of the block type design with 3 main poles.

- control circuit: AC operated with electronic coil interface
  - with faster operating time
  - reduced panel energy consumption
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

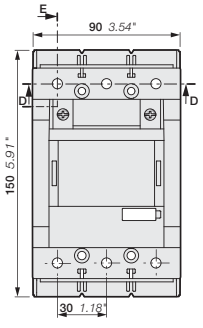
| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50 Hz | V 60Hz | | | | kg |
| **For connection with built-in cable clamps** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 110...120 | 110...120 | 0 0 | AF116-30-00-42 | 1SFL427001R4200 | 1.750 |
| | | | | 220...240 | 220...240 | 0 0 | AF116-30-00-43 | 1SFL427001R4300 | 1.750 |
| 75 | 200 | 100 | 200 | 110...120 | 110...120 | 0 0 | AF140-30-00-42 | 1SFL447001R4200 | 1.750 |
| | | | | 220...240 | 220...240 | 0 0 | AF140-30-00-43 | 1SFL447001R4300 | 1.750 |
| 75 | 225 | 100 | 200 | 110...120 | 110...120 | 0 0 | AF146-30-00-42 | 1SFL467001R4200 | 1.750 |
| | | | | 220...240 | 220...240 | 0 0 | AF146-30-00-43 | 1SFL467001R4300 | 1.750 |
| **With bar connections** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 110...120 | 110...120 | 0 0 | AF116-30-00B-42 | 1SFL427002R4200 | 1.500 |
| | | | | 220...240 | 220...240 | 0 0 | AF116-30-00B-43 | 1SFL427002R4300 | 1.500 |
| 75 | 200 | 100 | 200 | 110...120 | 110...120 | 0 0 | AF140-30-00B-42 | 1SFL447002R4200 | 1.500 |
| | | | | 220...240 | 220...240 | 0 0 | AF140-30-00B-43 | 1SFL447002R4300 | 1.500 |
| 75 | 225 | 100 | 200 | 110...120 | 110...120 | 0 0 | AF146-30-00B-42 | 1SFL467002R4200 | 1.500 |
| | | | | 220...240 | 220...240 | 0 0 | AF146-30-00B-43 | 1SFL467002R4300 | 1.500 |

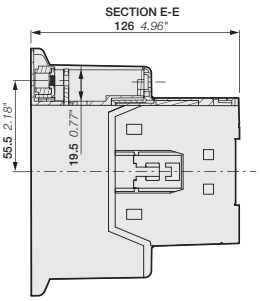
(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.




AF116, AF140, AF146-30-00



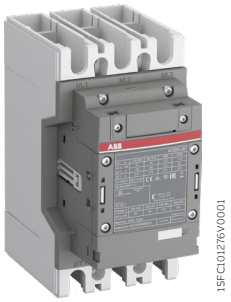

AF116, AF140, AF146-30-00B

Main dimensions mm, inches

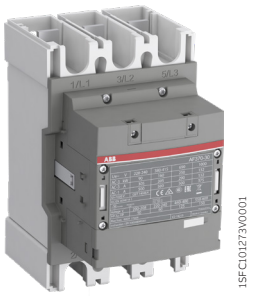
# AF190 ... AF370 3-pole contactors

## 90 to 200 kW

## AC / DC operated




AF205-30-00



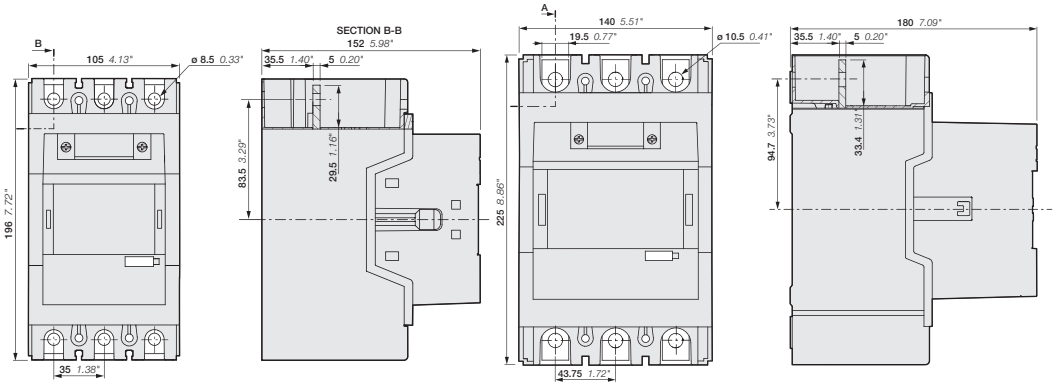

AF370-30-00

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and 340 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 90 | 275 | 125 | 275 | 24...60 | 20...60 | 0 0 | AF190-30-00-11 | 1SFL487002R1100 | 3.000 |
| | | | | 48...130 | 48...130 | 0 0 | AF190-30-00-12 | 1SFL487002R1200 | 3.000 |
| | | | | 100...250 | 100...250 | 0 0 | AF190-30-00-13 | 1SFL487002R1300 | 3.000 |
| | | | | 250...500 | 250...500 | 0 0 | AF190-30-00-14 | 1SFL487002R1400 | 3.000 |
| 110 | 350 | 150 | 300 | 24...60 | 20...60 | 0 0 | AF205-30-00-11 | 1SFL527002R1100 | 3.000 |
| | | | | 48...130 | 48...130 | 0 0 | AF205-30-00-12 | 1SFL527002R1200 | 3.000 |
| | | | | 100...250 | 100...250 | 0 0 | AF205-30-00-13 | 1SFL527002R1300 | 3.000 |
| | | | | 250...500 | 250...500 | 0 0 | AF205-30-00-14 | 1SFL527002R1400 | 3.000 |
| 132 | 400 | 200 | 350 | 24...60 | 20...60 | 0 0 | AF265-30-00-11 | 1SFL547002R1100 | 4.605 |
| | | | | 48...130 | 48...130 | 0 0 | AF265-30-00-12 | 1SFL547002R1200 | 4.605 |
| | | | | 100...250 | 100...250 | 0 0 | AF265-30-00-13 | 1SFL547002R1300 | 4.605 |
| | | | | 250...500 | 250...500 | 0 0 | AF265-30-00-14 | 1SFL547002R1400 | 4.605 |
| 160 | 500 | 250 | 400 | 24...60 | 20...60 | 0 0 | AF305-30-00-11 | 1SFL587002R1100 | 4.605 |
| | | | | 48...130 | 48...130 | 0 0 | AF305-30-00-12 | 1SFL587002R1200 | 4.605 |
| | | | | 100...250 | 100...250 | 0 0 | AF305-30-00-13 | 1SFL587002R1300 | 4.605 |
| | | | | 250...500 | 250...500 | 0 0 | AF305-30-00-14 | 1SFL587002R1400 | 4.605 |
| 200 | 600 | 300 | 520 | 24...60 | 20...60 | 0 0 | AF370-30-00-11 | 1SFL607002R1100 | 4.605 |
| | | | | 48...130 | 48...130 | 0 0 | AF370-30-00-12 | 1SFL607002R1200 | 4.605 |
| | | | | 100...250 | 100...250 | 0 0 | AF370-30-00-13 | 1SFL607002R1300 | 4.605 |
| | | | | 250...500 | 250...500 | 0 0 | AF370-30-00-14 | 1SFL607002R1400 | 4.605 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.




AF190, AF205

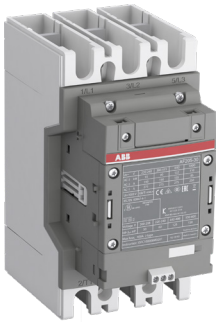
AF265, AF305, AF370

Main dimensions mm, inches

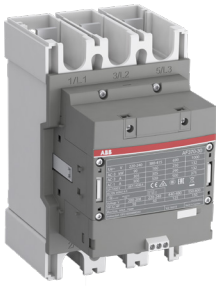
# AF190 ... AF370 3-pole contactors with built-in PLC interface

90 to 200 kW

AC / DC operated




AF205-30-00




AF370-30-00

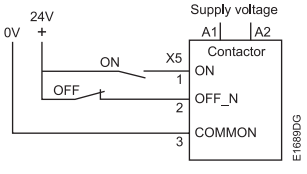
AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and 340 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range, only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request)
  - opening time below 20 ms.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

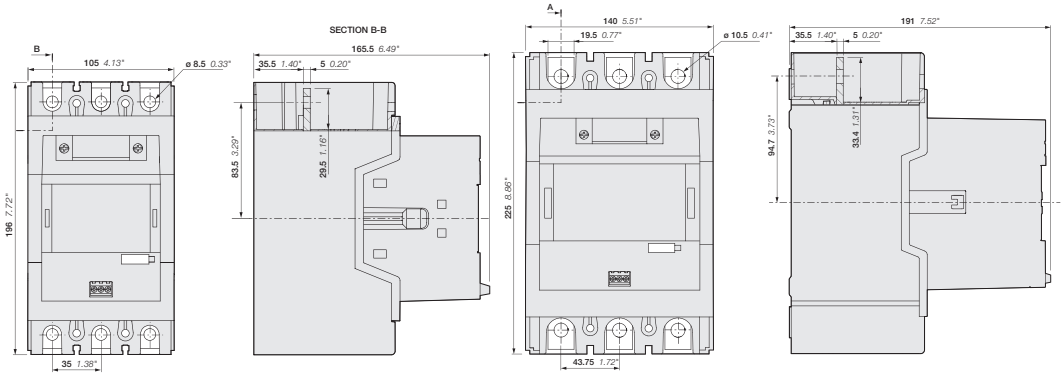
| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 90 | 275 | 125 | 275 | 24...60 | 20...60 | 0 0 | AF190-30-00-31 | 1SFL487002R3100 | 3.000 |
| | | | | 48...130 | 48...130 | 0 0 | AF190-30-00-32 | 1SFL487002R3200 | 3.000 |
| | | | | 100...250 | 100...250 | 0 0 | AF190-30-00-33 | 1SFL487002R3300 | 3.000 |
| | | | | 250...500 | 250...500 | 0 0 | AF190-30-00-34 | 1SFL487002R3400 | 3.000 |
| 110 | 350 | 150 | 300 | 24...60 | 20...60 | 0 0 | AF205-30-00-31 | 1SFL527002R3100 | 3.000 |
| | | | | 48...130 | 48...130 | 0 0 | AF205-30-00-32 | 1SFL527002R3200 | 3.000 |
| | | | | 100...250 | 100...250 | 0 0 | AF205-30-00-33 | 1SFL527002R3300 | 3.000 |
| | | | | 250...500 | 250...500 | 0 0 | AF205-30-00-34 | 1SFL527002R3400 | 3.000 |
| 132 | 400 | 200 | 350 | 24...60 | 20...60 | 0 0 | AF265-30-00-31 | 1SFL547002R3100 | 4.605 |
| | | | | 48...130 | 48...130 | 0 0 | AF265-30-00-32 | 1SFL547002R3200 | 4.605 |
| | | | | 100...250 | 100...250 | 0 0 | AF265-30-00-33 | 1SFL547002R3300 | 4.605 |
| | | | | 250...500 | 250...500 | 0 0 | AF265-30-00-34 | 1SFL547002R3400 | 4.605 |
| 160 | 500 | 250 | 400 | 24...60 | 20...60 | 0 0 | AF305-30-00-31 | 1SFL587002R3100 | 4.605 |
| | | | | 48...130 | 48...130 | 0 0 | AF305-30-00-32 | 1SFL587002R3200 | 4.605 |
| | | | | 100...250 | 100...250 | 0 0 | AF305-30-00-33 | 1SFL587002R3300 | 4.605 |
| | | | | 250...500 | 250...500 | 0 0 | AF305-30-00-34 | 1SFL587002R3400 | 4.605 |
| 200 | 600 | 300 | 520 | 24...60 | 20...60 | 0 0 | AF370-30-00-31 | 1SFL607002R3100 | 4.605 |
| | | | | 48...130 | 48...130 | 0 0 | AF370-30-00-32 | 1SFL607002R3200 | 4.605 |
| | | | | 100...250 | 100...250 | 0 0 | AF370-30-00-33 | 1SFL607002R3300 | 4.605 |
| | | | | 250...500 | 250...500 | 0 0 | AF370-30-00-34 | 1SFL607002R3400 | 4.605 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AF190 ... AF370 are equipped with low voltage inputs for control, for example by a PLC.




Control inputs




AF190, AF205

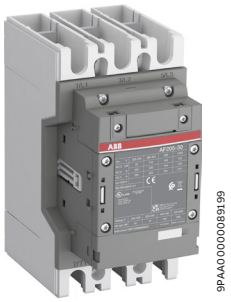
AF265, AF305, AF370

Main dimensions mm, inches

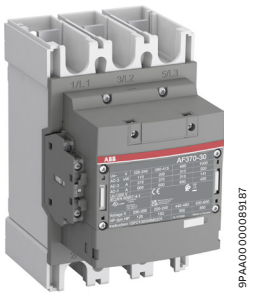
# AF190 ... AF370 3-pole contactors

## 90 to 200 kW

## AC operated-optimized for short operation times




AF205-30-00



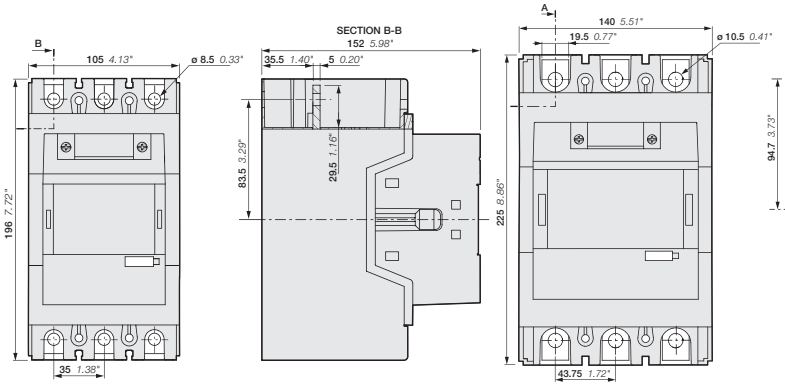

AF370-30-00

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC. These contactors are of the block type design with 3 main poles.

- control circuit: AC operated with electronic coil interface
  - with faster operating time
  - reduced panel energy consumption
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50 Hz | V 60 Hz | | | | kg |
| 90 | 275 | 125 | 275 | 110...120 | 48...130 | 0 0 | AF190-30-00-42 | 1SFL487002R4200 | 3.000 |
| | | | | 220...240 | 100...250 | 0 0 | AF190-30-00-43 | 1SFL487002R4300 | 3.000 |
| 110 | 350 | 150 | 300 | 110...120 | 110...120 | 0 0 | AF205-30-00-42 | 1SFL527002R4200 | 3.000 |
| | | | | 220...240 | 220...240 | 0 0 | AF205-30-00-43 | 1SFL527002R4300 | 3.000 |
| 132 | 400 | 200 | 350 | 110...120 | 110...120 | 0 0 | AF265-30-00-42 | 1SFL547002R4200 | 4.605 |
| | | | | 220...240 | 220...240 | 0 0 | AF265-30-00-43 | 1SFL547002R4300 | 4.605 |
| 160 | 500 | 250 | 400 | 110...120 | 110...120 | 0 0 | AF305-30-00-42 | 1SFL587002R4200 | 4.605 |
| | | | | 220...240 | 220...240 | 0 0 | AF305-30-00-43 | 1SFL587002R4300 | 4.605 |
| 200 | 600 | 300 | 520 | 110...120 | 110...120 | 0 0 | AF370-30-00-42 | 1SFL607002R4200 | 4.605 |
| | | | | 220...240 | 220...240 | 0 0 | AF370-30-00-43 | 1SFL607002R4300 | 4.605 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.



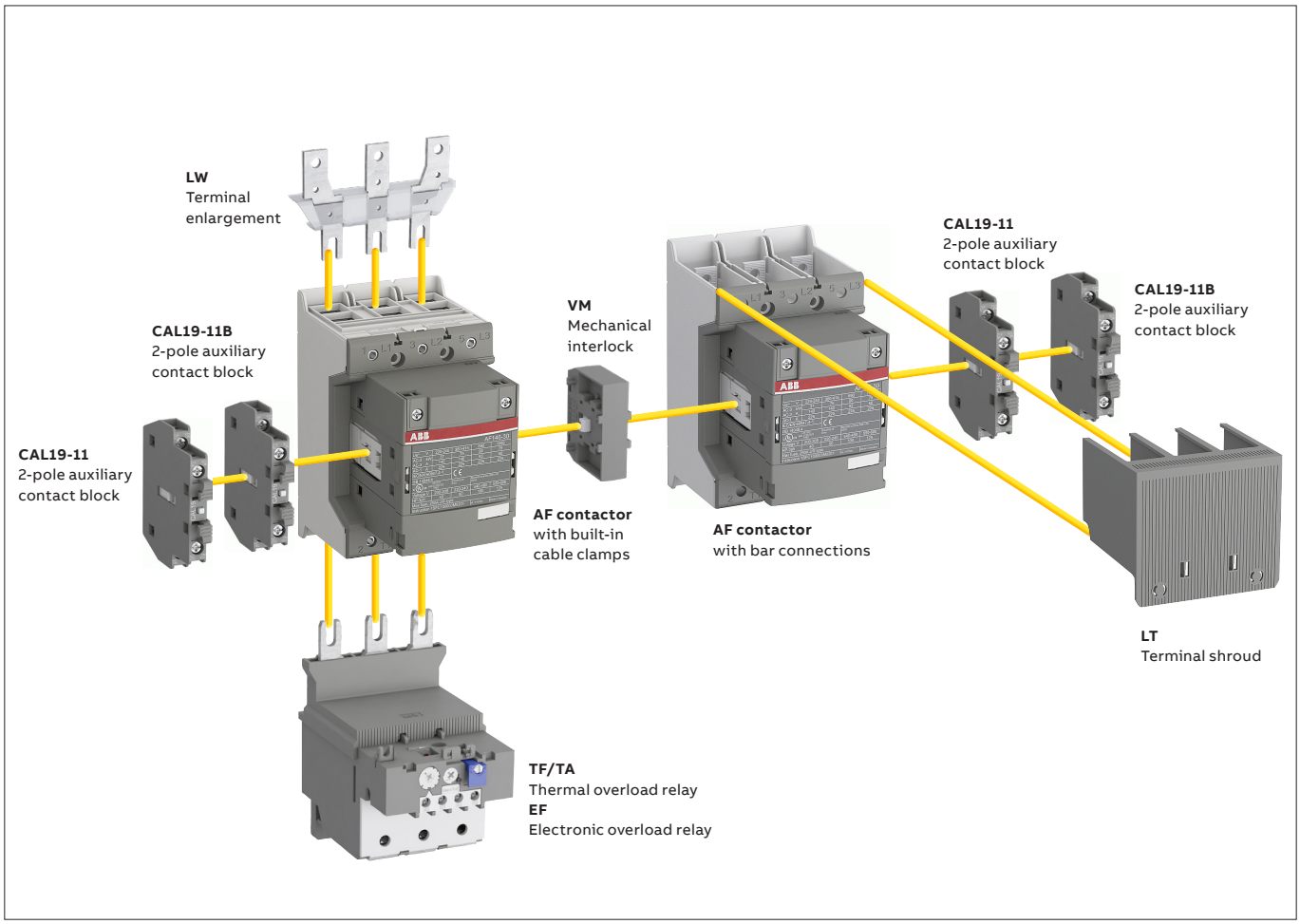

AF190, AF205

AF265, AF305, AF370

Main dimensions mm, inches

# AF116 ... AF370 3-pole contactors

## Contactors and main accessories




**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Available auxiliary contacts | Side-mounted accessories Auxiliary contact blocks | | Mechanical interlock units (between two contactors) |
|---|---|---|---|---|---|
| | | | CAL19-11 (3) | CAL19-11B | |
| AF116 ... AF370 | 3 0 | 0 0 | 2 x CAL19-11 | + 2 x CAL19-11B | – |
| AF116 ... AF370 | 3 0 | 0 0 | 2 x CAL19-11 (1) | + 2 x CAL19-11B (1) | + VM... (2) |

(1) Total number of auxiliary contact blocks for the two contactors.
(2) Interlock type, according to the contactor ratings (see "Accessories").
(3) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

### Overload relays fitting details (1)

| Contactor types | Thermal overload relays | Electronic overload relays |
|---|---|---|
| AF116 ... AF140 | TF140DU (66...142 A) | EF146 (54...150 A) |
| AF146 | – | EF146 (54...150 A) |
| AF190, AF205 | TA200DU (66...200 A) | EF205 (63...210 A) |
| AF265 ... AF370 | – | EF370 (115...380 A) |

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
(1) Direct mounting - No kit required.

# AF26 ... AF38 3-pole contactors

## 4 to 18.5 kW

## AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts



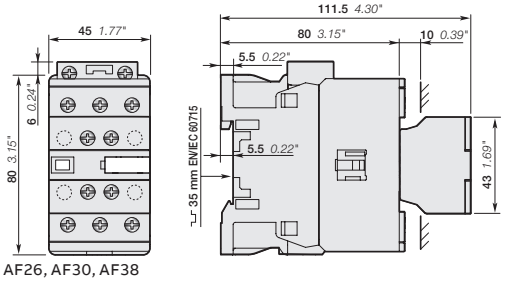

AF26-30-11

AF26 ... AF38 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 11 | 45 | 15 | 45 | 24...60 | 20...60 (1) | 1 1 | AF26-30-11-11 | 1SBL237001R1111 | 0.350 |
| | | | | 48...130 | 48...130 | 1 1 | AF26-30-11-12 | 1SBL237001R1211 | 0.350 |
| | | | | 100...250 | 100...250 | 1 1 | AF26-30-11-13 | 1SBL237001R1311 | 0.350 |
| | | | | 250...500 | 250...500 | 1 1 | AF26-30-11-14 | 1SBL237001R1411 | 0.390 |
| 15 | 50 | 20 | 50 | 24...60 | 20...60 (1) | 1 1 | AF30-30-11-11 | 1SBL277001R1111 | 0.350 |
| | | | | 48...130 | 48...130 | 1 1 | AF30-30-11-12 | 1SBL277001R1211 | 0.350 |
| | | | | 100...250 | 100...250 | 1 1 | AF30-30-11-13 | 1SBL277001R1311 | 0.350 |
| | | | | 250...500 | 250...500 | 1 1 | AF30-30-11-14 | 1SBL277001R1411 | 0.390 |
| 18.5 | 50 | 25 | 50 | 24...60 | 20...60 (1) | 1 1 | AF38-30-11-11 | 1SBL297001R1111 | 0.350 |
| | | | | 48...130 | 48...130 | 1 1 | AF38-30-11-12 | 1SBL297001R1211 | 0.350 |
| | | | | 100...250 | 100...250 | 1 1 | AF38-30-11-13 | 1SBL297001R1311 | 0.350 |
| | | | | 250...500 | 250...500 | 1 1 | AF38-30-11-14 | 1SBL297001R1411 | 0.390 |

(1) AF..-30-..-11 not suitable for direct control by PLC-output.




AF26, AF30, AF38

Main dimensions mm, inches

# AF26Z ... AF38Z 3-pole contactors

## 4 to 18.5 kW

## AC / DC operated for specific applications with 1 N.O. + 1 N.C. contacts



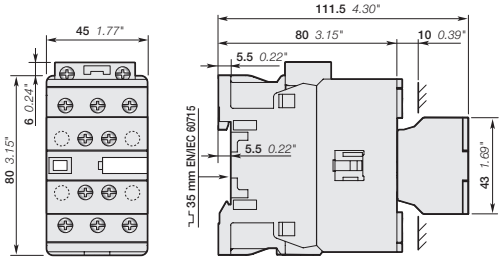

AF26Z-30-11

AF26Z ... AF38Z contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - can manage large control voltage variations, allow direct control by PLC-output ≥ 24 V DC 500 mA, reduced panel energy consumption, very distinct closing and opening,
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 11 | 45 | 15 | 45 | - | 12...20 | 1 1 | AF26Z-30-11-20 | 1SBL236001R2011 | 0.390 |
| | | | | 24...60 | 20...60 | 1 1 | AF26Z-30-11-21 | 1SBL236001R2111 | 0.390 |
| | | | | 48...130 | 48...130 | 1 1 | AF26Z-30-11-22 | 1SBL236001R2211 | 0.390 |
| | | | | 100...250 | 100...250 | 1 1 | AF26Z-30-11-23 | 1SBL236001R2311 | 0.390 |
| 15 | 50 | 20 | 50 | - | 12...20 | 1 1 | AF30Z-30-11-20 | 1SBL276001R2011 | 0.390 |
| | | | | 24...60 | 20...60 | 1 1 | AF30Z-30-11-21 | 1SBL276001R2111 | 0.390 |
| | | | | 48...130 | 48...130 | 1 1 | AF30Z-30-11-22 | 1SBL276001R2211 | 0.390 |
| | | | | 100...250 | 100...250 | 1 1 | AF30Z-30-11-23 | 1SBL276001R2311 | 0.390 |
| 18.5 | 50 | 25 | 50 | - | 12...20 | 1 1 | AF38Z-30-11-20 | 1SBL296001R2011 | 0.390 |
| | | | | 24...60 | 20...60 | 1 1 | AF38Z-30-11-21 | 1SBL296001R2111 | 0.390 |
| | | | | 48...130 | 48...130 | 1 1 | AF38Z-30-11-22 | 1SBL296001R2211 | 0.390 |
| | | | | 100...250 | 100...250 | 1 1 | AF38Z-30-11-23 | 1SBL296001R2311 | 0.390 |

Note: Only AF..Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole

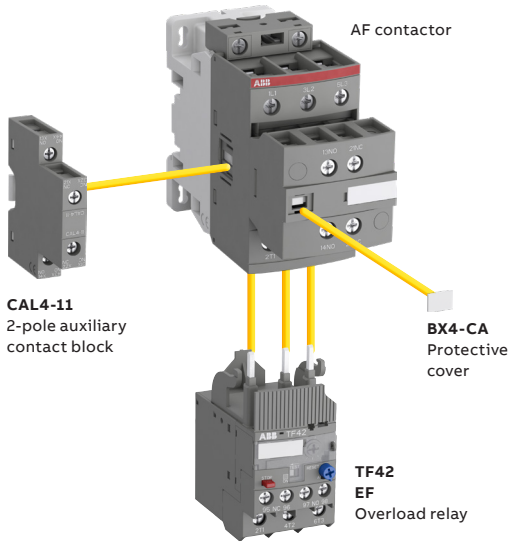



AF26Z, AF30Z, AF38Z

Main dimensions mm, inches

# AF26 ... AF38 3-pole contactors with 1 N.O. + 1 N.C. auxiliary contacts

## Contactors and main accessories




**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Built-in auxiliary contacts | Side-mounted accessories<br>Mechanical interlock unit<br>(between 2 contactors)<br>VM4 | Auxiliary contact blocks<br>2-pole CAL4-11<br>Left side | Right side |
|---|---|---|---|---|---|
| AF26 ... AF38 | 3 0 | 1 1 | 1 | + 1 | or 1 |
| | | | – | + 1 | + 1 |

**Overload relays fitting details (1)**

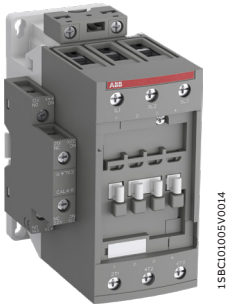
| Contactor types | Thermal overload relays | Electronic overload relays |
|---|---|---|
| AF26 ... AF38 | TF42 (0.10...38 A) | EF19 (0.10...19 A) |
| | | EF45 (9...45 A) |

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.
(1) Direct mounting - No kit required.

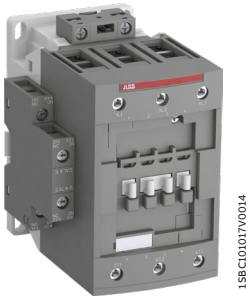
# AF40 ... AF96 3-pole contactors

## 18.5 to 30 kW

## AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts




AF40-30-11



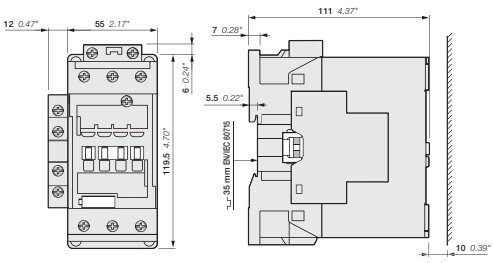

AF80-30-11

AF40 ... AF96 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

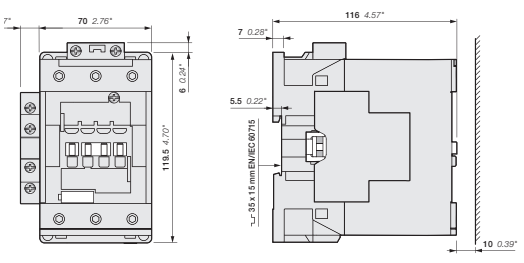
- with 1 N.O. + 1 N.C. side mounted auxiliary contact block
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 185 | 70 | 30 | 60 | 24...60 | 20...60 (1) | 1 1 | AF40-30-11-11 | 1SBL347001R1111 | 1.010 |
| | | | | 48...130 | 48...130 | 1 1 | AF40-30-11-12 | 1SBL347001R1211 | 1.010 |
| | | | | 100...250 | 100...250 | 1 1 | AF40-30-11-13 | 1SBL347001R1311 | 0.990 |
| | | | | 250...500 | 250...500 | 1 1 | AF40-30-11-14 | 1SBL347001R1411 | 0.990 |
| 22 | 100 | 40 | 80 | 24...60 | 20...60 (1) | 1 1 | AF52-30-11-11 | 1SBL367001R1111 | 1.010 |
| | | | | 48...130 | 48...130 | 1 1 | AF52-30-11-12 | 1SBL367001R1211 | 1.010 |
| | | | | 100...250 | 100...250 | 1 1 | AF52-30-11-13 | 1SBL367001R1311 | 0.990 |
| | | | | 250...500 | 250...500 | 1 1 | AF52-30-11-14 | 1SBL367001R1411 | 0.990 |
| 30 | 105 | 50 | 90 | 24...60 | 20...60 (1) | 1 1 | AF65-30-11-11 | 1SBL387001R1111 | 1.010 |
| | | | | 48...130 | 48...130 | 1 1 | AF65-30-11-12 | 1SBL387001R1211 | 1.010 |
| | | | | 100...250 | 100...250 | 1 1 | AF65-30-11-13 | 1SBL387001R1311 | 0.990 |
| | | | | 250...500 | 250...500 | 1 1 | AF65-30-11-14 | 1SBL387001R1411 | 0.990 |
| 37 | 125 | 60 | 105 | 24...60 | 20...60 (1) | 1 1 | AF80-30-11-11 | 1SBL397001R1111 | 1.260 |
| | | | | 48...130 | 48...130 | 1 1 | AF80-30-11-12 | 1SBL397001R1211 | 1.260 |
| | | | | 100...250 | 100...250 | 1 1 | AF80-30-11-13 | 1SBL397001R1311 | 1.210 |
| | | | | 250...500 | 250...500 | 1 1 | AF80-30-11-14 | 1SBL397001R1411 | 1.210 |
| 45/55 | 130 | 60/75 | 115 | 24...60 | 20...60 (1) | 1 1 | AF96-30-11-11 | 1SBL407001R1111 | 1.260 |
| | | | | 48...130 | 48...130 | 1 1 | AF96-30-11-12 | 1SBL407001R1211 | 1.260 |
| | | | | 100...250 | 100...250 | 1 1 | AF96-30-11-13 | 1SBL407001R1311 | 1.210 |
| | | | | 250...500 | 250...500 | 1 1 | AF96-30-11-14 | 1SBL407001R1411 | 1.210 |

(1) For control by PLC-output, use RA4 interface relay.




AF40, AF52, AF65-30-11-..

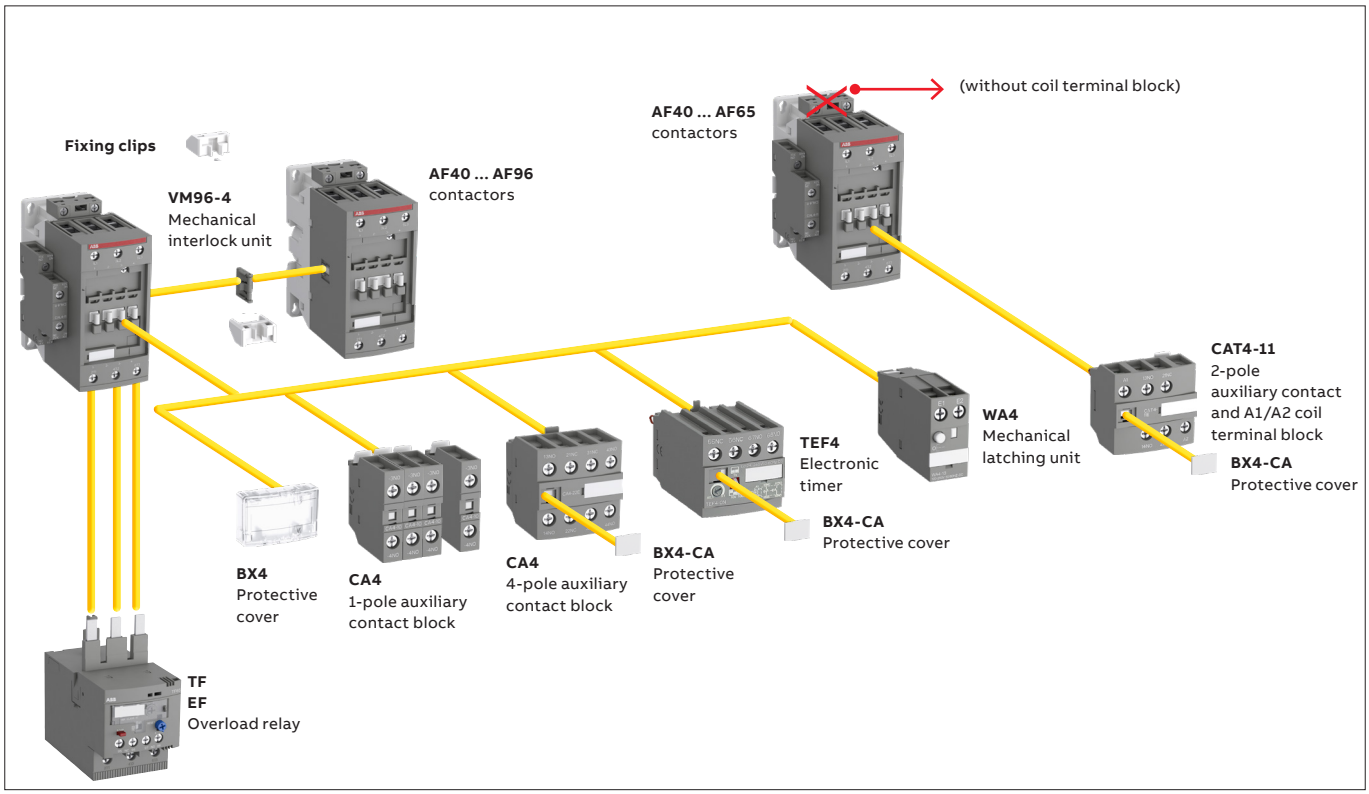



AF80, AF96-30-11-..

Main dimensions mm, inches

# AF40 ... AF96 3-pole contactors with 1 N.O. + 1 N.C. auxiliary contacts

## Contactors and main accessories




**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories Auxiliary contact blocks | | | Electronic timer | Mechanical latching unit (1) | Side-mounted accessories Mechanical interlock set (between 2 contactors) | | Auxiliary contact blocks | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-pole CA4 | 2-pole CAT4-11 | 4-pole CA4 | TEF4 | WA4 | VM96-4 | | 2-pole CAL4-11 Left side | Right side |
| AF40 ... AF65 | 3 0 | 1 1 | 4 max. | or 1 | or 1 | or 1 | or 1 | + 1 | | – | – |
| | | | 4 max. | or 1 | or 1 | or 1 | or 1 | – | + | – | 1 |
| AF80, AF96 | 3 0 | 1 1 | 4 max. | – | or 1 | or 1 | or 1 | + 1 | | – | – |
| | | | 4 max. | – | or 1 | or 1 | or 1 | – | + | – | 1 |

(1) Use WA4 for AF09...AF65 and WA4-96 for AF80, AF96.
Accept 1-pole CA4 auxiliary contacts on each side of the mechanical latch.

### Overload relays fitting details (2)

| Contactor types | Thermal overload relays | Electronic overload relays |
|---|---|---|
| AF40 ... AF65 | TF65 (22...67 A) | EF65 (20...70 A) |
| AF80, AF96 | TF96 (40...96 A) | EF96 (36...100 A) |

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.
(2) Direct mounting - No kit required.

# AF116 ... AF146 3-pole contactors

## 55 to 75 kW

## AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts




AF146-30-11



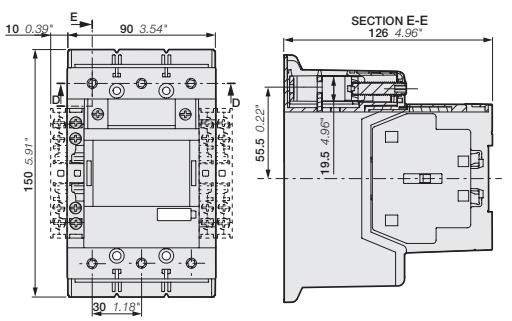

AF146-30-11B

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

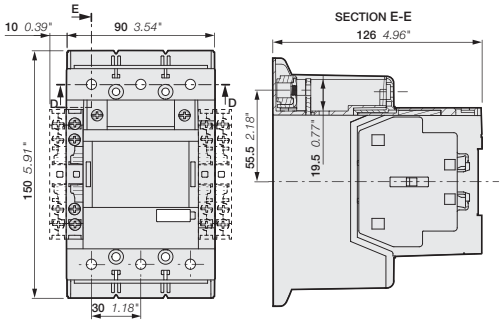
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power | current θ ≤ 40 °C | 3-phase motor rating | General use rating | | | | | | Pkg (1 pce) |
| 400 V AC-3 | AC-1 | 480 V | 600 V AC | | | | | | |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| **For connection with built-in cable clamps** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 1 1 | AF116-30-11-11 | 1SFL427001R1111 | 1.750 |
| | | | | 48...130 | 48...130 | 1 1 | AF116-30-11-12 | 1SFL427001R1211 | 1.750 |
| | | | | 100...250 | 100...250 | 1 1 | AF116-30-11-13 | 1SFL427001R1311 | 1.750 |
| | | | | 250...500 | 250...500 | 1 1 | AF116-30-11-14 | 1SFL427001R1411 | 1.750 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 1 1 | AF140-30-11-11 | 1SFL447001R1111 | 1.750 |
| | | | | 48...130 | 48...130 | 1 1 | AF140-30-11-12 | 1SFL447001R1211 | 1.750 |
| | | | | 100...250 | 100...250 | 1 1 | AF140-30-11-13 | 1SFL447001R1311 | 1.750 |
| | | | | 250...500 | 250...500 | 1 1 | AF140-30-11-14 | 1SFL447001R1411 | 1.750 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 1 1 | AF146-30-11-11 | 1SFL467001R1111 | 1.750 |
| | | | | 48...130 | 48...130 | 1 1 | AF146-30-11-12 | 1SFL467001R1211 | 1.750 |
| | | | | 100...250 | 100...250 | 1 1 | AF146-30-11-13 | 1SFL467001R1311 | 1.750 |
| | | | | 250...500 | 250...500 | 1 1 | AF146-30-11-14 | 1SFL467001R1411 | 1.750 |
| **With bar connections** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 1 1 | AF116-30-11B-11 | 1SFL427002R1111 | 1.500 |
| | | | | 48...130 | 48...130 | 1 1 | AF116-30-11B-12 | 1SFL427002R1211 | 1.500 |
| | | | | 100...250 | 100...250 | 1 1 | AF116-30-11B-13 | 1SFL427002R1311 | 1.500 |
| | | | | 250...500 | 250...500 | 1 1 | AF116-30-11B-14 | 1SFL427002R1411 | 1.500 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 1 1 | AF140-30-11B-11 | 1SFL447002R1111 | 1.500 |
| | | | | 48...130 | 48...130 | 1 1 | AF140-30-11B-12 | 1SFL447002R1211 | 1.500 |
| | | | | 100...250 | 100...250 | 1 1 | AF140-30-11B-13 | 1SFL447002R1311 | 1.500 |
| | | | | 250...500 | 250...500 | 1 1 | AF140-30-11B-14 | 1SFL447002R1411 | 1.500 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 1 1 | AF146-30-11B-11 | 1SFL467002R1111 | 1.500 |
| | | | | 48...130 | 48...130 | 1 1 | AF146-30-11B-12 | 1SFL467002R1211 | 1.500 |
| | | | | 100...250 | 100...250 | 1 1 | AF146-30-11B-13 | 1SFL467002R1311 | 1.500 |
| | | | | 250...500 | 250...500 | 1 1 | AF146-30-11B-14 | 1SFL467002R1411 | 1.500 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.




AF116, AF140, AF146-30-11




AF116, AF140, AF146-30-11B

Main dimensions mm, inches

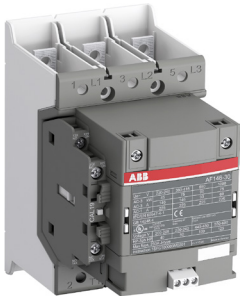
# AF116 ... AF146 3-pole contactors with built-in PLC interface

55 to 75 kW

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts




AF146-30-11




AF146-30-11B

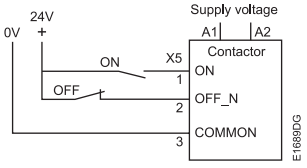
AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range, only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request)
  - opening time below 20 ms.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

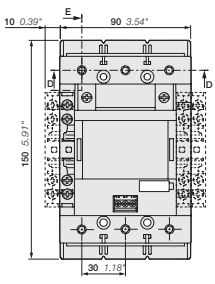
| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| **For connection with built-in cable clamps** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 1 1 | AF116-30-11-31 | 1SFL427001R3111 | 1.750 |
| | | | | 48...130 | 48...130 | 1 1 | AF116-30-11-32 | 1SFL427001R3211 | 1.750 |
| | | | | 100...250 | 100...250 | 1 1 | AF116-30-11-33 | 1SFL427001R3311 | 1.750 |
| | | | | 250...500 | 250...500 | 1 1 | AF116-30-11-34 | 1SFL427001R3411 | 1.750 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 1 1 | AF140-30-11-31 | 1SFL447001R3111 | 1.750 |
| | | | | 48...130 | 48...130 | 1 1 | AF140-30-11-32 | 1SFL447001R3111 | 1.750 |
| | | | | 100...250 | 100...250 | 1 1 | AF140-30-11-33 | 1SFL447001R3311 | 1.750 |
| | | | | 250...500 | 250...500 | 1 1 | AF140-30-11-34 | 1SFL447001R3411 | 1.750 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 1 1 | AF146-30-11-31 | 1SFL467001R3211 | 1.750 |
| | | | | 48...130 | 48...130 | 1 1 | AF146-30-11-32 | 1SFL467001R3111 | 1.750 |
| | | | | 100...250 | 100...250 | 1 1 | AF146-30-11-33 | 1SFL467001R3311 | 1.750 |
| | | | | 250...500 | 250...500 | 1 1 | AF146-30-11-34 | 1SFL467001R3411 | 1.750 |
| **With bar connections** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 1 1 | AF116-30-11B-31 | 1SFL427002R3111 | 1.500 |
| | | | | 48...130 | 48...130 | 1 1 | AF116-30-11B-32 | 1SFL427002R3211 | 1.500 |
| | | | | 100...250 | 100...250 | 1 1 | AF116-30-11B-33 | 1SFL427002R3311 | 1.500 |
| | | | | 250...500 | 250...500 | 1 1 | AF116-30-11B-34 | 1SFL427002R3411 | 1.500 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 1 1 | AF140-30-11B-31 | 1SFL447002R3111 | 1.500 |
| | | | | 48...130 | 48...130 | 1 1 | AF140-30-11B-32 | 1SFL447002R3211 | 1.500 |
| | | | | 100...250 | 100...250 | 1 1 | AF140-30-11B-33 | 1SFL447002R3311 | 1.500 |
| | | | | 250...500 | 250...500 | 1 1 | AF140-30-11B-34 | 1SFL447002R3411 | 1.500 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 1 1 | AF146-30-11B-31 | 1SFL467002R3111 | 1.500 |
| | | | | 48...130 | 48...130 | 1 1 | AF146-30-11B-32 | 1SFL467002R3211 | 1.500 |
| | | | | 100...250 | 100...250 | 1 1 | AF146-30-11B-33 | 1SFL467002R3311 | 1.500 |
| | | | | 250...500 | 250...500 | 1 1 | AF146-30-11B-34 | 1SFL467002R3411 | 1.500 |

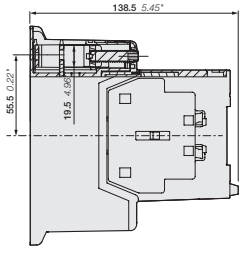
(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AF116 ... AF146 are equipped with low voltage inputs for control, for example by a PLC.

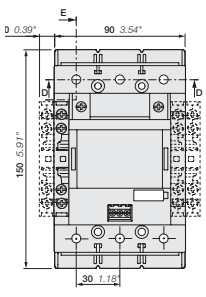


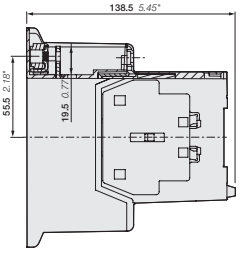

Control inputs




AF116, AF140, AF146-30-11




AF116, AF140, AF146-30-11B

Main dimensions mm, inches

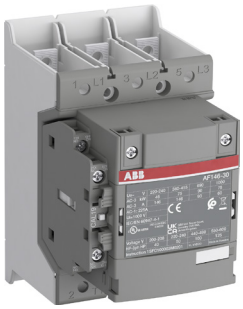
# AF116 ... AF146 3-pole contactors

55 to 75 kW

AC operated with 1 N.O. + 1 N.C. auxiliary contacts - optimized for short operation times




AF146-30-11



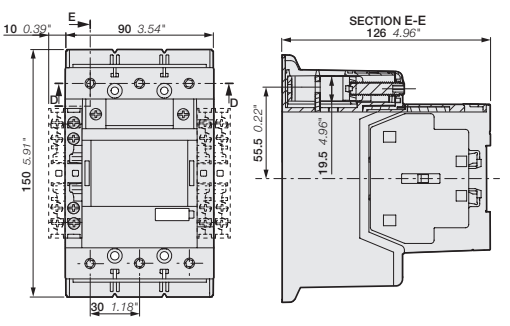

AF146-30-11B

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC. These contactors are of the block type design with 3 main poles.

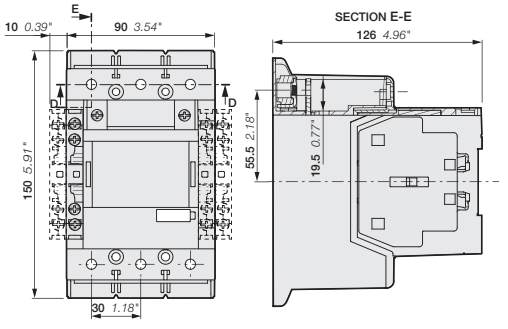
- control circuit: AC operated with electronic coil interface
  - with faster operating time
  - reduced panel energy consumption
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50 Hz | V 60Hz | | | | kg |
| **For connection with built-in cable clamps** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 110...120 | 110...120 | 1 1 | AF116-30-11-42 | 1SFL427001R4211 | 1.750 |
| | | | | 220...240 | 220...240 | 1 1 | AF116-30-11-43 | 1SFL427001R4311 | 1.750 |
| 75 | 200 | 100 | 200 | 110...120 | 110...120 | 1 1 | AF140-30-11-42 | 1SFL447001R4211 | 1.750 |
| | | | | 220...240 | 220...240 | 1 1 | AF140-30-11-43 | 1SFL447001R4311 | 1.750 |
| 75 | 225 | 100 | 200 | 110...120 | 110...120 | 1 1 | AF146-30-11-42 | 1SFL467001R4211 | 1.750 |
| | | | | 220...240 | 220...240 | 1 1 | AF146-30-11-43 | 1SFL467001R4311 | 1.750 |
| **With bar connections** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 110...120 | 110...120 | 1 1 | AF116-30-11B-42 | 1SFL427002R4211 | 1.500 |
| | | | | 220...240 | 220...240 | 1 1 | AF116-30-11B-43 | 1SFL427002R4311 | 1.500 |
| 75 | 200 | 100 | 200 | 110...120 | 110...120 | 1 1 | AF140-30-11B-42 | 1SFL447002R4211 | 1.500 |
| | | | | 220...240 | 220...240 | 1 1 | AF140-30-11B-43 | 1SFL447002R4311 | 1.500 |
| 75 | 225 | 100 | 200 | 110...120 | 110...120 | 1 1 | AF146-30-11B-42 | 1SFL467002R4211 | 1.500 |
| | | | | 220...240 | 210...240 | 1 1 | AF146-30-11B-43 | 1SFL467002R4311 | 1.500 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.




AF116, AF140, AF146-30-11



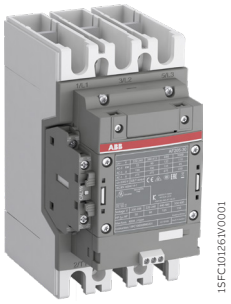

AF116, AF140, AF146-30-11B

Main dimensions mm, inches

# AF190 ... AF370 3-pole contactors

## 90 to 200 kW

## AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts



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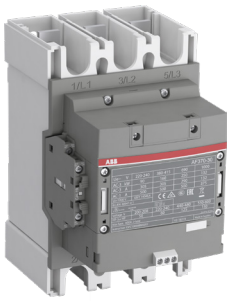
AF205-30-11



1SFC101258V0001

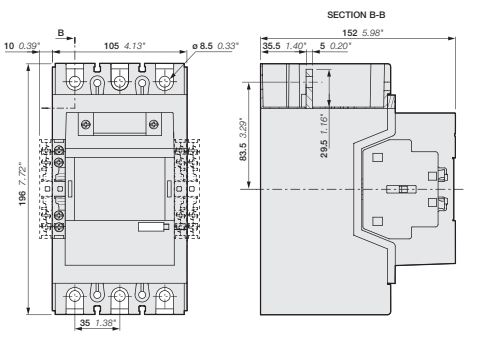
AF370-30-11

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and up to 340 V DC. These contactors are of the block type design with 3 main poles.

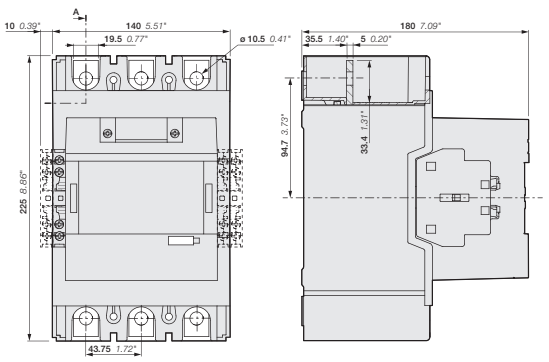
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 90 | 275 | 125 | 275 | 24...60 | 20...60 | 1 1 | AF190-30-11-11 | 1SFL487002R1111 | 3.000 |
| | | | | 48...130 | 48...130 | 1 1 | AF190-30-11-12 | 1SFL487002R1211 | 3.000 |
| | | | | 100...250 | 100...250 | 1 1 | AF190-30-11-13 | 1SFL487002R1311 | 3.000 |
| | | | | 250...500 | 250...500 | 1 1 | AF190-30-11-14 | 1SFL487002R1411 | 3.000 |
| 110 | 350 | 150 | 300 | 24...60 | 20...60 | 1 1 | AF205-30-11-11 | 1SFL527002R1111 | 3.000 |
| | | | | 48...130 | 48...130 | 1 1 | AF205-30-11-12 | 1SFL527002R1211 | 3.000 |
| | | | | 100...250 | 100...250 | 1 1 | AF205-30-11-13 | 1SFL527002R1311 | 3.000 |
| | | | | 250...500 | 250...500 | 1 1 | AF205-30-11-14 | 1SFL527002R1411 | 3.000 |
| 132 | 400 | 200 | 350 | 24...60 | 20...60 | 1 1 | AF265-30-11-11 | 1SFL547002R1111 | 4.640 |
| | | | | 48...130 | 48...130 | 1 1 | AF265-30-11-12 | 1SFL547002R1211 | 4.640 |
| | | | | 100...250 | 100...250 | 1 1 | AF265-30-11-13 | 1SFL547002R1311 | 4.640 |
| | | | | 250...500 | 250...500 | 1 1 | AF265-30-11-14 | 1SFL547002R1411 | 4.640 |
| 160 | 500 | 250 | 400 | 24...60 | 20...60 | 1 1 | AF305-30-11-11 | 1SFL587002R1111 | 4.640 |
| | | | | 48...130 | 48...130 | 1 1 | AF305-30-11-12 | 1SFL587002R1211 | 4.640 |
| | | | | 100...250 | 100...250 | 1 1 | AF305-30-11-13 | 1SFL587002R1311 | 4.640 |
| | | | | 250...500 | 250...500 | 1 1 | AF305-30-11-14 | 1SFL587002R1411 | 4.640 |
| 200 | 600 | 300 | 520 | 24...60 | 20...60 | 1 1 | AF370-30-11-11 | 1SFL607002R1111 | 4.640 |
| | | | | 48...130 | 48...130 | 1 1 | AF370-30-11-12 | 1SFL607002R1211 | 4.640 |
| | | | | 100...250 | 100...250 | 1 1 | AF370-30-11-13 | 1SFL607002R1311 | 4.640 |
| | | | | 250...500 | 250...500 | 1 1 | AF370-30-11-14 | 1SFL607002R1411 | 4.640 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.




AF190, AF205



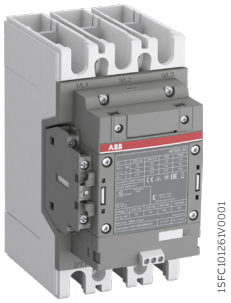

AF265, AF305, AF370

Main dimensions mm, inches

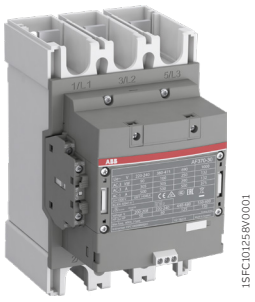
# AF190 ... AF370 3-pole contactors with built-in PLC interface

90 to 200 kW

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts for faster opening utilization




AF205-30-11




AF370-30-11

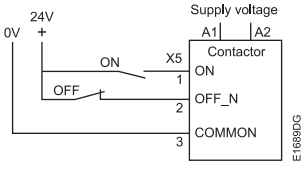
AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and up to 340 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range, only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request)
  - opening time below 20 ms.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

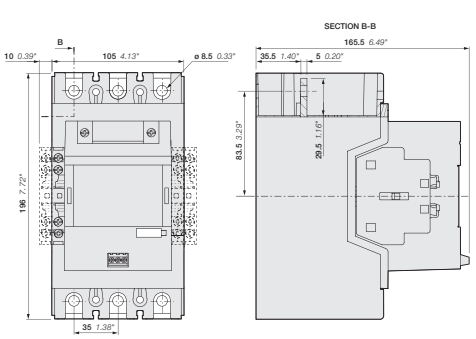
| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 90 | 275 | 125 | 275 | 24...60 | 20...60 | 1 1 | AF190-30-11-31 | 1SFL487002R3111 | 3.000 |
| | | | | 48...130 | 48...130 | 1 1 | AF190-30-11-32 | 1SFL487002R3211 | 3.000 |
| | | | | 100...250 | 100...250 | 1 1 | AF190-30-11-33 | 1SFL487002R3311 | 3.000 |
| | | | | 250...500 | 250...500 | 1 1 | AF190-30-11-34 | 1SFL487002R3411 | 3.000 |
| 110 | 350 | 150 | 300 | 24...60 | 20...60 | 1 1 | AF205-30-11-31 | 1SFL527002R3111 | 3.000 |
| | | | | 48...130 | 48...130 | 1 1 | AF205-30-11-32 | 1SFL527002R3211 | 3.000 |
| | | | | 100...250 | 100...250 | 1 1 | AF205-30-11-33 | 1SFL527002R3311 | 3.000 |
| | | | | 250...500 | 250...500 | 1 1 | AF205-30-11-34 | 1SFL527002R3411 | 3.000 |
| 132 | 400 | 200 | 350 | 24...60 | 20...60 | 1 1 | AF265-30-11-31 | 1SFL547002R3111 | 4.640 |
| | | | | 48...130 | 48...130 | 1 1 | AF265-30-11-32 | 1SFL547002R3211 | 4.640 |
| | | | | 100...250 | 100...250 | 1 1 | AF265-30-11-33 | 1SFL547002R3311 | 4.640 |
| | | | | 250...500 | 250...500 | 1 1 | AF265-30-11-34 | 1SFL547002R3411 | 4.640 |
| 160 | 500 | 250 | 400 | 24...60 | 20...60 | 1 1 | AF305-30-11-31 | 1SFL587002R3111 | 4.640 |
| | | | | 48...130 | 48...130 | 1 1 | AF305-30-11-32 | 1SFL587002R3211 | 4.640 |
| | | | | 100...250 | 100...250 | 1 1 | AF305-30-11-33 | 1SFL587002R3311 | 4.640 |
| | | | | 250...500 | 250...500 | 1 1 | AF305-30-11-34 | 1SFL587002R3411 | 4.640 |
| 200 | 600 | 300 | 520 | 24...60 | 20...60 | 1 1 | AF370-30-11-31 | 1SFL607002R3111 | 4.640 |
| | | | | 48...130 | 48...130 | 1 1 | AF370-30-11-32 | 1SFL607002R3211 | 4.640 |
| | | | | 100...250 | 100...250 | 1 1 | AF370-30-11-33 | 1SFL607002R3311 | 4.640 |
| | | | | 250...500 | 250...500 | 1 1 | AF370-30-11-34 | 1SFL607002R3411 | 4.640 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

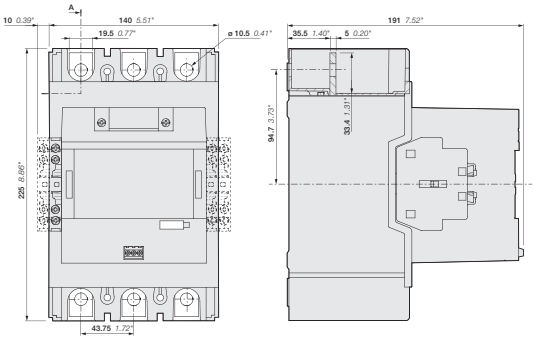
AF190 ... AF370 are equipped with low voltage inputs for control, for example by a PLC.




Control inputs




AF190, AF205



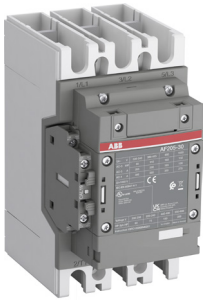

AF265, AF305, AF370

Main dimensions mm, inches

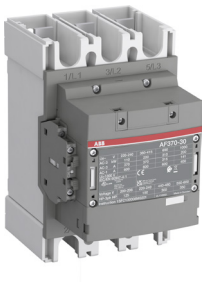
# AF190 ... AF370 3-pole contactors

## 90 to 200 kW

## AC operated with 1 N.O. + 1 N.C. auxiliary contacts - optimized for short operation times




AF205-30-11



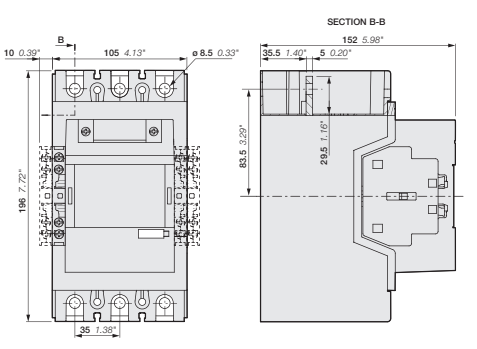

AF370-30-11

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC. These contactors are of the block type design with 3 main poles.

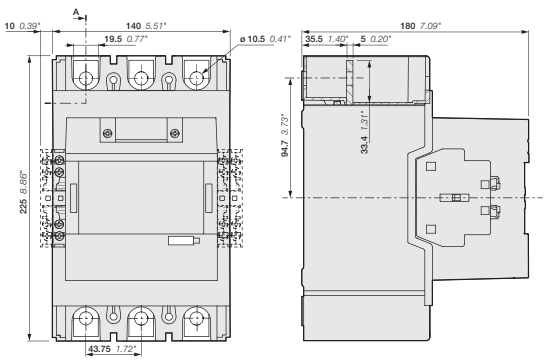
- control circuit: AC operated with electronic coil interface
  - with faster operating time
  - reduced panel energy consumption
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50 Hz | V 60 Hz | | | | kg |
| 90 | 275 | 125 | 275 | 110...120 | 110...120 | 1 1 | AF190-30-11-42 | 1SFL487002R4211 | 3.000 |
| | | | | 220...240 | 220...240 | 1 1 | AF190-30-11-43 | 1SFL487002R4311 | 3.000 |
| 110 | 350 | 150 | 300 | 110...120 | 110...120 | 1 1 | AF205-30-11-42 | 1SFL527002R4211 | 3.000 |
| | | | | 220...240 | 220...240 | 1 1 | AF205-30-11-43 | 1SFL527002R4311 | 3.000 |
| 132 | 400 | 200 | 350 | 110...120 | 110...120 | 1 1 | AF265-30-11-42 | 1SFL547002R4211 | 4.640 |
| | | | | 220...240 | 220...240 | 1 1 | AF265-30-11-43 | 1SFL547002R4311 | 4.640 |
| 160 | 500 | 250 | 400 | 110...120 | 110...120 | 1 1 | AF305-30-11-42 | 1SFL587002R4211 | 4.640 |
| | | | | 220...240 | 220...240 | 1 1 | AF305-30-11-43 | 1SFL587002R4311 | 4.640 |
| 200 | 600 | 300 | 520 | 110...120 | 110...120 | 1 1 | AF370-30-11-42 | 1SFL607002R4211 | 4.640 |
| | | | | 220...240 | 220...240 | 1 1 | AF370-30-11-43 | 1SFL607002R4311 | 4.640 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.




AF190, AF205

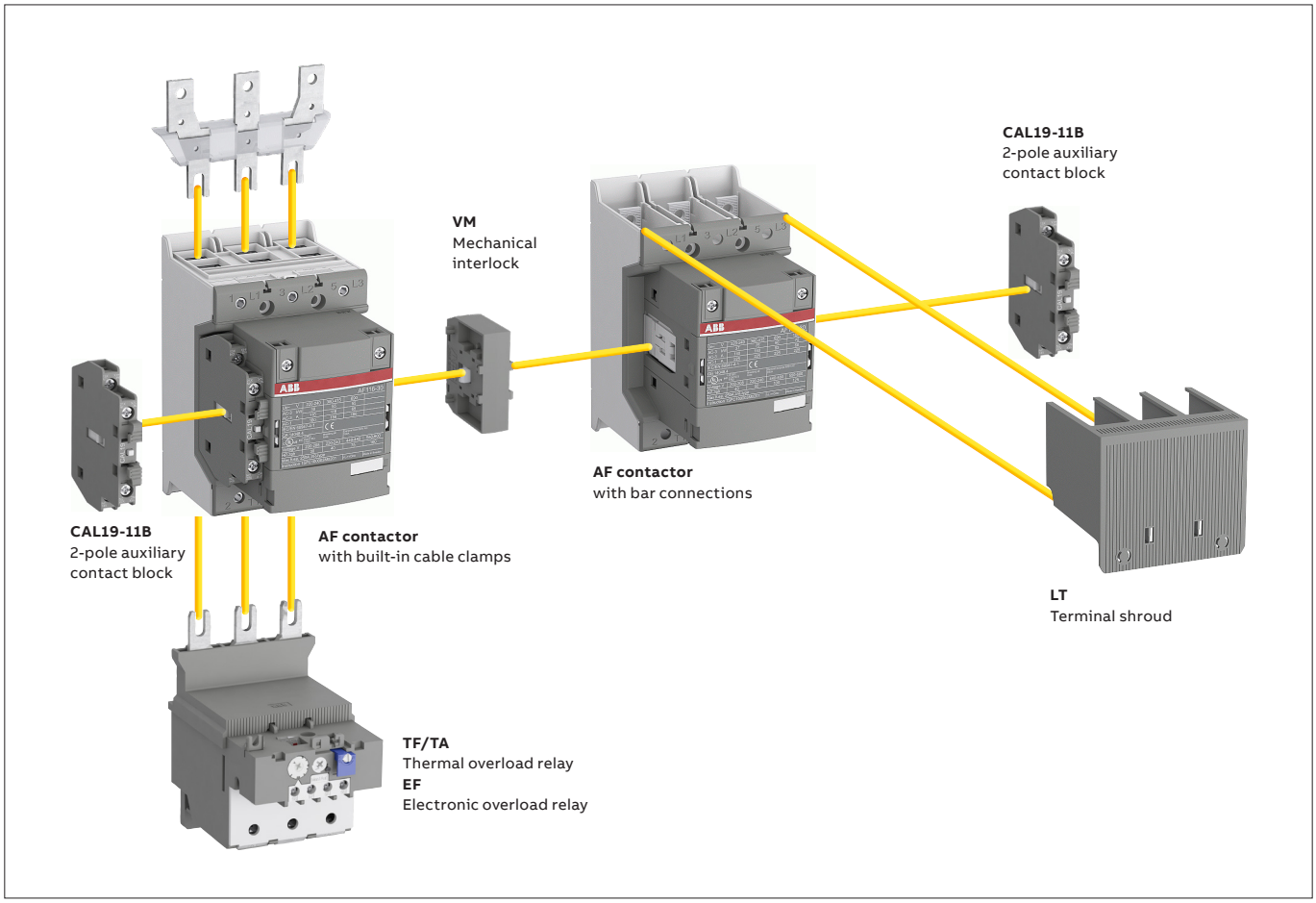



AF265, AF305, AF370

Main dimensions mm, inches

# AF116 ... AF370 3-pole contactors with 1 N.O. + 1 N.C. auxiliary contacts

## Contactors and main accessories




**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Available auxiliary contacts | Side-mounted accessories Auxiliary contact blocks | | Mechanical interlock units (between two contactors) |
|---|---|---|---|---|---|
| | | | CAL19-11 (3) | CAL19-11B (3) | |
| AF116 ... AF370 | 3 0 | 1 1 | 1 x CAL19-11 | + 2 x CAL19-11B | – |
| AF116 ... AF370 | 3 0 | 1 1 | – | + 2 x CAL19-11B (1) | + VM... (2) |

(1) Total number of auxiliary contact blocks for the two contactors.
(2) Interlock type, according to the contactor ratings (see "Accessories").
(3) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

### Overload relays fitting details (1)

| Contactor types | Thermal overload relays | Electronic overload relays |
|---|---|---|
| AF116 ... AF140 | TF140DU (66...142 A) | EF146 (54...150 A) |
| AF146 | – | EF146 (54...150 A) |
| AF190, AF205 | TA200DU (66...200 A) | EF205 (63...210 A) |
| AF265 ... AF370 | – | EF370 (115...380 A) |

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
(1) Direct mounting - No kit required.

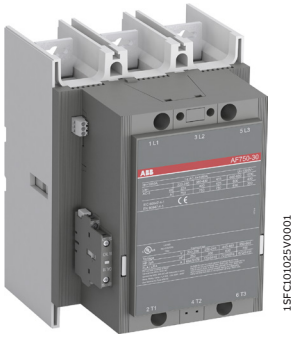
# AF400 ... AF750 3-pole contactors

## 200 to 400 kW

## AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts




AF460-30-11




AF750-30-11

AF400 ... AF750 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC or 600 V DC (2). These contactors are of the block type design with 3 main poles.

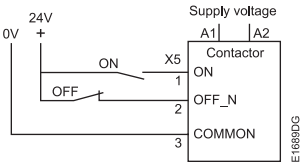
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

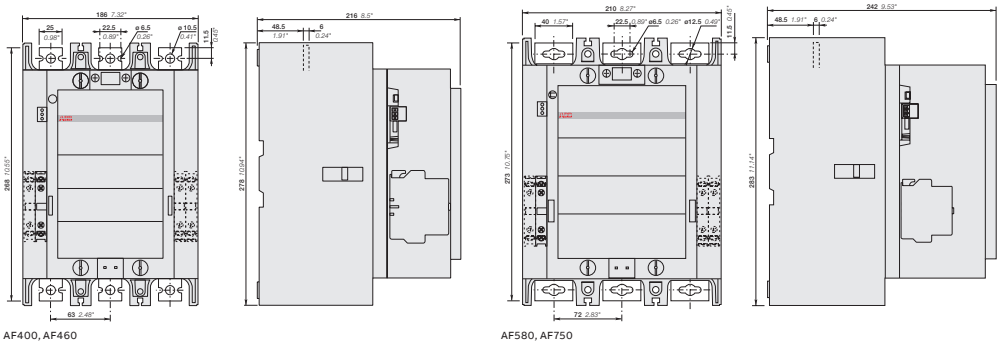
| IEC | | UL/CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C 690 V AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 200 | 600 | 350 | 550 | - | 24...60 | 1 1 | AF400-30-11 | 1SFL577001R6811 (1) | 12.000 |
| | | | | 48...130 | 48...130 | 1 1 | AF400-30-11 | 1SFL577001R6911 | 12.000 |
| | | | | 100...250 | 100...250 | 1 1 | AF400-30-11 | 1SFL577001R7011 | 12.000 |
| | | | | 250...500 | 250...500 | 1 1 | AF400-30-11 | 1SFL577001R7111 | 12.000 |
| 250 | 700 | 400 | 650 | - | 24...60 | 1 1 | AF460-30-11 | 1SFL597001R6811 (1) | 12.000 |
| | | | | 48...130 | 48...130 | 1 1 | AF460-30-11 | 1SFL597001R6911 | 12.000 |
| | | | | 100...250 | 100...250 | 1 1 | AF460-30-11 | 1SFL597001R7011 | 12.000 |
| | | | | 250...500 | 250...500 | 1 1 | AF460-30-11 | 1SFL597001R7111 | 12.000 |
| 315 | 800 | 500 | 750 | - | 24...60 | 1 1 | AF580-30-11 | 1SFL617001R6811 (1) | 15.000 |
| | | | | 48...130 | 48...130 | 1 1 | AF580-30-11 | 1SFL617001R6911 | 15.000 |
| | | | | 100...250 | 100...250 | 1 1 | AF580-30-11 | 1SFL617001R7011 | 15.000 |
| | | | | 250...500 | 250...500 | 1 1 | AF580-30-11 | 1SFL617001R7111 | 15.000 |
| 400 | 1050 | 600 | 900 | - | 24...60 | 1 1 | AF750-30-11 | 1SFL637001R6811 (1) | 15.000 |
| | | | | 48...130 | 48...130 | 1 1 | AF750-30-11 | 1SFL637001R6911 | 15.000 |
| | | | | 100...250 | 100...250 | 1 1 | AF750-30-11 | 1SFL637001R7011 | 15.000 |
| | | | | 250...500 | 250...500 | 1 1 | AF750-30-11 | 1SFL637001R7111 | 15.000 |

(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
(2) Up to 850 V DC for AF580, AF750.

AF400 ... AF750 are equipped with low voltage inputs for control, for example by a PLC.

### Control inputs



AF400, AF460 AF580, AF750

Main dimensions mm, inches

# AF1250 ... AF2850 3-pole contactors

## 475 to 560 kW and 1260 to 2850 A AC-1

## AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts




AF1250-30-11




AF2650-30-11

AF1250 ... AF2050 contactors are mainly used for controlling power circuits up to 1000 V AC or 850 V DC, AF2650 and AF2850 for controlling power up to 1000 V AC. These contactors are of the block type design with 3 main poles.

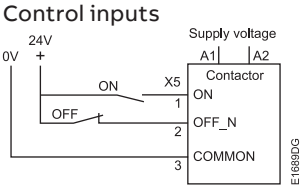
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - only 4 coils for AF1250 to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
  - only 1 coil for AF1350 ... AF2850 to cover control voltages between 100...250 V 50/60 Hz and 100...250 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc (1) | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C 690 V AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC (2) | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| - | 1260 | - | 1210 | - | 24...60 | 1 1 | AF1250-30-11 | 1SFL647001R6811 (1) | 16.000 |
| | | | | 48...130 | 48...130 | 1 1 | AF1250-30-11 | 1SFL647001R6911 | 16.000 |
| | | | | 100...250 | 100...250 | 1 1 | AF1250-30-11 | 1SFL647001R7011 | 16.000 |
| | | | | 250...500 | 250...500 | 1 1 | AF1250-30-11 | 1SFL647001R7111 | 16.000 |
| 475 | 1350 | 800 | 1350 | 100...250 | 100...250 | 1 1 | AF1350-30-11 | 1SFL657001R7011 | 34.000 |
| 560 | 1650 | 900 | 1650 | 100...250 | 100...250 | 1 1 | AF1650-30-11 | 1SFL677001R7011 | 35.000 |
| - | 2050 | - | 2100 | 100...250 | 100...250 | 1 1 | AF2050-30-11 | 1SFL707001R7011 | 35.000 |
| - | 2650 | - | 2700 | 100...250 | 100...250 | 1 1 | AF2650-30-11 | 1SFL667001R7011 | 45.000 |
| - | 2850 | - | 2850 | 100...250 | 100...250 | 1 1 | AF2850-30-11 | 1SFL687001R7011 | 45.000 |

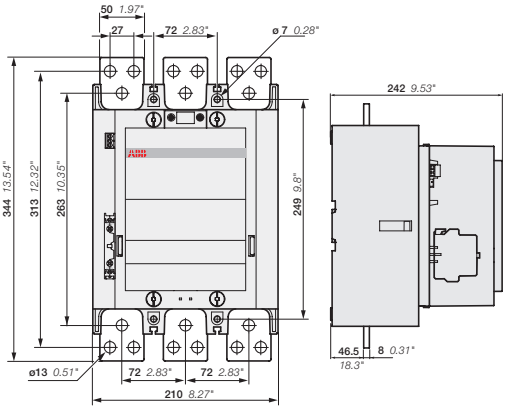
(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.(2) AF2650: Maximum operational voltage = 1000 V according to UL / CSA.

AF1250 ... AF2850 are equipped with low voltage inputs for control, for example by a PLC

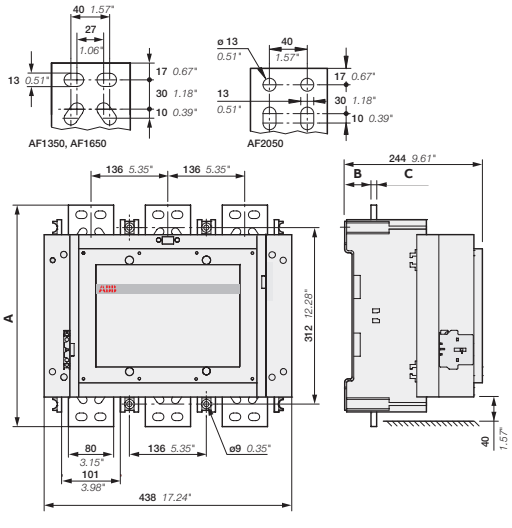
### Control inputs




| | AF1350, AF1650, AF2050 | AF2650, AF2850 |
|---|---|---|
| A | 392 mm / 15.43" | 422 mm / 16.61" |
| B | 47 mm / 1.85" | 53 mm / 2.09" |
| C | 10 mm / 0.39" | 25 mm / 0.98" |




AF1250
Main dimensions mm, inches




AF1350, AF1650, AF2050, AF2650, AF2850

# AF1350T ... AF2850T 3-pole contactors with built-in LVRT

## 475 to 560 kW and 1350 to 2850 A AC-1

## AC operated with 1 N.O. + 1 N.C. auxiliary contacts



1SFC101216V0001

AF2650-30T-11

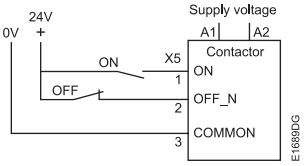
AF1350T .. AF2850T contactors are designed to meet the Low Voltage Ride Through requirements for grid connections withstand voltage drop-outs up to 1 sec without opening. These contactors are often used in grid connected applications where the demand of non interrupted power is required. When controlled through built-in PLC connection the contactor is operated directly without delay function.

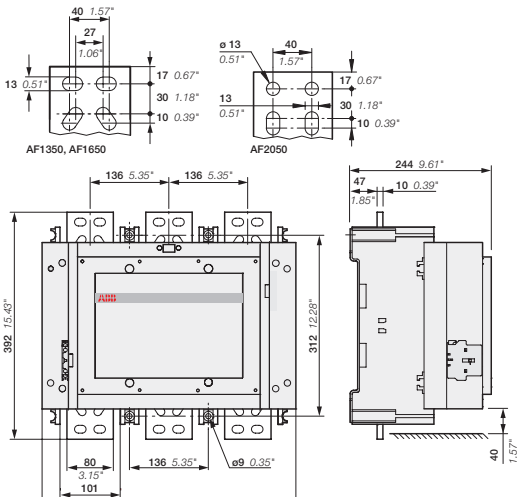
- Control circuit: AC operated with electronic coil interface
  - can withstand voltage drop-outs according to Low Voltage Ride Through requirements
  - equipped with low voltage inputs for direct control by a PLC
  - distinct closing and opening
  - add-on auxiliary contact blocks for side mounting and a wide range of accessories
  - Drop out level complies with DC range 75% to 10% of the rated control supply voltage specified in operating limits §9.3.6.2 acc. to IEC60947-4-1.

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C 690 V AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | | | | kg |
| 475 | 1350 | 800 | 1350 | 230 ... 240 | 1 1 | AF1350T-30-11 (1) | 1SFL657001R9101 | 34.000 |
| 560 | 1650 | 900 | 1650 | 230 ... 240 | 1 1 | AF1650T-30-11 (1) | 1SFL677001R9101 | 35.000 |
| - | 2050 | - | 2100 | 230 ... 240 | 1 1 | AF2050T-30-11 (1) | 1SFL707001R9101 | 35.000 |
| - | 2650 | - | 2700 | 230 ... 240 | 1 1 | AF2650T-30-11 (1) | 1SFL667001R9101 | 45.000 |
| - | 2850 | - | 2850 | 230 ... 240 | 1 1 | AF2850T-30-11 (1) | 1SFL687001R9101 | 45.000 |

(1) Types -00 and -22 on request.

### Control inputs




AF1350T-30-11, AF1650T-30-11, AF2050T-30-11, AF2650T-30-11, AF2850T-30-10-11

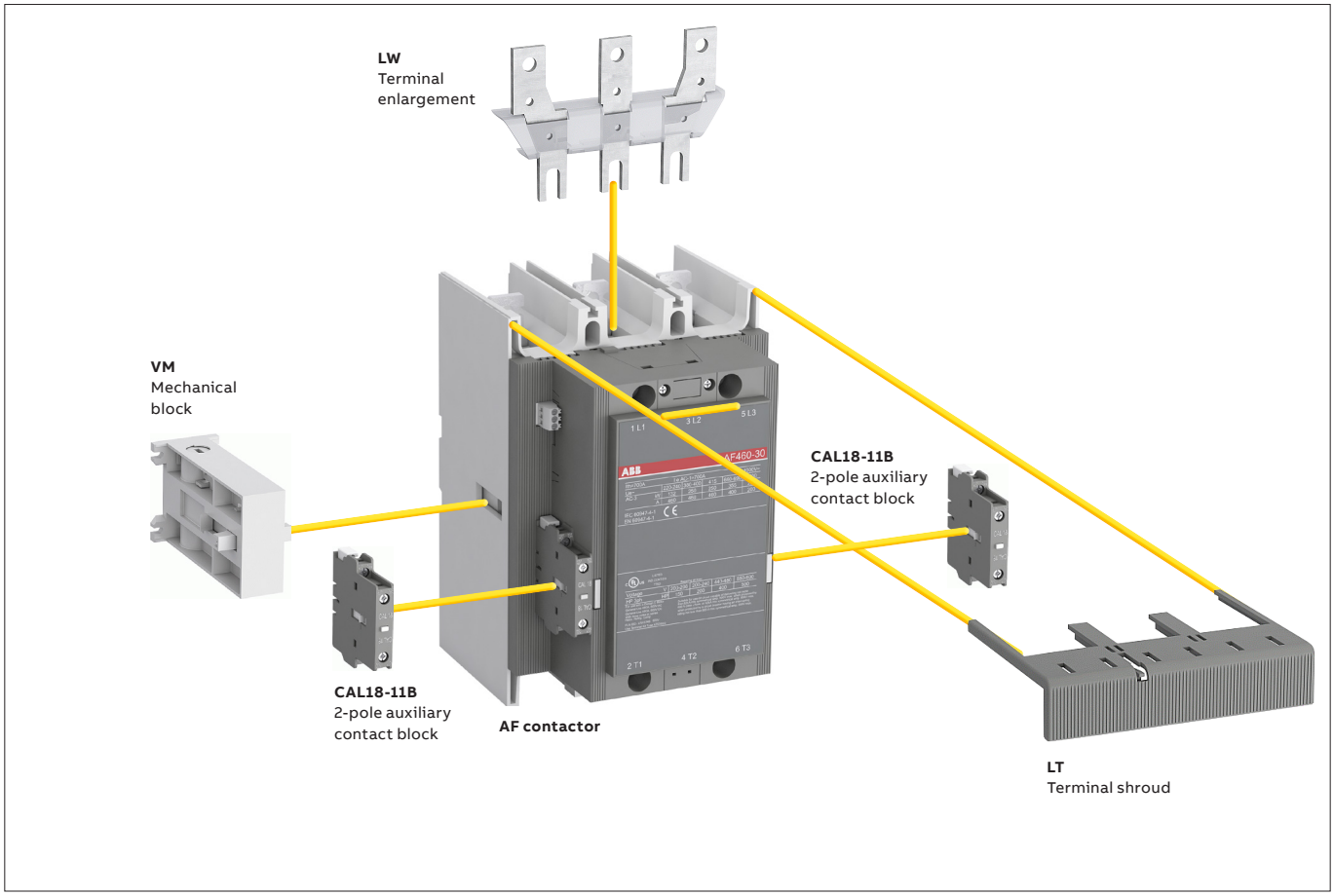
Main dimensions mm, inches

| | AF1350, AF1650, AF2050 | AF2650, AF2850 |
|---|---|---|
| A | 392 mm / 15.43" | 422 mm / 16.61" |
| B | 47 mm / 1.85" | 53 mm / 2.09" |
| C | 10 mm / 0.39" | 25 mm / 0.98" |

# AF400 ... AF2850 3-pole contactors with 1 N.O. + 1 N.C. auxiliary contacts

Contactors and main accessories

## Main accessories (other accessories available)




## Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Available auxiliary contacts | Side-mounted accessories<br>Auxiliary contact blocks<br>CAL18-11 | CAL18-11B (3) | Mechanical interlock units (between two contactors) |
|---|---|---|---|---|---|
| **Contactors + auxiliary contact blocks** | | | | | |
| AF400 ... AF2850 | 3 | 0 1 1 | 1 x CAL18-11 | + 2 x CAL18-11B | – |
| **Contactors with mechanical interlocking + auxiliary contact blocks** | | | | | |
| AF400 ... AF2850 | 3 | 0 1 1 | 2 x CAL18-11 (1) | + 4 x CAL18-11B (1) | + VM...H (2) |

(1) Total number of auxiliary contact blocks for the two contactors. (2) Interlock type, according to the contactor ratings (see "Accessories").
(3) The CEL18-.. auxiliary contact blocks can replace the CAL18-11 and CAL18-11B. Though, no auxiliary contact block can be mounted outside the CEL18-..

## Overload relays fitting details

| Contactor types | Thermal overload relays | Electronic overload relays |
|---|---|---|
| AF400, AF460 | – | EF460 (150...500 A) (1) |
| AF580, AF750 | – | EF750 (250...800 A) (1) |
| AF1350, AF1650 | – | EF1250DU (375...1250 A) (1) |

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
(1) Mounting kit required (see "Motor protection").

03

# AF09 ... AF38 3-pole contactors

## 4 to 18.5 kW

## AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts



1SBC101002V0014

AF09-30-22



1SBC101004V0014

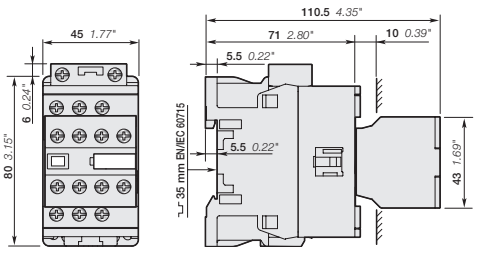
AF26-30-22

AF09 ... AF38 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 4 | 25 | 5 | 25 | 24...60 | 20...60 (1) | 2 2 | AF09-30-22-11 | 1SBL137001R1122 | 0.320 |
| | | | | 48...130 | 48...130 | 2 2 | AF09-30-22-12 | 1SBL137001R1222 | 0.320 |
| | | | | 100...250 | 100...250 | 2 2 | AF09-30-22-13 | 1SBL137001R1322 | 0.320 |
| | | | | 250...500 | 250...500 | 2 2 | AF09-30-22-14 | 1SBL137001R1422 | 0.360 |
| 5.5 | 28 | 7.5 | 28 | 24...60 | 20...60 (1) | 2 2 | AF12-30-22-11 | 1SBL157001R1122 | 0.320 |
| | | | | 48...130 | 48...130 | 2 2 | AF12-30-22-12 | 1SBL157001R1222 | 0.320 |
| | | | | 100...250 | 100...250 | 2 2 | AF12-30-22-13 | 1SBL157001R1322 | 0.320 |
| | | | | 250...500 | 250...500 | 2 2 | AF12-30-22-14 | 1SBL157001R1422 | 0.360 |
| 7.5 | 30 | 10 | 30 | 24...60 | 20...60 (1) | 2 2 | AF16-30-22-11 | 1SBL177001R1122 | 0.320 |
| | | | | 48...130 | 48...130 | 2 2 | AF16-30-22-12 | 1SBL177001R1222 | 0.320 |
| | | | | 100...250 | 100...250 | 2 2 | AF16-30-22-13 | 1SBL177001R1322 | 0.320 |
| | | | | 250...500 | 250...500 | 2 2 | AF16-30-22-14 | 1SBL177001R1422 | 0.360 |
| 11 | 45 | 15 | 45 | 24...60 | 20...60 (1) | 2 2 | AF26-30-22-11 | 1SBL237001R1122 | 0.360 |
| | | | | 48...130 | 48...130 | 2 2 | AF26-30-22-12 | 1SBL237001R1222 | 0.360 |
| | | | | 100...250 | 100...250 | 2 2 | AF26-30-22-13 | 1SBL237001R1322 | 0.360 |
| | | | | 250...500 | 250...500 | 2 2 | AF26-30-22-14 | 1SBL237001R1422 | 0.400 |
| 15 | 50 | 20 | 50 | 24...60 | 20...60 (1) | 2 2 | AF30-30-22-11 | 1SBL277001R1122 | 0.360 |
| | | | | 48...130 | 48...130 | 2 2 | AF30-30-22-12 | 1SBL277001R1222 | 0.360 |
| | | | | 100...250 | 100...250 | 2 2 | AF30-30-22-13 | 1SBL277001R1322 | 0.360 |
| | | | | 250...500 | 250...500 | 2 2 | AF30-30-22-14 | 1SBL277001R1422 | 0.400 |
| 18.5 | 50 | 25 | 50 | 24...60 | 20...60 (1) | 2 2 | AF38-30-22-11 | 1SBL297001R1122 | 0.360 |
| | | | | 48...130 | 48...130 | 2 2 | AF38-30-22-12 | 1SBL297001R1222 | 0.360 |
| | | | | 100...250 | 100...250 | 2 2 | AF38-30-22-13 | 1SBL297001R1322 | 0.360 |
| | | | | 250...500 | 250...500 | 2 2 | AF38-30-22-14 | 1SBL297001R1422 | 0.400 |

(1) AF..-30-..-11 not suitable for direct control by PLC-output.




AF09, AF12, AF16

AF26, AF30, AF38

Main dimensions mm, inches

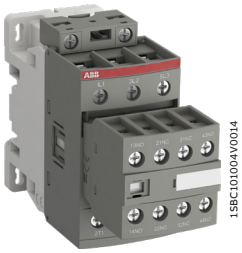
# AF09Z ... AF38Z 3-pole contactors

## 4 to 18.5 kW

## AC / DC operated for specific applications with 2 N.O. + 2 N.C. auxiliary contacts




AF09Z-30-22



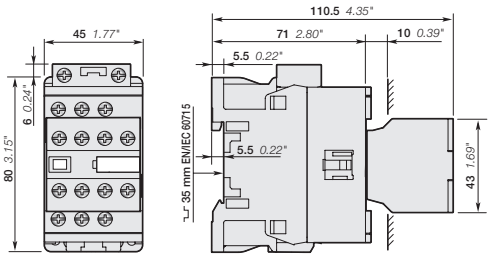

AF26Z-30-22

AF09Z ... AF38Z contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

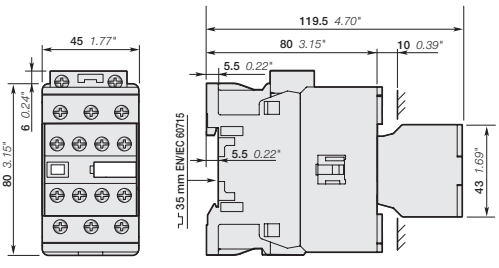
- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - can manage large control voltage variations,
  - allow direct control by PLC-output ≥ 24 V DC 500 mA,
  - reduced panel energy consumption,
  - very distinct closing and opening,
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 4 | 25 | 5 | 25 | - | 12...20 | 2 2 | AF09Z-30-22-20 | 1SBL136001R2022 | 0.360 |
| | | | | 24...60 | 20...60 | 2 2 | AF09Z-30-22-21 | 1SBL136001R2122 | 0.360 |
| | | | | 48...130 | 48...130 | 2 2 | AF09Z-30-22-22 | 1SBL136001R2222 | 0.360 |
| | | | | 100...250 | 100...250 | 2 2 | AF09Z-30-22-23 | 1SBL136001R2322 | 0.360 |
| 5.5 | 28 | 7.5 | 28 | - | 12...20 | 2 2 | AF12Z-30-22-20 | 1SBL156001R2022 | 0.360 |
| | | | | 24...60 | 20...60 | 2 2 | AF12Z-30-22-21 | 1SBL156001R2122 | 0.360 |
| | | | | 48...130 | 48...130 | 2 2 | AF12Z-30-22-22 | 1SBL156001R2222 | 0.360 |
| | | | | 100...250 | 100...250 | 2 2 | AF12Z-30-22-23 | 1SBL156001R2322 | 0.360 |
| 7.5 | 30 | 10 | 30 | - | 12...20 | 2 2 | AF16Z-30-22-20 | 1SBL176001R2022 | 0.360 |
| | | | | 24...60 | 20...60 | 2 2 | AF16Z-30-22-21 | 1SBL176001R2122 | 0.360 |
| | | | | 48...130 | 48...130 | 2 2 | AF16Z-30-22-22 | 1SBL176001R2222 | 0.360 |
| | | | | 100...250 | 100...250 | 2 2 | AF16Z-30-22-23 | 1SBL176001R2322 | 0.360 |
| 11 | 45 | 15 | 45 | - | 12...20 | 2 2 | AF26Z-30-22-20 | 1SBL236001R2022 | 0.400 |
| | | | | 24...60 | 20...60 | 2 2 | AF26Z-30-22-21 | 1SBL236001R2122 | 0.400 |
| | | | | 48...130 | 48...130 | 2 2 | AF26Z-30-22-22 | 1SBL236001R2222 | 0.400 |
| | | | | 100...250 | 100...250 | 2 2 | AF26Z-30-22-23 | 1SBL236001R2322 | 0.400 |
| 15 | 50 | 20 | 50 | - | 12...20 | 2 2 | AF30Z-30-22-20 | 1SBL276001R2022 | 0.400 |
| | | | | 24...60 | 20...60 | 2 2 | AF30Z-30-22-21 | 1SBL276001R2122 | 0.400 |
| | | | | 48...130 | 48...130 | 2 2 | AF30Z-30-22-22 | 1SBL276001R2222 | 0.400 |
| | | | | 100...250 | 100...250 | 2 2 | AF30Z-30-22-23 | 1SBL276001R2322 | 0.400 |
| 18.5 | 50 | 25 | 50 | - | 12...20 | 2 2 | AF38Z-30-22-20 | 1SBL296001R2022 | 0.400 |
| | | | | 24...60 | 20...60 | 2 2 | AF38Z-30-22-21 | 1SBL296001R2122 | 0.400 |
| | | | | 48...130 | 48...130 | 2 2 | AF38Z-30-22-22 | 1SBL296001R2222 | 0.400 |
| | | | | 100...250 | 100...250 | 2 2 | AF38Z-30-22-23 | 1SBL296001R2322 | 0.400 |

Note: Only AF..Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole




AF09Z, AF12Z, AF16Z




AF26Z, AF30Z, AF38Z

Main dimensions mm, inches

03

# AF40 ... AF96 3-pole contactors

## 18.5 to 30 kW

## AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts




AF40-30-22



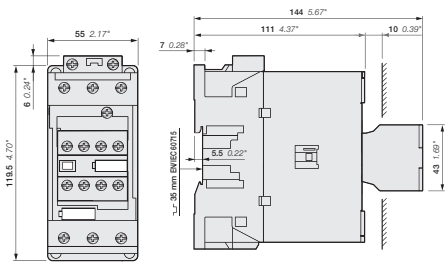

AF80-30-22

AF40 ... AF96 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

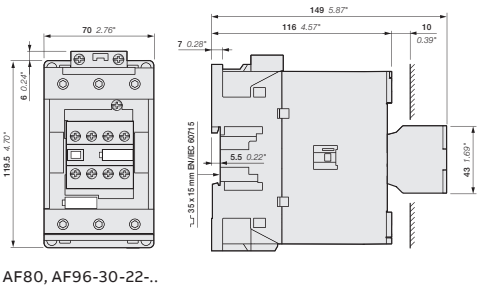
- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 18.5 | 70 | 30 | 60 | 24...60 | 20...60 (1) | 2 2 | AF40-30-22-11 | 1SBL347001R1122 | 1.020 |
| | | | | 48...130 | 48...130 | 2 2 | AF40-30-22-12 | 1SBL347001R1222 | 1.020 |
| | | | | 100...250 | 100...250 | 2 2 | AF40-30-22-13 | 1SBL347001R1322 | 1.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF40-30-22-14 | 1SBL347001R1422 | 1.000 |
| 22 | 100 | 40 | 80 | 24...60 | 20...60 (1) | 2 2 | AF52-30-22-11 | 1SBL367001R1122 | 1.020 |
| | | | | 48...130 | 48...130 | 2 2 | AF52-30-22-12 | 1SBL367001R1222 | 1.020 |
| | | | | 100...250 | 100...250 | 2 2 | AF52-30-22-13 | 1SBL367001R1322 | 1.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF52-30-22-14 | 1SBL367001R1422 | 1.000 |
| 30 | 105 | 50 | 90 | 24...60 | 20...60 (1) | 2 2 | AF65-30-22-11 | 1SBL387001R1122 | 1.020 |
| | | | | 48...130 | 48...130 | 2 2 | AF65-30-22-12 | 1SBL387001R1222 | 1.020 |
| | | | | 100...250 | 100...250 | 2 2 | AF65-30-22-13 | 1SBL387001R1322 | 1.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF65-30-22-14 | 1SBL387001R1422 | 1.000 |
| 37 | 125 | 60 | 105 | 24...60 | 20...60 (1) | 2 2 | AF80-30-22-11 | 1SBL397001R1122 | 1.270 |
| | | | | 48...130 | 48...130 | 2 2 | AF80-30-22-12 | 1SBL397001R1222 | 1.270 |
| | | | | 100...250 | 100...250 | 2 2 | AF80-30-22-13 | 1SBL397001R1322 | 1.220 |
| | | | | 250...500 | 250...500 | 2 2 | AF80-30-22-14 | 1SBL397001R1422 | 1.220 |
| 45/55 | 130 | 60/75 | 115 | 24...60 | 20...60 (1) | 2 2 | AF96-30-22-11 | 1SBL407001R1122 | 1.270 |
| | | | | 48...130 | 48...130 | 2 2 | AF96-30-22-12 | 1SBL407001R1222 | 1.270 |
| | | | | 100...250 | 100...250 | 2 2 | AF96-30-22-13 | 1SBL407001R1322 | 1.220 |
| | | | | 250...500 | 250...500 | 2 2 | AF96-30-22-14 | 1SBL407001R1422 | 1.220 |

(1) For control by PLC-output, use RA4 interface relay.




AF40, AF52, AF65-30-22-..

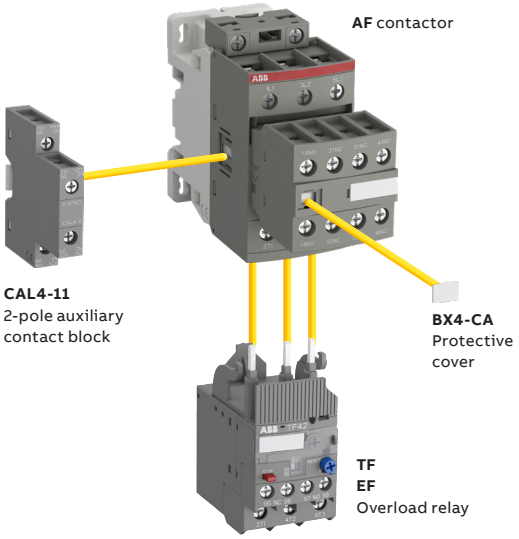



AF80, AF96-30-22-..

Main dimensions mm, inches

# AF09 ... AF96 3-pole contactors with 2 N.O. + 2 N.C. auxiliary contacts

## Contactors and main accessories




**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Built-in auxiliary contacts | Side-mounted accessories Mechanical interlock unit (between 2 contactors) | Auxiliary contact blocks | |
|---|---|---|---|---|---|
| | | | VM.. | 2-pole CAL4-11 Left side | Right side |
| AF09 ... AF38 | 3 0 | 2 2 | 1 | + 1 | or 1 |
| AF40 ... AF96 | 3 0 | 2 2 | 1 | + 1 | or 1 |
| | | | – | + 1 | + 1 |

**Overload relays fitting details (1)**

| Contactor types | Thermal overload relays | Electronic overload relays |
|---|---|---|
| AF09 ... AF38 | TF42 (0.10...38 A) | EF19 (0.10...19 A) |
| AF26 ... AF38 | TF42 (0.10...38 A) | EF45 (9...45 A) |
| AF40 ... AF65 | TF65 (22...67 A) | EF65 (20...70 A) |
| AF80 , AF96 | TF96 (40...96 A) | EF96 (36...100 A) |

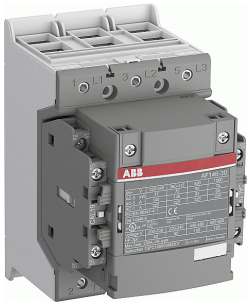
The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.
(1) Direct mounting - No kit required.

03

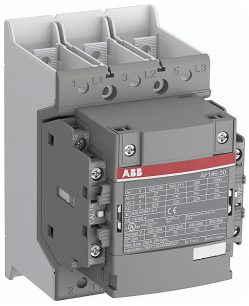
# AF116 ... AF146 3-pole contactors

## 55 to 75 kW

## AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts




AF146-30-22



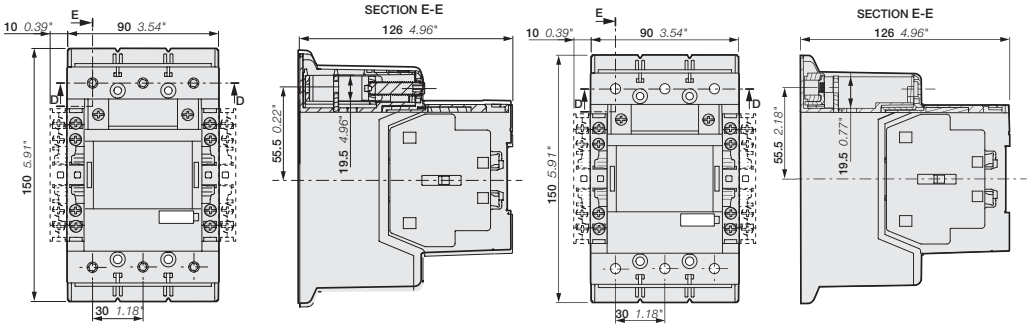

AF146-30-22B

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| **For connection with built-in cable clamps** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 2 2 | AF116-30-22-11 | 1SFL427001R1122 | 1.750 |
| | | | | 48...130 | 48...130 | 2 2 | AF116-30-22-12 | 1SFL427001R1222 | 1.750 |
| | | | | 100...250 | 100...250 | 2 2 | AF116-30-22-13 | 1SFL427001R1322 | 1.750 |
| | | | | 250...500 | 250...500 | 2 2 | AF116-30-22-14 | 1SFL427001R1422 | 1.750 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 2 2 | AF140-30-22-11 | 1SFL447001R1122 | 1.750 |
| | | | | 48...130 | 48...130 | 2 2 | AF140-30-22-12 | 1SFL447001R1222 | 1.750 |
| | | | | 100...250 | 100...250 | 2 2 | AF140-30-22-13 | 1SFL447001R1322 | 1.750 |
| | | | | 250...500 | 250...500 | 2 2 | AF140-30-22-13 | 1SFL447001R1422 | 1.750 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 2 2 | AF146-30-22-11 | 1SFL467001R1122 | 1.750 |
| | | | | 48...130 | 48...130 | 2 2 | AF146-30-22-12 | 1SFL467001R1222 | 1.750 |
| | | | | 100...250 | 100...250 | 2 2 | AF146-30-22-13 | 1SFL467001R1322 | 1.750 |
| | | | | 250...500 | 250...500 | 2 2 | AF146-30-22-14 | 1SFL467001R1422 | 1.750 |
| **With bar connections** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 2 2 | AF116-30-22B-11 | 1SFL427002R1122 | 1.500 |
| | | | | 48...130 | 48...130 | 2 2 | AF116-30-22B-12 | 1SFL427002R1222 | 1.500 |
| | | | | 100...250 | 100...250 | 2 2 | AF116-30-22B-13 | 1SFL427002R1322 | 1.500 |
| | | | | 250...500 | 250...500 | 2 2 | AF116-30-22B-14 | 1SFL427002R1422 | 1.500 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 2 2 | AF140-30-22B-11 | 1SFL447002R1122 | 1.500 |
| | | | | 48...130 | 48...130 | 2 2 | AF140-30-22B-12 | 1SFL447002R1222 | 1.500 |
| | | | | 100...250 | 100...250 | 2 2 | AF140-30-22B-13 | 1SFL447002R1322 | 1.500 |
| | | | | 250...500 | 250...500 | 2 2 | AF140-30-22B-14 | 1SFL447002R1422 | 1.500 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 2 2 | AF146-30-22B-11 | 1SFL467002R1122 | 1.500 |
| | | | | 48...130 | 48...130 | 2 2 | AF146-30-22B-12 | 1SFL467002R1222 | 1.500 |
| | | | | 100...250 | 100...250 | 2 2 | AF146-30-22B-13 | 1SFL467002R1322 | 1.500 |
| | | | | 250...500 | 250...500 | 2 2 | AF146-30-22B-14 | 1SFL467002R1422 | 1.500 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.




AF116, AF140, AF146-30-22

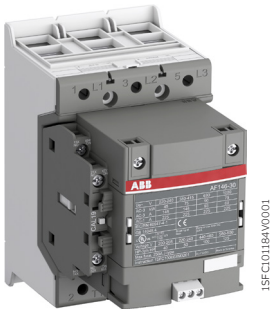
AF116, AF140, AF146-30-22B

Main dimensions mm, inches

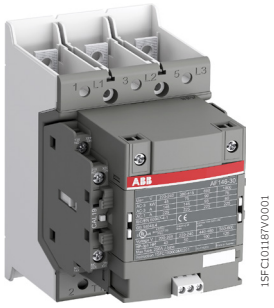
# AF116 ... AF146 3-pole contactors with built-in PLC interface

## 55 to 75 kW

## AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts




AF146-30-22




AF146-30-22B

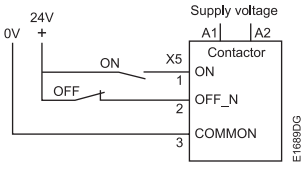
AF116 ... AF146 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range, only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request)
  - opening time below 20 ms.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

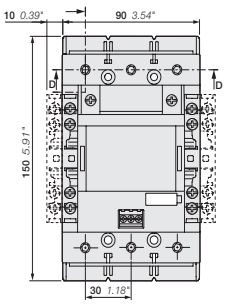
| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power | current | 3-phase motor rating | General use rating | | | | | | |
| | θ ≤ 40 °C | 480 V | 600 V AC | | | | | | Pkg (1 pce) |
| 400 V AC-3 | AC-1 | | | | | | | | |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| **For connection with built-in cable clamps** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 2 2 | AF116-30-22-31 | 1SFL427001R3122 | 1.750 |
| | | | | 48...130 | 48...130 | 2 2 | AF116-30-22-32 | 1SFL427001R3222 | 1.750 |
| | | | | 100...250 | 100...250 | 2 2 | AF116-30-22-33 | 1SFL427001R3322 | 1.750 |
| | | | | 250...500 | 250...500 | 2 2 | AF116-30-22-34 | 1SFL427001R3422 | 1.750 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 2 2 | AF140-30-22-31 | 1SFL447001R3122 | 1.750 |
| | | | | 48...130 | 48...130 | 2 2 | AF140-30-22-32 | 1SFL447001R3222 | 1.750 |
| | | | | 100...250 | 100...250 | 2 2 | AF140-30-22-33 | 1SFL447001R3322 | 1.750 |
| | | | | 250...500 | 250...500 | 2 2 | AF140-30-22-34 | 1SFL447001R3422 | 1.750 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 2 2 | AF146-30-22-31 | 1SFL467001R3122 | 1.750 |
| | | | | 48...130 | 48...130 | 2 2 | AF146-30-22-31 | 1SFL467001R3222 | 1.750 |
| | | | | 100...250 | 100...250 | 2 2 | AF146-30-22-33 | 1SFL467001R3322 | 1.750 |
| | | | | 250...500 | 250...500 | 2 2 | AF146-30-22-34 | 1SFL467001R3422 | 1.750 |
| **With bar connections** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 2 2 | AF116-30-22B-31 | 1SFL427002R3122 | 1.500 |
| | | | | 48...130 | 48...130 | 2 2 | AF116-30-22B-32 | 1SFL427002R3222 | 1.500 |
| | | | | 100...250 | 100...250 | 2 2 | AF116-30-22B-33 | 1SFL427002R3322 | 1.500 |
| | | | | 250...500 | 250...500 | 2 2 | AF116-30-22B-34 | 1SFL427002R3422 | 1.500 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 2 2 | AF140-30-22B-31 | 1SFL447002R3122 | 1.500 |
| | | | | 48...130 | 48...130 | 2 2 | AF140-30-22B-32 | 1SFL447002R3122 | 1.500 |
| | | | | 100...250 | 100...250 | 2 2 | AF140-30-22B-33 | 1SFL447002R3322 | 1.500 |
| | | | | 250...500 | 250...500 | 2 2 | AF140-30-22B-34 | 1SFL447002R3422 | 1.500 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 2 2 | AF146-30-22B-31 | 1SFL467002R3222 | 1.500 |
| | | | | 48...130 | 48...130 | 2 2 | AF146-30-22B-32 | 1SFL467002R1222 | 1.500 |
| | | | | 100...250 | 100...250 | 2 2 | AF146-30-22B-33 | 1SFL467002R3322 | 1.500 |
| | | | | 250...500 | 250...500 | 2 2 | AF146-30-22B-34 | 1SFL467002R3422 | 1.500 |

For other auxiliary contacts arrangements, please contact your ABB local sales organization.

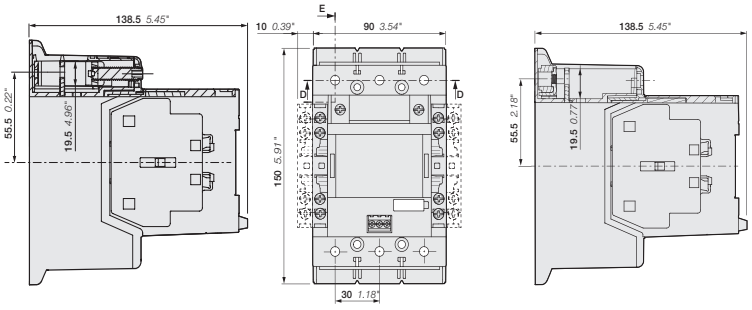
AF116 ... AF146 are equipped with low voltage inputs for control, for example by a PLC.




Control inputs




AF116, AF140, AF146-30-22




AF116, AF140, AF146-30-22B

Main dimensions mm, inches

03

# AF116 ... AF146 3-pole contactors

## 55 to 75 kW

## AC operated with 2 N.O. + 2 N.C. auxiliary contacts - optimized for short operation times




AF146-30-22



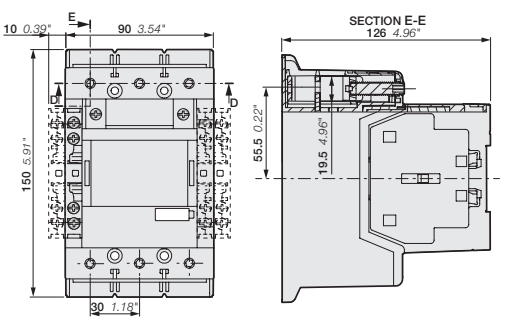

AF146-30-22B

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC. These contactors are of the block type design with 3 main poles.

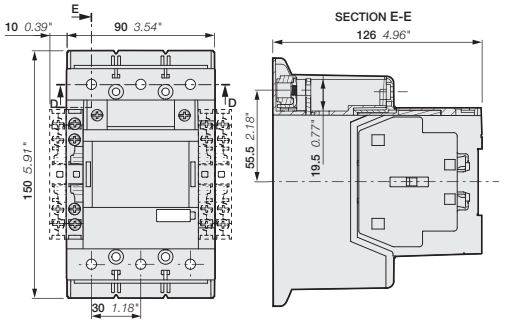
- control circuit: AC operated with electronic coil interface
  - with faster operating time
  - reduced panel energy consumption
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50 Hz | V 60Hz | | | | kg |
| **For connection with built-in cable clamps** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 110...120 | 110...120 | 2 2 | AF116-30-22-42 | 1SFL427001R4222 | 1.750 |
| | | | | 220...240 | 220...240 | 2 2 | AF116-30-22-43 | 1SFL427001R4322 | 1.750 |
| 75 | 200 | 100 | 200 | 110...120 | 110...120 | 2 2 | AF140-30-22-42 | 1SFL447001R4222 | 1.750 |
| | | | | 220...240 | 220...240 | 2 2 | AF140-30-22-43 | 1SFL447001R4322 | 1.750 |
| 75 | 225 | 100 | 200 | 110...120 | 110...120 | 2 2 | AF146-30-22-42 | 1SFL467001R4222 | 1.750 |
| | | | | 220...240 | 220...240 | 2 2 | AF146-30-22-43 | 1SFL467001R4322 | 1.750 |
| With bar connections | | | | | | | | | |
| 55 | 160 | 75 | 160 | 110...120 | 110...120 | 2 2 | AF116-30-22B-42 | 1SFL427002R4222 | 1.500 |
| | | | | 220...240 | 220...240 | 2 2 | AF116-30-22B-43 | 1SFL427002R4322 | 1.500 |
| 75 | 200 | 100 | 200 | 110...120 | 110...120 | 2 2 | AF140-30-22B-42 | 1SFL447002R4222 | 1.500 |
| | | | | 220...240 | 220...240 | 2 2 | AF140-30-22B-43 | 1SFL447002R4322 | 1.500 |
| 75 | 225 | 100 | 200 | 110...120 | 110...120 | 2 2 | AF146-30-22B-42 | 1SFL467002R4222 | 1.500 |
| | | | | 220...240 | 210...240 | 2 2 | AF146-30-22B-43 | 1SFL467002R4322 | 1.500 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.




AF116, AF140, AF146-30-11



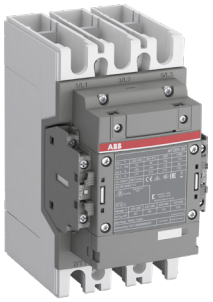

AF116, AF140, AF146-30-11B

Main dimensions mm, inches

# AF190 ... AF370 3-pole contactors

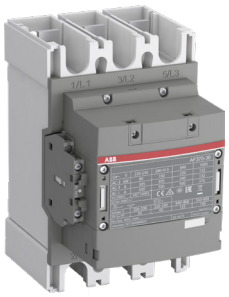
## 90 to 200 kW

## AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts



1SFC101256V0001

AF205-30-22



1SFC101253V0001

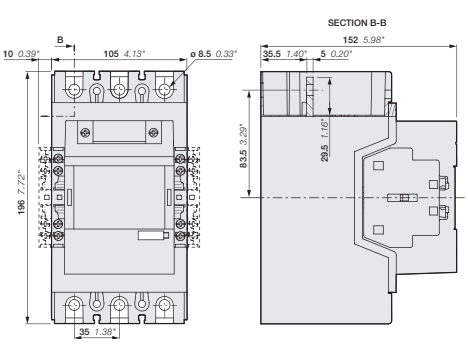
AF370-30-22

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and up to 340 V DC. These contactors are of the block type design with 3 main poles.

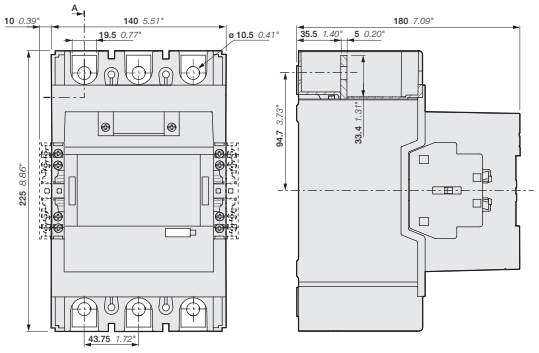
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 90 | 275 | 125 | 275 | 24...60 | 20...60 | 2 2 | AF190-30-22-11 | 1SFL487002R1122 | 3.000 |
| | | | | 48...130 | 48...130 | 2 2 | AF190-30-22-12 | 1SFL487002R1222 | 3.000 |
| | | | | 100...250 | 100...250 | 2 2 | AF190-30-22-13 | 1SFL487002R1322 | 3.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF190-30-22-14 | 1SFL487002R1422 | 3.000 |
| 110 | 350 | 150 | 300 | 24...60 | 20...60 | 2 2 | AF205-30-22-11 | 1SFL527002R1122 | 3.000 |
| | | | | 48...130 | 48...130 | 2 2 | AF205-30-22-12 | 1SFL527002R1222 | 3.000 |
| | | | | 100...250 | 100...250 | 2 2 | AF205-30-22-13 | 1SFL527002R1322 | 3.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF205-30-22-14 | 1SFL527002R1422 | 3.000 |
| 132 | 400 | 200 | 350 | 24...60 | 20...60 | 2 2 | AF265-30-22-11 | 1SFL547002R1122 | 4.675 |
| | | | | 48...130 | 48...130 | 2 2 | AF265-30-22-12 | 1SFL547002R1222 | 4.675 |
| | | | | 100...250 | 100...250 | 2 2 | AF265-30-22-13 | 1SFL547002R1322 | 4.675 |
| | | | | 250...500 | 250...500 | 2 2 | AF265-30-22-14 | 1SFL547002R1422 | 4.675 |
| 160 | 500 | 250 | 400 | 24...60 | 20...60 | 2 2 | AF305-30-22-11 | 1SFL587002R1122 | 4.675 |
| | | | | 48...130 | 48...130 | 2 2 | AF305-30-22-12 | 1SFL587002R1222 | 4.675 |
| | | | | 100...250 | 100...250 | 2 2 | AF305-30-22-13 | 1SFL587002R1322 | 4.675 |
| | | | | 250...500 | 250...500 | 2 2 | AF305-30-22-14 | 1SFL587002R1422 | 4.675 |
| 200 | 600 | 300 | 520 | 24...60 | 20...60 | 2 2 | AF370-30-22-11 | 1SFL607002R1122 | 4.675 |
| | | | | 48...130 | 48...130 | 2 2 | AF370-30-22-12 | 1SFL607002R1222 | 4.675 |
| | | | | 100...250 | 100...250 | 2 2 | AF370-30-22-13 | 1SFL607002R1322 | 4.675 |
| | | | | 250...500 | 250...500 | 2 2 | AF370-30-22-14 | 1SFL607002R1422 | 4.675 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.




AF190, AF205



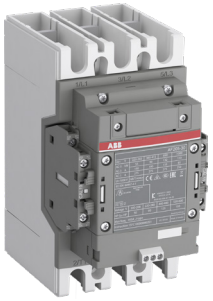

AF265, AF305, AF370

Main dimensions mm, inches

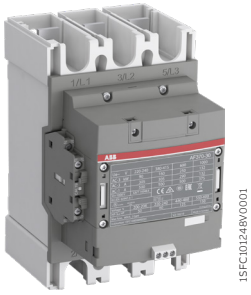
# AF190 ... AF370 3-pole contactors with built-in PLC interface

## 90 to 200 kW

## AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts




AF205-30-22




AF370-30-22

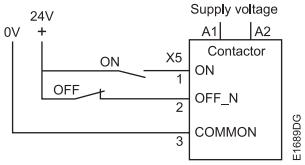
AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and up to 340 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range, only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request)
  - opening time below 20 ms.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

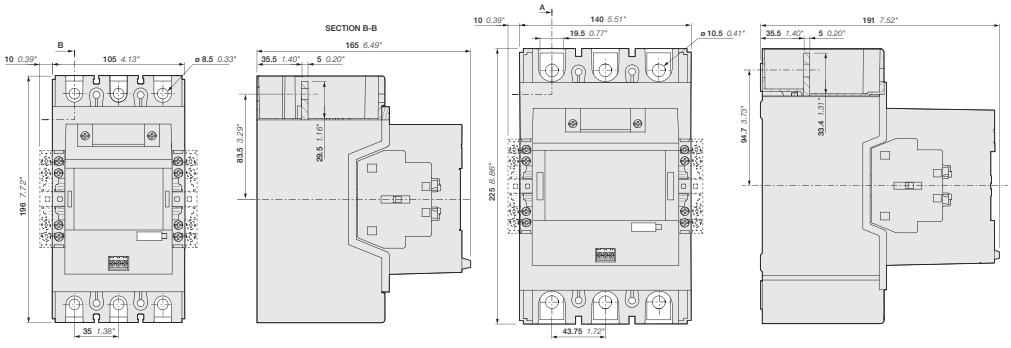
| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 90 | 275 | 125 | 275 | 24...60 | 20...60 | 2 2 | AF190-30-22-31 | 1SFL487002R3122 | 3.000 |
| | | | | 48...130 | 48...130 | 2 2 | AF190-30-22-32 | 1SFL487002R3222 | 3.000 |
| | | | | 100...250 | 100...250 | 2 2 | AF190-30-22-33 | 1SFL487002R3322 | 3.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF190-30-22-34 | 1SFL487002R3422 | 3.000 |
| 110 | 350 | 150 | 300 | 24...60 | 20...60 | 2 2 | AF205-30-22-31 | 1SFL527002R3122 | 3.000 |
| | | | | 48...130 | 48...130 | 2 2 | AF205-30-22-32 | 1SFL527002R3222 | 3.000 |
| | | | | 100...250 | 100...250 | 2 2 | AF205-30-22-33 | 1SFL527002R3322 | 3.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF205-30-22-34 | 1SFL527002R3422 | 3.000 |
| 132 | 400 | 200 | 350 | 24...60 | 20...60 | 2 2 | AF265-30-22-31 | 1SFL547002R3122 | 4.675 |
| | | | | 48...130 | 48...130 | 2 2 | AF265-30-22-32 | 1SFL547002R3222 | 4.675 |
| | | | | 100...250 | 100...250 | 2 2 | AF265-30-22-33 | 1SFL547002R3322 | 4.675 |
| | | | | 250...500 | 250...500 | 2 2 | AF265-30-22-34 | 1SFL547002R3422 | 4.675 |
| 160 | 500 | 250 | 400 | 24...60 | 20...60 | 2 2 | AF305-30-22-31 | 1SFL587002R3122 | 4.675 |
| | | | | 48...130 | 48...130 | 2 2 | AF305-30-22-32 | 1SFL587002R3222 | 4.675 |
| | | | | 100...250 | 100...250 | 2 2 | AF305-30-22-33 | 1SFL587002R3322 | 4.675 |
| | | | | 250...500 | 250...500 | 2 2 | AF305-30-22-34 | 1SFL587002R3422 | 4.675 |
| 200 | 600 | 300 | 520 | 24...60 | 20...60 | 2 2 | AF370-30-22-31 | 1SFL607002R3122 | 4.675 |
| | | | | 48...130 | 48...130 | 2 2 | AF370-30-22-32 | 1SFL607002R3222 | 4.675 |
| | | | | 100...250 | 100...250 | 2 2 | AF370-30-22-33 | 1SFL607002R3322 | 4.675 |
| | | | | 250...500 | 250...500 | 2 2 | AF370-30-22-34 | 1SFL607002R3422 | 4.675 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AF190 ... AF370 are equipped with low voltage inputs for control, for example by a PLC.




Control inputs

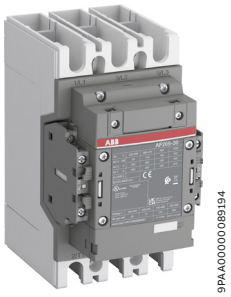



Main dimensions mm, inches

# AF190 ... AF370 3-pole contactors

## 90 to 200 kW

## AC operated with 2 N.O. + 2 N.C. auxiliary contacts - optimized for short operation times



9PAA000000089194

AF205-30-22



9PAA000000891171

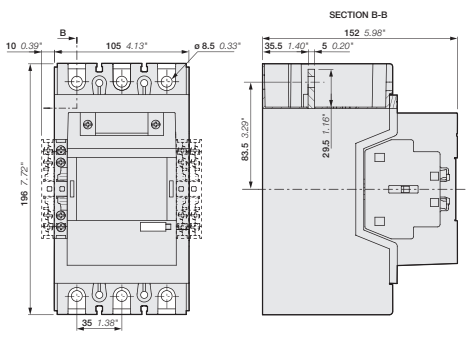
AF370-30-22

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC. These contactors are of the block type design with 3 main poles.

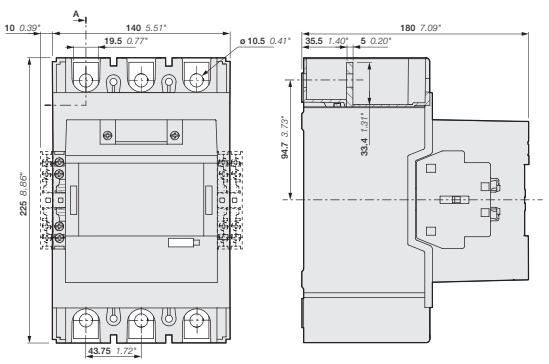
- control circuit: AC operated with electronic coil interface
  - with faster operating time
  - reduced panel energy consumption
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50 Hz | V 60 Hz | | | | kg |
| 90 | 275 | 125 | 275 | 110...120 | 110...120 | 2 2 | AF190-30-22-42 | 1SFL487002R4222 | 3.000 |
| | | | | 220...240 | 220...240 | 2 2 | AF190-30-22-43 | 1SFL487002R4322 | 3.000 |
| 110 | 350 | 150 | 300 | 110...120 | 110...120 | 2 2 | AF205-30-22-42 | 1SFL527002R4222 | 3.000 |
| | | | | 220...240 | 220...240 | 2 2 | AF205-30-22-43 | 1SFL527002R4322 | 3.000 |
| 132 | 400 | 200 | 350 | 110...120 | 110...120 | 2 2 | AF265-30-22-42 | 1SFL547002R4222 | 4.675 |
| | | | | 220...240 | 220...240 | 2 2 | AF265-30-22-43 | 1SFL547002R4322 | 4.675 |
| 160 | 500 | 250 | 400 | 110...120 | 110...120 | 2 2 | AF305-30-22-42 | 1SFL587002R4222 | 4.675 |
| | | | | 220...240 | 220...240 | 2 2 | AF305-30-22-43 | 1SFL587002R4322 | 4.675 |
| 200 | 600 | 300 | 520 | 110...120 | 110...120 | 2 2 | AF370-30-22-42 | 1SFL607002R4222 | 4.675 |
| | | | | 220...240 | 220...240 | 2 2 | AF370-30-22-43 | 1SFL607002R4322 | 4.675 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.




AF190, AF205




AF265, AF305, AF370

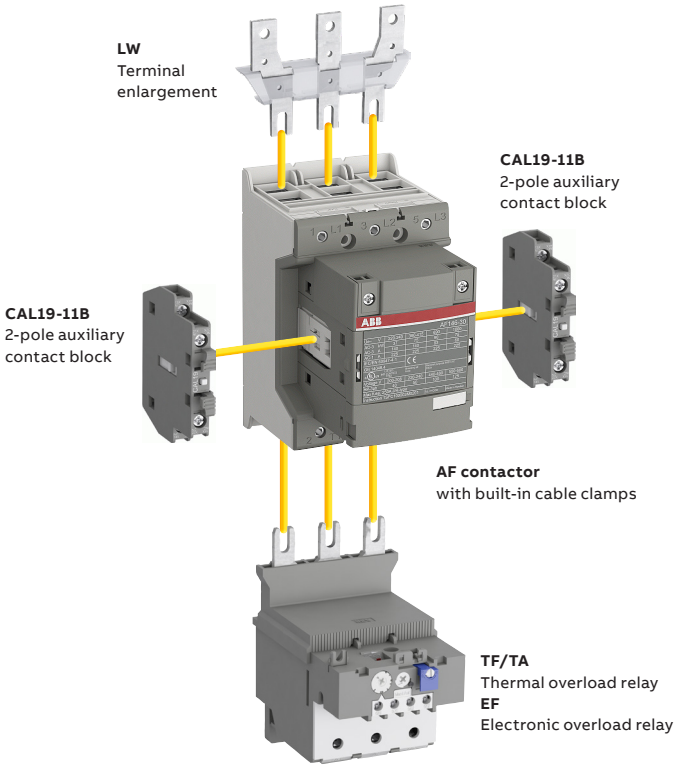
Main dimensions mm, inches

# AF116 ... AF370 3-pole contactors with 2 N.O. + 2 N.C. auxiliary contacts

Contactors and main accessories



## Main accessories (other accessories available)




**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Available auxiliary contacts | Side-mounted accessories<br>Auxiliary contact blocks<br>CAL19-11 (2) | <br><br>CAL19-11B (2) | Mechanical interlock units<br>(between two contactors) |
|---|---|---|---|---|---|
| AF116 ... AF370 | 3 0 | 2 2 | 2 x CAL19-11 included | + 2 x CAL19-11B | – |

(2) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

## Overload relays fitting details (1)

| Contactor types | Thermal overload relays | Electronic overload relays |
|---|---|---|
| AF116 ... AF140 | TF140DU (66...142 A) | EF146 (54...150 A) |
| AF146 | – | EF146 (54...150 A) |
| AF190, AF205 | TA200DU (66...200 A) | EF205 (63...210 A) |
| AF265 ... AF370 | – | EF370 (115...380 A) |

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
(1) Direct mounting - No kit required.

# AF400 ... AF750 3-pole contactors

## 200 to 400 kW

## AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts




AF460-30-22




AF750-30-22

AF400 ... AF750 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC or 600 V DC (2). These contactors are of the block type design with 3 main poles.

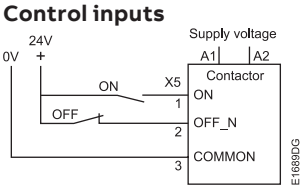
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

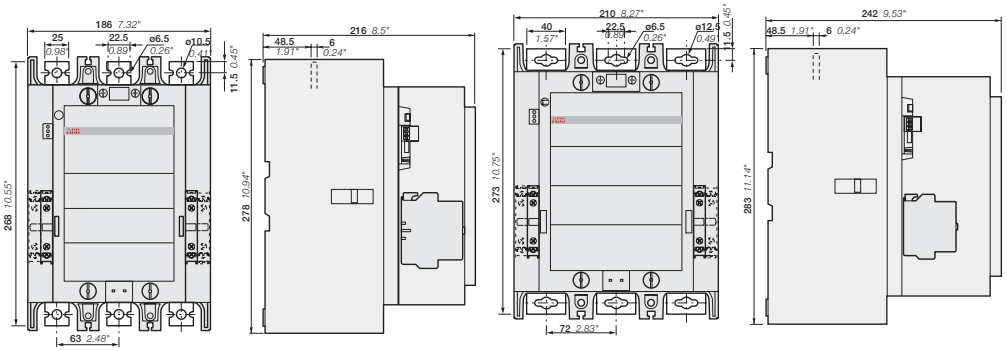
| IEC | | UL/CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C 690 V AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 200 | 600 | 350 | 550 | - | 24...60 | 2 2 | AF400-30-22 | 1SFL577001R6822 (1) | 12.000 |
| | | | | 48...130 | 48...130 | 2 2 | AF400-30-22 | 1SFL577001R6922 | 12.000 |
| | | | | 100...250 | 100...250 | 2 2 | AF400-30-22 | 1SFL577001R7022 | 12.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF400-30-22 | 1SFL577001R7122 | 12.000 |
| 250 | 700 | 400 | 650 | - | 24...60 | 2 2 | AF460-30-22 | 1SFL597001R6822 (1) | 12.000 |
| | | | | 48...130 | 48...130 | 2 2 | AF460-30-22 | 1SFL597001R6922 | 12.000 |
| | | | | 100...250 | 100...250 | 2 2 | AF460-30-22 | 1SFL597001R7022 | 12.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF460-30-22 | 1SFL597001R7122 | 12.000 |
| 315 | 800 | 500 | 750 | - | 24...60 | 2 2 | AF580-30-22 | 1SFL617001R6822 (1) | 15.000 |
| | | | | 48...130 | 48...130 | 2 2 | AF580-30-22 | 1SFL617001R6922 | 15.000 |
| | | | | 100...250 | 100...250 | 2 2 | AF580-30-22 | 1SFL617001R7022 | 15.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF580-30-22 | 1SFL617001R7122 | 15.000 |
| 400 | 1050 | 600 | 900 | - | 24...60 | 2 2 | AF750-30-22 | 1SFL637001R6822 (1) | 15.000 |
| | | | | 48...130 | 48...130 | 2 2 | AF750-30-22 | 1SFL637001R6922 | 15.000 |
| | | | | 100...250 | 100...250 | 2 2 | AF750-30-22 | 1SFL637001R7022 | 15.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF750-30-22 | 1SFL637001R7122 | 15.000 |

(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
(2) Up to 850 V DC for AF580, AF750.

AF400...AF750 are equipped with low voltage inputs for control, for example by a PLC.

### Control inputs




AF400, AF460

AF580, AF750

Main dimensions mm, inches

# AF1250 ... AF2850 3-pole contactors

## 475 to 560 kW and 1260 to 2850 A AC-1

## AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts




AF1250-30-22




AF2650-30-22

AF1250 ... AF2050 contactors are mainly used for controlling power circuits up to 1000 V AC or 850 V DC, AF2650 and AF2850 for controlling power up to 1000 V AC. These contactors are of the block type design with 3 main poles.

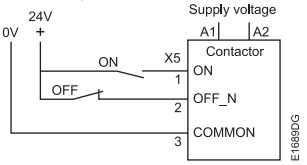
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
- only 4 coils for AF1250 to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
- only 1 coil for AF1350 ... AF2850 to cover control voltages between 100...250 V 50/60 Hz and 100...250 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc (1) | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C 690 V AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC (2) | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| - | 1260 | - | 1210 | - | 24...60 | 2 2 | AF1250-30-22 | 1SFL647001R6822 (1) | 16.000 |
| | | | | 48...130 | 48...130 | 2 2 | AF1250-30-22 | 1SFL647001R6922 | 16.000 |
| | | | | 100...250 | 100...250 | 2 2 | AF1250-30-22 | 1SFL647001R7022 | 16.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF1250-30-22 | 1SFL647001R7122 | 16.000 |
| 475 | 1350 | 800 | 1350 | 100...250 | 100...250 | 2 2 | AF1350-30-22 | 1SFL657001R7022 | 34.000 |
| 560 | 1650 | 900 | 1650 | 100...250 | 100...250 | 2 2 | AF1650-30-22 | 1SFL677001R7022 | 35.000 |
| - | 2050 | - | 2100 | 100...250 | 100...250 | 2 2 | AF2050-30-22 | 1SFL707001R7022 | 35.000 |
| - | 2650 | - | 2700 | 100...250 | 100...250 | 2 2 | AF2650-30-22 | 1SFL667001R7022 | 45.000 |
| - | 2850 | - | 2850 | 100...250 | 100...250 | 2 2 | AF2850-30-22 | 1SFL687001R7022 | 45.000 |

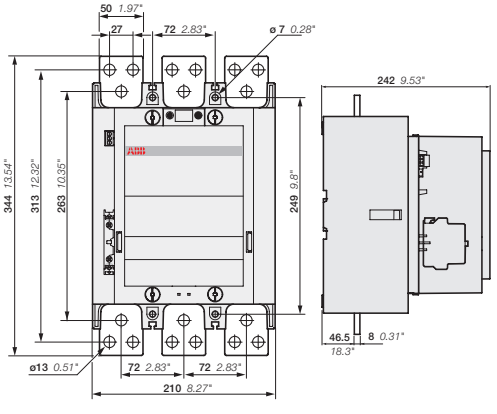
(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
(2) AF2650 : Maximum operational voltage = 1000 V according to UL / CSA.

AF1250 ... AF2850 are equipped with low voltage inputs for control, for example by a PLC.

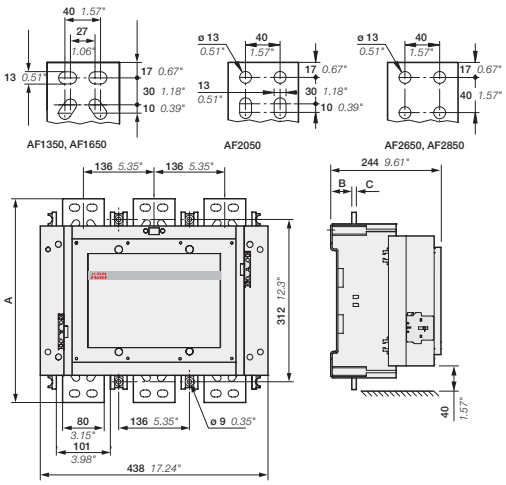
Control inputs




| | AF1350, AF1650, AF2050 | AF2650, AF2850 |
|---|---|---|
| A | 392 mm / 15.43" | 422 mm / 16.61" |
| B | 47 mm / 1.85" | 53 mm / 2.11" |
| C | 10 mm / 0.39" | 25 mm / 0.98" |




AF1250

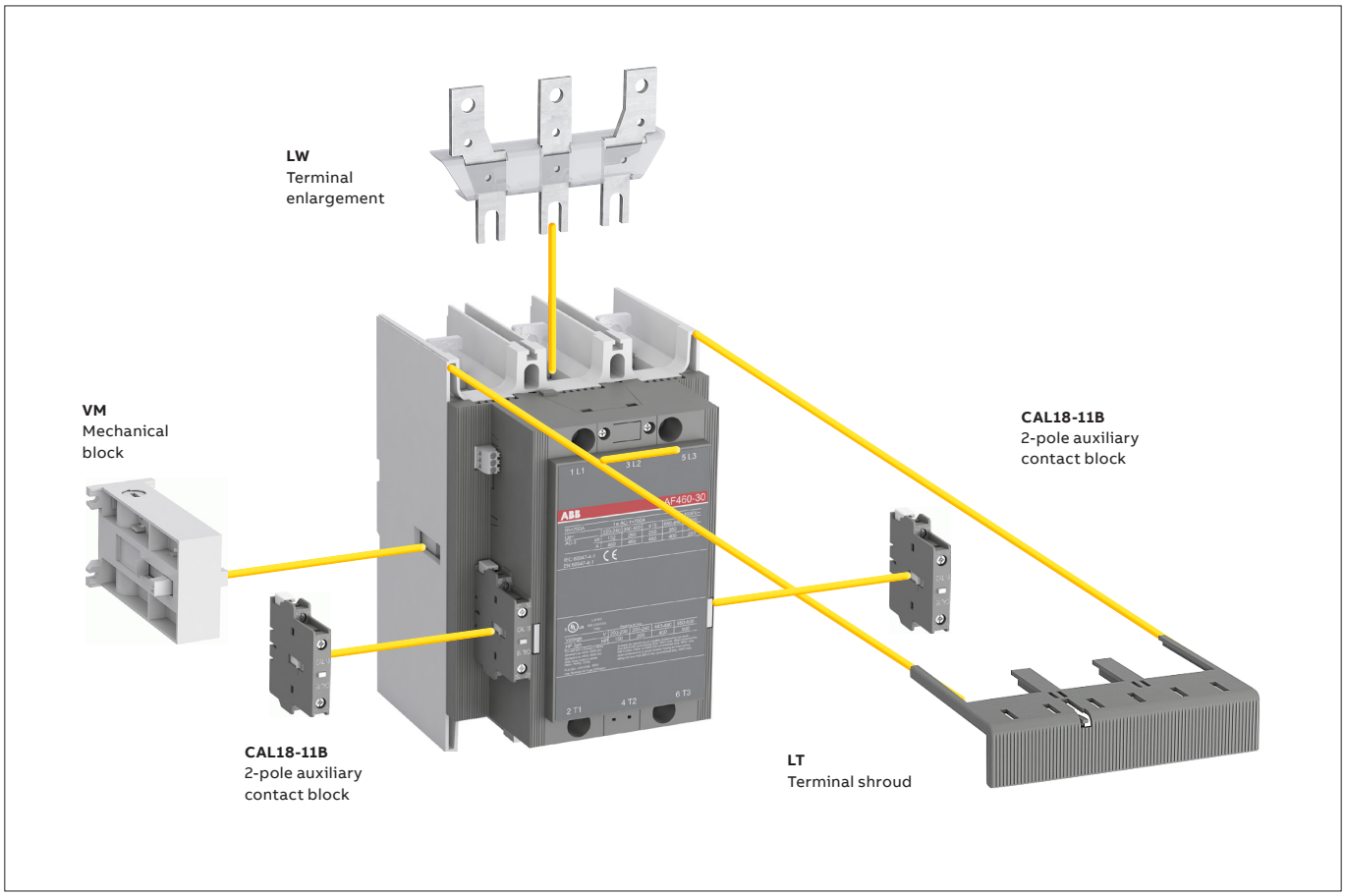



AF1350, AF1650, AF2050, AF2650, AF2850

Main dimensions mm, inches

# AF400... AF2850 3-pole contactors with 2 N.O. + 2 N.C. auxiliary contacts

## Contactors and main accessories




**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Available auxiliary contacts | Side-mounted accessories Auxiliary contact blocks CAL18-11 | CAL18-11B (2) | Mechanical interlock units (between two contactors) |
|---|---|---|---|---|---|
| **Contactors + auxiliary contact blocks** | | | | | |
| AF145 ... AF2850 | 3 | 0 2 2 | 2 x CAL18-11 included | 2 x CAL18-11B | – |
| **Contactors with mechanical interlocking + auxiliary contact blocks** | | | | | |
| AF400 ... AF2850 | 3 | 0 2 2 | 2 x CAL18-11 included | 4 x CAL18-11B | + VM...H (1) |

(1) Interlock type, according to the contactor ratings (see "Accessories").
(2) The CEL18-.. auxiliary contact blocks can replace the CAL18-11 and CAL18-11B. Though, no auxiliary contact block can be mounted outside the CEL18-..

### Overload relays fitting details

| Contactor types | Thermal overload relays | Electronic overload relays |
|---|---|---|
| AF400, AF460 | – | EF460 (150...500 A) (3) |
| AF580, AF750 | – | EF750 (250...800 A) (3) |
| AF1350, AF1650 | – | E1250DU (375...1250 A) (3) |

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
(3) Mounting kit required (see "Motor protection").

# AF09 ... AF38 3-pole contactors
## Technical data



### Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 |
|---|---|---|---|---|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1 | | | | | |
| Rated operational voltage Ue max. | | 690 V | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | |
| Conventional free-air thermal current Ith | | | | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 35 A | 35 A | 35 A | 50 A | 50 A | 50 A |
| With conductor cross-sectional area | | 6 mm² | 6 mm² | 6 mm² | 10 mm² | 10 mm² | 10 mm² |
| AC-1 Utilization category | | | | | | | |
| For air temperature close to contactor | | | | | | | |
| Ie / Rated operational current AC-1 | θ ≤ 40 °C | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A |
| Ue max. ≤ 690 V, 50/60 Hz | θ ≤ 60 °C | 25 A | 28 A | 30 A | 40 A | 42 A | 42 A |
| | θ ≤ 70 °C | 22 A | 24 A | 26 A | 32 A | 37 A | 37 A |
| With conductor cross-sectional area | | 4 mm² | 6 mm² | 6 mm² | 10 mm² | 10 mm² | 10 mm² |
| AC-3, AC-3e Utilization category | | | | | | | |
| For air temperature close to contactor θ ≤ 60 °C | | | | | | | |
| Ie / Max. rated operational current AC-3, AC-3e (1) | | | | | | | |
| 3-phase motors | 220-230-240 V | 9 A | 12 A | 18 A | 26 A | 33 A | 40 A |
| | 380-400 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A |
| | 415 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A |
| | 440 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A |
| | 500 V | 9.5 A | 12.5 A | 15 A | 23 A | 28 A | 33 A |
| | 690 V | 7 A | 9 A | 10.5 A | 17 A | 21 A | 24 A |
| Rated operational power AC-3, AC-3e (1) | | | | | | | |
| 1500 r.p.m. 50 Hz | 220-230-240 V | 2.2 kW | 3 kW | 4 kW | 6.5 kW | 9 kW | 11 kW |
| 1800 r.p.m. 60 Hz | 380-400 V | 4 kW | 5.5 kW | 7.5 kW | 11 kW | 15 kW | 18.5 kW |
| 3-phase motors | 415 V | 4 kW | 5.5 kW | 9 kW | 11 kW | 15 kW | 18.5 kW |
| | 440 V | 4 kW | 5.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW |
| | 500 V | 5.5 kW | 7.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW |
| | 690 V | 5.5 kW | 7.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW |
| Rated making capacity AC-3, AC-3e | | 10 x Ie AC-3, 12 x Ie AC-3e acc. to IEC 60947-4-1 | | | | | |
| Rated breaking capacity AC-3, AC-3e | | 8 x Ie AC-3, 8.5 x Ie AC-3e acc. to IEC 60947-4-1 | | | | | |
| AC-8a Utilization category | | | | | | | |
| (without thermal overload relay - Ue 400 V 50/60 Hz - θ ≤ 40 °C) | | | | | | | |
| Ie / Rated operational current AC-8a | | 12 A | 16 A | 22 A | 30 A | 40 A | 50 A |
| Rated operational power AC-8a | | 5.5 kW | 7.5 kW | 11 kW | 15 kW | 20 kW | 25 kW |
| Short-circuit protection device for contactors | | | | | | | |
| without thermal overload relay - Motor protection excluded (2) | | | | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 25 A | 32 A | 32 A | 50 A | 63 A | 63 A |
| Rated short-time withstand current Icw | 1 s | 300 A | 300 A | 300 A | 700 A | 700 A | 700 A |
| at 40 °C ambient temperature, | 10 s | 150 A | 150 A | 150 A | 350 A | 350 A | 350 A |
| in free air from a cold state | 30 s | 80 A | 80 A | 80 A | 225 A | 225 A | 225 A |
| | 1 min | 60 A | 60 A | 60 A | 150 A | 150 A | 150 A |
| | 15 min | 35 A | 35 A | 35 A | 50 A | 50 A | 50 A |
| Maximum breaking capacity | | | | | | | |
| cos ϕ = 0.45 | at 440 V | 250 A | 250 A | 250 A | 500 A | 500 A | 500 A |
| | at 690 V | 106 A | 106 A | 106 A | 200 A | 200 A | 200 A |
| Power dissipation per pole | Ie / AC-1 | 0.8 W | 1 W | 1.2 W | 1.8 W | 2.4 W | 2.4 W |
| | Ie / AC-3, AC-3e | 0.1 W | 0.2 W | 0.35 W | 0.6 W | 0.9 W | 1.3 W |
| Max. electrical switching frequency | AC-1 | 600 cycles/h | | | | | |
| | AC-3, AC-3e | 1200 cycles/h | | | | | |
| | AC-2, AC-4 | 300 cycles/h | | | 150 cycles/h | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

# AF40 ... AF96 3-pole contactors
## Technical data



### Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AF40 | AF52 | AF65 | AF80 | AF96 |
|---|---|---|---|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1 | | | | |
| Rated operational voltage Ue max. | | 690 V | | | 1000 V | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | |
| Conventional free-air thermal current Ith | | | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 105 A | 105 A | 105 A | 130 A | 130 A |
| With conductor cross-sectional area | | 35 mm² | 35 mm² | 35 mm² | 50 mm² | 50 mm² |
| AC-1 Utilization category | | | | | | |
| For air temperature close to contactor | | | | | | |
| Ie / Rated operational current AC-1 | θ ≤ 40 °C | 70 A | 100 A | 105 A | 125 A | 130 A |
| Ue max. ≤ 690 V, 50/60 Hz | θ ≤ 60 °C | 60 A | 80 A | 90 A | 100 A | 105 A |
| | θ ≤ 70 °C | 50 A | 70 A | 80 A | 85 A | 90 A |
| With conductor cross-sectional area | | 25 mm² | 35 mm² | 35 mm² | 50 mm² | 50 mm² |
| AC-3, AC-3e Utilization category | | | | | | |
| For air temperature close to contactor θ ≤ 60 °C | | | | | | |
| Ie / Max. rated operational current AC-3, AC-3e (1) | | | | | | |
| AC-3e Ue ≤ 690 V | 220-230-240 V | 40 A | 53 A | 65 A | 80 A | 105 A |
| | 380-400 V | 40 A | 53 A | 65 A | 80 A | 105 A |
|  3-phase motors | 415 V | 40 A | 53 A | 65 A | 80 A | 96 A |
| | 440 V | 40 A | 53 A | 65 A | 80 A | 96 A |
| | 500 V | 35 A | 45 A | 55 A | 65 A | 80 A |
| | 690 V | 25 A | 35 A | 39 A | 49 A | 57 A |
| | 1000 V | - | - | - | 25 A | 30A |
| Rated operational power AC-3, AC-3e (1) | | | | | | |
| AC-3e Ue ≤ 690 V | 220-230-240 V | 11 kW | 15 kW | 18.5 kW | 22 kW | 30 kW |
| | 380-400 V | 18.5 kW | 22 kW | 30 kW | 37 kW | 55 kW |
|  1500 r.p.m. 50 Hz<br>1800 r.p.m. 60 Hz<br>3-phase motors | 415 V | 22 kW | 30 kW | 37 kW | 45 kW | 55 kW |
| | 440 V | 22 kW | 30 kW | 37 kW | 45 kW | 55 kW |
| | 500 V | 22 kW | 30 kW | 37 kW | 45 kW | 55 kW |
| | 690 V | 22 kW | 30 kW | 37 kW | 45 kW | 55 kW |
| | 1000 V | - | - | - | 35 kW | 40 kW |
| Rated making capacity AC-3, AC-3e | | 10 x Ie AC-3, 12 x Ie AC-3e acc. to IEC 60947-4-1 | | | | |
| Rated breaking capacity AC-3, AC-3e | | 8 x Ie AC-3, 8.5 x Ie AC-3e acc. to IEC 60947-4-1 | | | | |
| AC-8a Utilization category | | | | | | |
| (without thermal overload relay | | | | | | |
| Ue 400 V 50/60 Hz - θ ≤ 40 °C) | | | | | | |
| Ie / Rated operational current AC-8a | | 53 A | 70 A | 85 A | 105 A | 120 A |
| Rated operational power AC-8a | | 25 kW | 37 kW | 45 kW | 55 kW | 65 kW |
| Short-circuit protection device for contactors | | | | | | |
| without thermal overload relay - Motor protection excluded (2) | | | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 100 A | 125 A | 160 A | 160 A | 200 A |
| Rated short-time withstand current Icw | 1 s | 1000 A | 1000 A | 1000 A | 1200 A | 1200 A |
| at 40 °C ambient temperature, | 10 s | 600 A | 600 A | 600 A | 780 A | 780 A |
| in free air from a cold state | 30 s | 350 A | 350 A | 350 A | 450 A | 450 A |
| | 1 min | 250 A | 250 A | 250 A | 300 A | 300 A |
| | 15 min | 110 A | 110 A | 110 A | 140 A | 140 A |
| Maximum breaking capacity | | | | | | |
| cos ϕ = 0.45 | at 440 V | 950 A | 950 A | 950 A | 1150 A | 1150 A |
| | at 690 V | 600 A | 600 A | 600 A | 750 A | 750 A |
| Power dissipation per pole | Ie / AC-1 | 3 W | 6.3 W | 7 W | 7.6 W | 8.2 W |
| | Ie / AC-3, AC-3e | 1 W | 1.7 W | 2.7 W | 3 W | 4.5 W |
| Max. electrical switching frequency | AC-1 | 600 cycles/h | | | | |
| | AC-3, AC-3e | 1200 cycles/h | | | | |
| | AC-2, AC-4 | 150 cycles/h | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

# AF116 ... AF370 3-pole contactors
## Technical data



### Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|---|---|---|---|---|---|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1 | | | | | | | |
| Rated operational voltage Ue max. | | 690 V | 690 V | 1000 V | 1000 V | 1000 V | 1000 V | 1000 V | 1000 V |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | | | |
| Conventional free-air thermal current Ith | | | | | | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 160 A | 200 A | 225 A | 275 A | 350 A | 400 A | 500 A | 600 A |
| With conductor cross-sectional area | | 70 mm² | 95 mm² | 95 mm² | 150 mm² | 240 mm² (3) | 240 mm² | 300 mm² (4) | 2 x 185 mm² (4) |
| AC-1 Utilization category | | | | | | | | | |
| For air temperature close to contactor | | | | | | | | | |
| Ie / Rated operational current AC-1 | θ ≤ 40 °C | 160 A | 200 A | 225 A | 275 A | 350 A | 400 A | 500 A | 600 A |
| Ue max. ≤ 690 V, 50/60 Hz | θ ≤ 60 °C | 145 A | 175 A | 200 A | 250 A | 300 A | 350 A | 400 A | 500 A |
| | θ ≤ 70 °C | 130 A | 160 A | 175 A | 200 A | 240 A | 290 A | 325 A | 400 A |
| Ie / Rated operational current AC-1 | θ ≤ 40 °C | – | – | 225 A | 250 A | 275 A | 350 A | 375 A | 400 A |
| Ue max. ≤ 1000 V, 50/60 Hz | θ ≤ 60 °C | – | – | 200 A | 225 A | 250 A | 300 A | 325 A | 350 A |
| | θ ≤ 70 °C | – | – | 175 A | 185 A | 200 A | 240 A | 260 A | 290 A |
| With conductor cross-sectional area | | 70 mm² | 95 mm² | 95 mm² | 150 mm² | 240 mm² (3) | 240 mm² | 300 mm² (4) | 2 x 185 mm² (4) |
| AC-3, AC-3e Utilization category | | | | | | | | | |
| For air temperature close to contactor θ ≤ 60 °C | | | | | | | | | |
| Ie / Max. rated operational current AC-3, AC-3e (1) | | | | | | | | | |
| | 220-230-240 V | 116 A | 140 A | 146 A | 190 A | 205 A | 265 A | 305 A | 370 A |
| | 380-400 V | 116 A | 140 A | 146 A | 190 A | 205 A | 265 A | 305 A | 370 A |
|  3-phase motors | 415 V | 116 A | 140 A | 146 A | 190 A | 205 A | 265 A | 305 A | 370 A |
| | 440 V | 116 A | 140 A | 146 A | 190 A | 205 A | 265 A | 305 A | 370 A |
| | 500 V | 110 A | 130 A | 130 A | 156 A | 186 A | 250 A | 290 A | 350 A |
| | 690 V | 65 A | 80 A | 93 A | 135 A | 165 A | 250 A | 290 A | 315 A |
| | 1000 V | – | – | 60 A / 54 A | 85 A | 100 A | 113 A | 131 A | 141 A |
| Rated operational power AC-3 (1) | | | | | | | | | |
| | 220-230-240 V | 30 kW | 37 kW | 45 kW | 55 kW | 55 kW | 75 kW | 90 kW | 110 kW |
| | 380-400 V | 55 kW | 75 kW | 75 kW | 90 kW | 110 kW | 132 kW | 160 kW | 200 kW |
|  1500 r.p.m. 50 Hz | 415 V | 55 kW | 75 kW | 75 kW | 90 kW | 110 kW | 132 kW | 160 kW | 200 kW |
| 1800 r.p.m. 60 Hz | 440 V | 75 kW | 90 kW | 90 kW | 110 kW | 132 kW | 160 kW | 160 kW | 200 kW |
| 3-phase motors | 500 V | 75 kW | 90 kW | 90 kW | 110 kW | 132 kW | 160 kW | 200 kW | 250 kW |
| | 690 V | 55 kW | 75 kW | 90 kW | 132 kW | 160 kW | 200 kW | 250 kW | 315 kW |
| | 1000 V | – | – | 75 kW | 110 kW | 132 kW | 160 kW | 185 kW | 200 kW |
| Rated making capacity AC-3, AC-3e | | 10 x Ie AC-3, 12 x Ie AC-3e acc. to IEC 60947-4-1 | | | | | | | |
| Rated breaking capacity AC-3, AC-3e | | 8 x Ie AC-3, 8.5 x Ie AC-3e acc. to IEC 60947-4-1 | | | | | | | |
| Short-circuit protection device for contactors | | | | | | | | | |
| without thermal overload relay - Motor protection excluded (2) | | | | | | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 250 A | 315 A | 315 A | 355 A | 400 A | 500 A | 500 A | 630 A |
| Rated short-time withstand current Icw | 1 s | 1300 A | 1460 A | 1460 A | 1900 A | 2050 A | 2650 A | 3050 A | 3700 A |
| at 40 °C ambient temperature, | 10 s | 928 A | 1168 A | 1168 A | 1520 A | 1640 A | 2120 A | 2440 A | 2960 A |
| in free air from a cold state | 30 s | 536 A | 674 A | 674 A | 878 A | 947 A | 1224 A | 1409 A | 1709 A |
| | 1 min | 379 A | 477 A | 477 A | 621 A | 670 A | 865 A | 996 A | 1208 A |
| | 15 min | 160 A | 200 A | 225 A | 275 A | 350 A | 400 A | 500 A | 600 A |
| Maximum breaking capacity | | | | | | | | | |
| cos ϕ = 0.45 | at 440 V | 2000 A | 3000 A | 3000 A | 3300 A | 3500 A | 3800 A | 4600 A | 5000 A |
| (cos ϕ = 0.35 for Ie > 100 A) | at 690 V | 1000 A | 1500 A | 1500 A | 2200 A | 2500 A | 3300 A | 3800 A | 4000 A |
| Power dissipation per pole | Ie / AC-1 | 12 W | 18 W | 23 W | 15 W | 25 W | 32 W | 50 W | 72 W |
| | Ie / AC-3 | 6 W | 9 W | 10 W | 7 W | 8 W | 14 W | 19 W | 27 W |
| Maximum electrical switching frequency | AC-1 | 300 cycles/h | | | | | | | |
| | AC-3 | 300 cycles/h | | | | | | | |
| | AC-2, AC-4 | 150 cycles/h | | | | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
For AC-3e utilization category, please consult your ABB local sales organization. AC-3e is valid up to AF190.
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".
(3) For currents above 275A use terminal enlargements or terminal extensions.
(4) For currents above 450A use terminal enlargements or terminal extensions.

# AF400 ... AF750 3-pole contactors
## Technical data

### Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AF400 | AF460 | AF580 | AF750 |
|---|---|---|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1 | | | |
| Rated operational voltage Ue max. | | 1000 V | | | |
| Rated frequency (without derating) | | 50/60 Hz | | | |
| Conventional free-air thermal current Ith | | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 600 A | 700 A | 800 A | 1050 A |
| With conductor cross-sectional area (3) | | 2x185 mm² | 2x240 mm² | 2x240 mm² | 800 mm² (4) |
| AC-1 Utilization category | | | | | |
| For air temperature close to contactor | | | | | |
| Ie / Rated operational current AC-1 | θ ≤ 40 °C | 600 A | 700 A | 800 A | 1050 A |
| Ue max. ≤ 690 V, 50/60 Hz | θ ≤ 55 °C | 500 A | 600 A | 700 A | 875 A |
| | θ ≤ 70 °C | 400 A | 480 A | 580 A | 720 A |
| Ie / Rated operational current AC-1 | θ ≤ 40 °C | 600 A | 700 A | 800 A | 1000 A |
| Ue max. ≤ 1000 V, 50/60 Hz | θ ≤ 55 °C | 500 A | 600 A | 700 A | 875 A |
| | θ ≤ 70 °C | 400 A | 480 A | 580 A | 720 A |
| With conductor cross-sectional area | | 2x185 mm² | 2x240 mm² | 2x240 mm² | 800 mm² (4) |
| AC-3 Utilization category | | | | | |
| For air temperature close to contactor θ ≤ 55 °C | | | | | |
| Ie / Max. rated operational current AC-3 (1) | | | | | |
| | 220-230-240 V | 400 A | 460 A | 580 A | 750 A |
| | 380-400 V | 400 A | 460 A | 580 A | 750 A |
|  3-phase motors | 415 V | 400 A | 460 A | 580 A | 750 A |
| | 440 V | 400 A | 460 A | 580 A | 750 A |
| | 500 V | 400 A | 460 A | 580 A | 750 A |
| | 690 V | 350 A | 400 A | 500 A | 650 A |
| | 1000 V | 155 A | 200 A | 250 A | 300 A |
| Rated operational power AC-3 (1) | | | | | |
| | 220-230-240 V | 110 kW | 132 kW | 160 kW | 220 kW |
| | 380-400 V | 200 kW | 250 kW | 315 kW | 400 kW |
|  1500 r.p.m. 50 Hz<br>1800 r.p.m. 60 Hz<br>3-phase motors | 415 V | 220 kW | 250 kW | 355 kW | 425 kW |
| | 440 V | 220 kW | 250 kW | 355 kW | 450 kW |
| | 500 V | 250 kW | 315 kW | 400 kW | 520 kW |
| | 690 V | 315 kW | 355 kW | 500 kW | 600 kW |
| | 1000 V | 220 kW | 280 kW | 355 kW | 400 kW |
| Rated making capacity AC-3 | | 10 x Ie AC-3 acc. to IEC 60947-4-1 | | | |
| Rated breaking capacity AC-3 | | 8 x Ie AC-3 acc. to IEC 60947-4-1 | | | |
| Short-circuit protection device for contactors | | | | | |
| without thermal overload relay | | | | | |
| Motor protection excluded (2) | | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 630 A | 800 A | 1000 A | 1000 A |
| Rated short-time withstand current Icw | 1 s | 4600 A | 4600 A | 7000 A | 7000 A |
| at 40 °C ambient temperature, | 10 s | 4400 A | 4400 A | 6400 A | 6400 A |
| in free air from a cold state | 30 s | 3100 A | 3100 A | 4500 A | 4500 A |
| | 1 min | 2500 A | 2500 A | 3500 A | 3500 A |
| | 15 min | 840 A | 840 A | 1300 A | 1300 A |
| Maximum breaking capacity | | | | | |
| cos ϕ = 0.45 | at 440 V | 4000 A | 5000 A | 6000 A | 7500 A |
| (cos ϕ = 0.35 for Ie > 100 A) | at 690 V | 3500 A | 4500 A | 5000 A | 7000 A |
| Power dissipation per pole | Ie / AC-1 | 30 W | 42 W | 32 W | 50 W |
| | Ie / AC-3 | 16 W | 21 W | 17 W | 28 W |
| Max. electrical switching | AC-1 | 300 cycles/h | | 300 cycles/h | |
| frequency | AC-3 | 300 cycles/h | | 300 cycles/h | |
| | AC-2, AC-4 | 60 cycles/h | | 60 cycles/h | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
For AC-3e utilization category, please consult your ABB local sales organization.
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".
(3) Conductors with preparation.
(4) Max. connection bar width 50 mm.
(5) Max. connection bar width 100 mm.

# AF1250 ... AF2850 3-pole contactors
## Technical data



### Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 | AF2850 |
|---|---|---|---|---|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1 | | | | | |
| Rated operational voltage Ue max. | | 1000 V | | | | | |
| Rated frequency (without derating) | | 50/60 Hz | | | | | |
| Conventional free-air thermal current Ith | | | | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 1260 A | 1350 A | 1650 A | 2050 A | 2650 A | 2850 A |
| With conductor cross-sectional area (3) | | 1000 mm² (4) | 1000 mm² (5) | 1500 mm² (5) | 2000 mm² (5) | 3000 mm² (5) | 3000 mm² (5) |
| AC-1 Utilization category | | | | | | | |
| For air temperature close to contactor | | | | | | | |
| Ie / Rated operational current AC-1 | θ ≤ 40 °C | 1260 A | 1350 A | 1650 A | 2050 A | 2650 A | 2850 A |
| Ue max. ≤ 690 V, 50/60 Hz | θ ≤ 55 °C | 1040 A | 1150 A | 1450 A | 1750 A | 2350 A | 2600 A |
| | θ ≤ 70 °C | 875 A | 1000 A | 1270 A | 1500 A | 2120 A | 2300 A |
| Ie / Rated operational current AC-1 | θ ≤ 40 °C | 1260 A | 1350 A | 1650 A | 2050 A | 2650 A | 2850 A |
| Ue max. ≤ 1000 V, 50/60 Hz | θ ≤ 55 °C | 1040 A | 1150 A | 1450 A | 1750 A | 2350 A | 2600 A |
| | θ ≤ 70 °C | 875 A | 1000 A | 1270 A | 1500 A | 2120 A | 2300 A |
| With conductor cross-sectional area | | 1000 mm² (4) | 1000 mm² (5) | 1500 mm² (5) | 2000 mm² (5) | 3000 mm² (5) | 3000 mm² (5) |
| AC-3, AC-3e Utilization category | | | | | | | |
| For air temperature close to contactor θ ≤ 55 °C | | | | | | | |
| Ie / Max. rated operational current AC-3, AC-3e (1) | | | | | | | |
| | 220-230-240 V | – | 860 A | 1060 A | 1060 A | – | – |
| | 380-400 V | – | 860 A | 1060 A | 1060 A | – | – |
|  3-phase motors | 415 V | – | 860 A | 1060 A | 1060 A | – | – |
| | 440 V | – | 860 A | 1060 A | 1060 A | – | – |
| | 500 V | – | 800 A | 970 A | 970 A | – | – |
| | 690 V | – | 800 A | 970 A | 970 A | – | – |
| | 1000 V | – | 375 A | 400 A | 425 A | – | – |
| Rated operational power AC-3, AC-3e (1) | | | | | | | |
| | 220-230-240 V | – | 257 kW | 315 kW | – | – | – |
| | 380-400 V | – | 475 kW | 560 kW | – | – | – |
|  1500 r.p.m. 50 Hz<br>1800 r.p.m. 60 Hz<br>3-phase motors | 415 V | – | 500 kW | 630 kW | 630 kW | – | – |
| | 440 V | – | 560 kW | 710 kW | 710 kW | – | – |
| | 500 V | – | 560 kW | 710 kW | – | – | – |
| | 690 V | – | 800 kW | 1000 kW | 1000 kW | – | – |
| | 1000 V | – | 560 kW | 600 kW | 630 kW | – | – |
| Rated making capacity AC-3, AC-3e | | 10 x Ie AC-3, 12 x Ie AC-3e acc. to IEC 60947-4-1 | | | | | |
| Rated breaking capacity AC-3, AC-3e | | 8 x Ie AC-3, 8.5 x Ie AC-3e acc. to IEC 60947-4-1 | | | | | |
| Short-circuit protection device for contactors without thermal overload relay Motor protection excluded (2) Ue ≤ 500 V AC - gG type fuse | | Please consult us for coordination with circuit-breaker | | | | | |
| Rated short-time withstand current Icw | 1 s | 8000 A | 10000 A | 12000 A | 12000 A | 12000 A | 12000 A |
| at 40 °C ambient temperature, | 10 s | 7200 A | 8000 A | 10000 A | 10000 A | 10000 A | 10000 A |
| in free air from a cold state | 30 s | 5200 A | 6000 A | 7500 A | 7500 A | 7500 A | 7500 A |
| | 1 min | 4000 A | 4500 A | 5500 A | 5500 A | 5500 A | 5500 A |
| | 15 min | 1500 A | 1600 A | 2200 A | 2200 A | 2800 A | 3000 A |
| Maximum breaking capacity | | | | | | | |
| cos ϕ = 0.45 | at 440 V | 7500 A | 10000 A | 12000 A | 8400 A | 8400 A | 8400 A |
| (cos ϕ = 0.35 for Ie > 100 A) | at 690 V | 7000 A | – | – | – | – | – |
| Power dissipation per pole | Ie / AC-1 | 80 W | 80 W | 80 W | 125 W | 200 W | 200 W |
| | Ie / AC-3 | – | 50 W | 50 W | – | – | – |
| Max. electrical switching frequency | AC-1 | 300 cycles/h | 60 cycles/h | | 60 cycles/h | 15 cycles/h | 15 cycles/h |
| | AC-3 | – | 60 cycles/h | | – | – | – |
| | AC-2, AC-4 | – | 60 cycles/h | | – | – | – |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
For AC-3e utilization category, please consult your ABB local sales organization AC-3e is valid up to AF190.
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".
(3) Conductors with preparation.
(4) Max. connection bar width 50 mm.
(5) Max. connection bar width 100 mm.

# AF09 ... AF38 3-pole contactors
## Technical data

### Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 |
|---|---|---|---|---|---|---|---|
| Standards | | UL 60947-4-1, CSA C22.2 No. 60947-4-1 | | | | | |
| Maximum operational voltage | | 600 V | | | | | |
| NEMA size | | 00 | 0 | – | 1 | – | – |
| NEMA continuous amp rating | Thermal current | 9 A | 18 A | | 27 A | | |
| NEMA maximum horse power ratings | | | | | | | |
| 1-phase, 60 Hz | 115 V AC | 1/3 hp | 1 hp | | 2 hp | | |
| | 230 V AC | 1 hp | 2 hp | | 3 hp | | |
| NEMA maximum horse power ratings | | | | | | | |
| 3-phase, 60 Hz | 200 V AC | 1-1/2 hp | 3 hp | | 7-1/2 hp | | |
| | 230 V AC | 1-1/2 hp | 3 hp | | 7-1/2 hp | | |
| | 460 V AC | 2 hp | 5 hp | | 10 hp | | |
| | 575 V AC | 2 hp | 5 hp | | 10 hp | | |
| UL / CSA general use rating | | | | | | | |
| | 600 V AC | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A |
| With conductor cross-sectional area | | AWG 10 | AWG 10 | AWG 10 | AWG 8 | AWG 8 | AWG 8 |
| 1 pole | 80 V DC | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A |
| 2 poles in serie | 160 V DC | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A |
| 3 poles in serie | 240 V DC | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A |
| With conductor cross-sectional area | | AWG 10 | AWG 10 | AWG 10 | AWG 8 | AWG 8 | AWG 8 |
| UL / CSA maximum 1-phase motor rating | | | | | | | |
| Full load current | 120 V AC | 13.8 A | 16 A | 20 A | 24 A | 24 A | 24 A |
| | 240 V AC | 10 A | 12 A | 17 A | 17 A | 28 A | 28 A |
| Horse power rating | 120 V AC | 3/4 hp | 1 hp | 1-1/2 hp | 2 hp | 2 hp | 2 hp |
| | 240 V AC | 1-1/2 hp | 2 hp | 3 hp | 3 hp | 5 hp | 5 hp |
| UL / CSA maximum 3-phase motor rating | | | | | | | |
| Full load current (1) | 200-208 V AC | 7.8 A | 11 A | 17.5 A | 25.3 A | 32.2 A | 32.2 A |
| | 220-240 V AC | 6.8 A | 9.6 A | 15.2 A | 22 A | 28 A | 28 A |
| | 440-480 V AC | 7.6 A | 11 A | 14 A | 21 A | 27 A | 34 A (3) |
| | 550-600 V AC | 9 A | 11 A | 17 A | 22 A | 27 A (2) | 32 A (3) |
| Horse power rating (1) | 200-208 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp |
| | 220-240 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp |
| | 440-480 V AC | 5 hp | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp (3) |
| | 550-600 V AC | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp (2) | 30 hp (3) |
| UL / CSA - DC motor starting - 3 poles in series | | | | | | | |
| Full Load Amps (FLA) | 125 V DC | 9.5 A | 13.2 A | 17 A | 25 A | 25 A | 25 A |
| | 250 V DC | 8.5 A | 12.2 A | 12.2 A | 20 A | 29 A | 29 A |
| Horse power rating | 125 V DC | 1 hp | 1-1/2 hp | 2 hp | 3 hp | 3 hp | 3 hp |
| | 250 V DC | 2 hp | 3 hp | 3 hp | 5 hp | 7-1/2 hp | 7-1/2 hp |
| Short-circuit protection device for contactors | | | | | | | |
| without thermal overload relay - Motor protection excluded | | | | | | | |
| High fault current | | 100 kA | | | | | |
| Fuse rating | | 30 A | 30 A | 60 A | 60 A | 100 A | 100 A |
| Fuse type, 600 V | | J | | | | | |
| Max. electrical switching frequency | | | | | | | |
| For general use | | 600 cycles/h | | | | | |
| For motor use | | 1200 cycles/h | | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see “Motor rated operational powers and currents”.
(2) For contactors produced since week 49-2011.
(3) For contactors produced since week 36-2014.

# AF40 ... AF96 3-pole contactors
## Technical data



### Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC / DC operated | AF40 | AF52 | AF65 | AF80 | AF96 |
|---|---|---|---|---|---|---|
| Standards | | UL 60947-1, UL 60947-4-1, CSA C22.2 No. 60947-1:22, CSA C22.2 No. 60947-4-1:22 | | | | |
| Maximum operational voltage | | 600 V | | | | |
| NEMA size | | 2 | - | - | 3 | - |
| NEMA continuous amp rating | Thermal current | 45 A | - | - | 90 A | - |
| NEMA maximum horse power ratings | | | | | | |
| 1-phase, 60 Hz | 115 V AC | 3 hp | - | - | - | - |
| | 230 V AC | 7.5 hp | - | - | - | - |
| NEMA maximum horse power ratings | | | | | | |
| 3-phase, 60 Hz | 200 V AC | 10 hp | - | - | 25 hp | - |
| | 230 V AC | 15 hp | - | - | 30 hp | - |
| | 460 V AC | 25 hp | - | - | 50 hp | - |
| | 575 V AC | 25 hp | - | - | 50 hp | - |
| UL / CSA general use rating | | | | | | |
| | 600 V AC | 60 A | 80 A | 90 A | 105 A | 115 A |
| With conductor cross-sectional area | | AWG 6 | AWG 4 | AWG 3 | AWG 2 | AWG 2 |
| 1 pole | 80 V DC | 60 A | 80 A | 90 A | 105 A | 115 A |
| 2 poles in serie | 160 V DC | 60 A | 80 A | 90 A | 105 A | 115 A |
| 3 poles in serie | 240 V DC | 60 A | 80 A | 90 A | 105 A | 115 A |
| With conductor cross-sectional area | | AWG 6 | AWG 4 | AWG 3 | AWG 2 | AWG 2 |
| UL / CSA maximum 1-phase motor rating | | | | | | |
| Full load current | 120 V AC | 34 A | 34 A | 56 A | 80 A | 80 A |
| | 240 V AC | 40 A | 50 A | 68 A | 68 A | 88 A |
| Horse power rating | 120 V AC | 3 hp | 3 hp | 5 hp | 7-1/2 hp | 7-1/2 hp |
| | 240 V AC | 7-1/2 hp | 10 hp | 15 hp | 15 hp | 20 hp |
| UL / CSA maximum 3-phase motor rating | | | | | | |
| Full load current (1) | 200-208 V AC | 32.2 A | 48.3 A | 62.1 A | 78.2 A | 96 A |
| | 220-240 V AC | 42 A | 54 A | 68 A | 80 A | 96 A |
| | 440-480 V AC | 40 A | 52 A | 65 A | 77 A | 96 A |
| | 550-600 V AC | 41 A | 52 A | 62 A | 77 A | 77 A |
| Horse power rating (1) | 200-208 V AC | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp |
| | 220-240 V AC | 15 hp | 20 hp | 25 hp | 30 hp | 40 hp |
| | 440-480 V AC | 30 hp | 40 hp | 50 hp | 60 hp | 75 hp |
| | 550-600 V AC | 40 hp | 50 hp | 60 hp | 75 hp | 75 hp |
| UL / CSA - DC motor starting - 3 poles in series | | | | | | |
| Full Load Amps (FLA) | 125 V DC | 40 A | 58 A | 76 A | 76 A | 110 A |
| | 250 V DC | 38 A | 55 A | 72 A | 89 A | 106 A |
| Horse power rating | 125 V DC | 5 hp | 7-1/2 hp | 10 hp | 10 hp | 15 hp |
| | 250 V DC | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded | | | | | | |
| High fault current | | 100 kA | | | | |
| Fuse rating | | 150 A | 150 A | 150 A | 200 A | 200 A |
| Fuse type, 600 V | | J | | | | |
| Maximum electrical switching frequency | | | | | | |
| For general use | | 600 cycles/h | | | | |
| For motor use | | 1200 cycles/h | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

# AF116 ... AF370 3-pole contactors
## Technical data

### Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC / DC operated | AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|---|---|---|---|---|---|---|---|---|
| Standards | | UL 60947-4-1, CSA C22.2 No. 60947-4-1-14 | | | | | | | |
| Maximum operational voltage | | 600 V | | 1000 V | | | | | |
| NEMA size | | – | 4 | – | – | – | 5 | – | – |
| NEMA continuous amp rating | Thermal current | – | 135 A | – | – | – | 270 A | – | – |
| NEMA maximum horse power ratings | | | | | | | | | |
| 1-phase, 60 Hz | 115 V AC | – | – | – | – | – | – | – | – |
| | 230 V AC | – | – | – | – | – | – | – | – |
| NEMA maximum horse power ratings | | | | | | | | | |
| 3-phase, 60 Hz | 200 V AC | – | 40 hp | – | – | – | 75 hp | – | – |
| | 230 V AC | – | 50hp | – | – | – | 100 hp | – | – |
| | 460 V AC | – | 100 hp | – | – | – | 200 hp | – | – |
| | 575 V AC | – | 100 hp | – | – | – | 200 hp | – | – |
| UL / CSA general use rating | | | | | | | | | |
| 600 V AC | | 160 A | 200 A | | 275 A | 300 A | 350 A | 400 A | 520 A |
| 1000 V AC | | – | – | 200 A | 250 A | 275 A | 300 A | 350 A | 400 A |
| With conductor cross-sectional area | | AWG 2/0 | AWG 3/0 | AWG 3/0 | MCM 250 | MCM 350 (2) | MCM 500 | 2//AWG 3/0 | 2//MCM 300 |
| UL / CSA maximum 1-phase motor rating | | | | | | | | | |
| Full load current | 120 V AC | – | – | – | – | – | – | – | – |
| | 240 V AC | – | – | – | – | – | – | – | – |
| Horse power rating | 120 V AC | – | – | – | – | – | – | – | – |
| | 240 V AC | – | – | – | – | – | – | – | – |
| UL / CSA maximum 3-phase motor rating | | | | | | | | | |
| Full load current (1) | 200-208 V AC | 92 A | 120 A | 120 A | 150 A | 177 A | 221 A | 285 A | 359 A |
| | 220-240 V AC | 104 A | 130 A | 130 A | 154 A | 192 A | 248 A | 312 A | 360 A |
| | 440-480 V AC | 96 A | 124 A | 124 A | 156 A | 180 A | 240 A | 302 A | 361 A |
| | 550-600 V AC | 99 A | 125 A | 125 A | 144 A | 192 A | 242 A | 289 A | 336 A |
| Horse power rating (1) | 200-208 V AC | 30 hp | 40 hp | 40 hp | 50 hp | 60 hp | 75 hp | 100 hp | 125 hp |
| | 220-240 V AC | 40 hp | 50 hp | 50 hp | 60 hp | 75 hp | 100 hp | 125 hp | 150 hp |
| | 440-480 V AC | 75 hp | 100 hp | 100 hp | 125 hp | 150 hp | 200 hp | 250 hp | 300 hp |
| | 550-600 V AC | 100 hp | 125 hp | 125 hp | 150 hp | 200 hp | 250 hp | 300 hp | 350 hp |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded | | | | | | | | | |
| High fault current | | 100 kA | | | | | | | |
| Fuse rating | | 225 A | 250 A | | 400 A | | 500 A | 600 A | |
| Fuse type, 600 V | | J | | | | | | | |
| Maximum electrical switching frequency | | | | | | | | | |
| For general use | | 300 cycles/h | | | | | | | |
| For motor use | | 300 cycles/h | | | | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For conductor cross-sectional area above MCM 300 use terminal enlargements LW205.

# AF400 ... AF750 3-pole contactors
## Technical data



### Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC / DC operated | AF400 | AF460 | AF580 | AF750 |
|---|---|---|---|---|---|
| Standards | | UL 60947-4-1, CSA C22.2 No. 60947-4-1-14 | | | |
| Maximum operational voltage | | 1000 V | | | |
| NEMA size | | – | 6 | – | 7 |
| NEMA maximum horse power ratings | | | | | |
| 1-phase, 60 Hz | 115 V AC | – | | | |
| | 230 V AC | – | | | |
| NEMA maximum horse power ratings | | | | | |
| 3-phase, 60 Hz | 200 V AC | – | 150 hp | – | – |
| | 230 V AC | – | 200 hp | – | 300 hp |
| | 460 V AC | – | 400 hp | – | 600 hp |
| | 575 V AC | – | 400 hp | – | 600 hp |
| UL / CSA general use rating | | | | | |
| 1000 V AC | | 550 A | 650 A | 750 A | 900 A |
| 3 poles in serie | 600 V DC | 550 A | 650 A | 750 A | 900 A |
| UL / CSA maximum 1-phase motor rating | | | | | |
| Full load current | 120 V AC | – | – | – | – |
| | 240 V AC | – | – | – | – |
| Horse power rating | 120 V AC | – | – | – | – |
| | 240 V AC | – | – | – | – |
| UL / CSA maximum 3-phase motor rating | | | | | |
| Full load current (1) | 200-208 V AC | 358.8 A | 414 A | 552 A | 692.3 A |
| | 220-240 V AC | 360 A | 480 A | 604 A | 722 A |
| | 440-480 V AC | 414 A | 477 A | 590 A | 722 A |
| | 550-600 V AC | 382 A | 472 A | 578 A | 672 A |
| Horse power rating (1) | 200-208 V AC | 125 hp | 150 hp | 200 hp | 250 hp |
| | 220-240 V AC | 150 hp | 200 hp | 250 hp | 300 hp |
| | 440-480 V AC | 350 hp | 400 hp | 500 hp | 600 hp |
| | 550-600 V AC | 400 hp | 500 hp | 600 hp | 700 hp |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded | | | | | |
| Fuse rating | | 1000 A | | 1200 A | |
| Fuse type, 600 V | | L | | | |
| Maximum electrical switching frequency | | | | | |
| For general use | | 300 cycles/h | | | |
| For motor use | | 300 cycles/h | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see “Motor rated operational powers and currents”.

# AF1250 ... AF2850 3-pole contactors
## Technical data



### Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC / DC operated | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 | AF2850 |
|---|---|---|---|---|---|---|---|
| Standards | | UL 60947-4-1A, CSA C22.2 No. 60947-4-1-07 | | | | UL 60947-4-1<br>CAN/CSA C22.2 No. 60947-4-1-14 | |
| Maximum operational voltage | | 1000 V | | | | | |
| NEMA size | | – | – | 8 | – | – | – |
| NEMA maximum horse power ratings | | | | | | | |
| 1-phase, 60 Hz | 115 V AC | – | | | | | |
| | 230 V AC | – | | | | | |
| NEMA maximum horse power ratings | | | | | | | |
| 3-phase, 60 Hz | 200 V AC | – | – | – | – | – | – |
| | 230 V AC | 300 hp | – | 450 hp | – | – | – |
| | 460 V AC | 600 hp | – | 900 hp | – | – | – |
| | 575 V AC | 600 hp | – | 900 hp | – | – | – |
| UL / CSA general use rating | | | | | | | |
| 1000 V AC | | 1210 A | 1350 A | 1650 A | 2100 A | 2700 A | 2850 A |
| 3 poles in serie | 600 V DC | 1210 A | – | – | – | – | – |
| UL / CSA maximum 1-phase motor rating | | | | | | | |
| Full load current | 120 V AC | – | – | – | – | – | – |
| | 240 V AC | – | – | – | – | – | – |
| Horse power rating | 120 V AC | – | – | – | – | – | – |
| | 240 V AC | – | – | – | – | – | – |
| UL / CSA maximum 3-phase motor rating | | | | | | | |
| Full load current (1) | 200-208 V AC | – | 954 A | 1030 A | – | – | – |
| | 220-240 V AC | – | 954 A | 1030 A | – | – | – |
| | 440-480 V AC | – | 954 A | 1030 A | – | – | – |
| | 550-600 V AC | – | 944 A | 1050 A | – | – | – |
| Horse power rating (1) | 200-208 V AC | – | – | – | – | – | – |
| | 220-240 V AC | – | 400 hp | 450 hp | – | – | – |
| | 440-480 V AC | – | 800 hp | 900 hp | – | – | – |
| | 550-600 V AC | – | 1000 hp | 1150 hp | – | – | – |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded | | | | | | | |
| Fuse rating | | 1200 A | Please consult us for coordination with circuit-breaker | | | | |
| Fuse type, 600 V | | L | | | | | |
| Maximum electrical switching frequency | | | | | | | |
| For general use | | 300 cycles/h | 60 cycles/h | | | 15 cycles/h | 15 cycles/h |
| For motor use | | 300 cycles/h | 60 cycles/h | | | – | – |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see “Motor rated operational powers and currents”.

# AF09 ... AF96 3-pole contactors
## Technical data



### Main pole utilization characteristics - 3 N.O. non-reversing contactors

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HVAC application - UL / CSA | | | | | | | | | | | | |
| Definite purpose heating rating - 3-phase | | | | | | | | | | | | |
| Full Load Amps (FLA) | | 20 A | 25 A | 30 A | 45 A | 50 A | 50 A | 60 A | 80 A | 90 A | 105 A | 115 A |
| Locked Rotor Amps (LRA) | 200-208 V AC | 120 A | 150 A | 180 A | 270 A | 300 A | 300 A | 360 A | 480 A | 540 A | 630 A | 690 A |
| | 220-240 V AC | 120 A | 150 A | 180 A | 270 A | 300 A | 300 A | 360 A | 480 A | 540 A | 630 A | 690 A |
| | 440-480 V AC | 120 A | 150 A | 180 A | 270 A | 300 A | 300 A | 360 A | 480 A | 540 A | 630 A | 690 A |
| | 550-600 V AC | 80 A | 100 A | 120 A | 180 A | 200 A | 200 A | 240 A | 320 A | 360 A | 420 A | 460 A |
| Definite purpose air conditioning rating - 3-phase | | | | | | | | | | | | |
| Full Load Amps (FLA) | | 20 A | 25 A | 30 A | 45 A | 50 A | 50 A | 60 A | 80 A | 90 A | 105 A | 115 A |
| Locked Rotor Amps (LRA) | 200-208 V AC | 120 A | 150 A | 180 A | 270 A | 300 A | 300 A | 360 A | 480 A | 540 A | 630 A | 690 A |
| | 220-240 V AC | 120 A | 150 A | 180 A | 270 A | 300 A | 300 A | 360 A | 480 A | 540 A | 630 A | 690 A |
| | 440-480 V AC | 120 A | 150 A | 180 A | 270 A | 300 A | 300 A | 360 A | 480 A | 540 A | 630 A | 690 A |
| | 550-600 V AC | 80 A | 100 A | 120 A | 180 A | 200 A | 200 A | 240 A | 320 A | 360 A | 420 A | 460 A |
| AC Resistance air heating | | | | | | | | | | | | |
| Full Load Amps (FLA) | 600 V AC | 20 A | 25 A | 30 A | 45 A | 50 A | 50 A | 65 A | 80 A | 90 A | 105 A | 115 A |
| Elevator control, load switching, 500 000 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.1 | | | | | | | | | | | | |
| 1-phase | | | | | | | | | | | | |
| Horse power rating | 110-120 V AC | 1/4 hp | 1/3 hp | (1) | 1-1/2 hp | 2 hp | 2 hp | 3 hp | 3 hp | 3 hp | 5 hp | 5 hp |
| | 220-240 V AC | 1/2 hp | 3/4 hp | (1) | 3 hp | 3 hp | 5 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp | 10 hp |
| 3-phase | | | | | | | | | | | | |
| Horse power rating | 200-208 V AC | 1 hp | 2 hp | (1) | 5 hp | 7-1/2 hp | 7-1/2 hp | 10 hp | 10 hp | 15 hp | 15 hp | 15 hp |
| | 220-240 V AC | 1 hp | 2 hp | (1) | 5 hp | 7-1/2 hp | 10 hp | 10 hp | 15 hp | 20 hp | 20 hp | 20 hp |
| | 440-480 V AC | 3 hp | 5 hp | (1) | 15 hp | 20 hp | 20 hp | 25 hp | 30 hp | 40 hp | 40 hp | 40 hp |
| | 550-600 V AC | 3 hp | 5 hp | (1) | 15 hp | 20 hp | 20 hp | 30 hp | 40 hp | 40 hp | 50 hp | 50 hp |
| Elevator control, 500 000 mechanical operating cycles, 5 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.2 | | | | | | | | | | | | |
| 1-phase | | | | | | | | | | | | |
| Horse power rating | 110-120 V AC | 3/4 hp | 1 hp | 1-1/2 hp | 2 hp | 2 hp | 3 hp | 3 hp | 3 hp | 5 hp | 7-1/2 hp | 7-1/2 hp |
| | 220-240 V AC | 1-1/2 hp | 2 hp | 3 hp | 3 hp | 5 hp | 7.5 hp | 7-1/2 hp | 7-1/2 hp | 10 hp | 15 hp | 20 hp |
| 3-phase | | | | | | | | | | | | |
| Horse power rating | 200-208 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp |
| | 220-240 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp | 30 hp |
| | 440-480 V AC | 5 hp | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp | 40 hp | 50 hp | 60 hp | 60 hp |
| | 550-600 V AC | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp | 40 hp | 50 hp | 60 hp | 75 hp | 75 hp |
| Lighting application - UL / CSA | | | | | | | | | | | | |
| Tungsten lamps | | | | | | | | | | | | |
| 1-phase per pole | 347 V AC | 20 A | 25 A | 30 A | 45 A | 50 A | 50 A | 65 A | 80 A | 90 A | 105 A | 115 A |
| 3-phase break all lines | 600 V AC | 20 A | 25 A | 30 A | 45 A | 50 A | 50 A | 65 A | 80 A | 90 A | 105 A | 115 A |
| Electrical discharge lamps (ballast) | | | | | | | | | | | | |
| 1-phase per pole | 347 V AC | 20 A | 25 A | 30 A | 45 A | 50 A | 50 A | 65 A | 80 A | 90 A | 105 A | 115 A |
| 3-phase break all lines | 600 V AC | 20 A | 25 A | 30 A | 45 A | 50 A | 50 A | 65 A | 80 A | 90 A | 105 A | 115 A |

(1) 3-pole AF16 cannot be used. Select 4-pole non-reversing contactor AF16..-40-..

# AF116 ... AF370 3-pole contactors

## Technical data

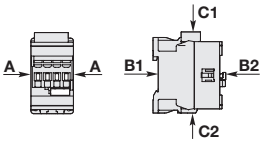
### Main pole utilization characteristics - 3 N.O. non-reversing contactors

| Contactor types | AC / DC operated | AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|---|---|---|---|---|---|---|---|---|
| HVAC application - UL / CSA | | | | | | | | | |
| Definite purpose heating rating - 3-phase | | | | | | | | | |
| Full Load Amps (FLA) | | 116 A | 125 A | 160 A | 200 A | 250 A | 300 A | 350 A | 520 A |
| Locked Rotor Amps (LRA) | 200-208 V AC | 800 A | 875 A | 1050 A | 1400 A | 1500 A | 2100 A | 2450 A | 3120 A |
| | 220-240 V AC | 800 A | 875 A | 1050 A | 1400 A | 1500 A | 2100 A | 2450 A | 3120 A |
| | 440-480 V AC | 800 A | 875 A | 1050 A | 1400 A | 1500 A | 2100 A | 2450 A | 3120 A |
| | 550-600 V AC | 800 A | 875 A | 1050 A | 1400 A | 1500 A | 2100 A | 2450 A | 3120 A |
| Definite purpose air conditioning rating - 3-phase | | | | | | | | | |
| Full Load Amps (FLA) | | 116 A | 125 A | 160 A | 200 A | 250 A | 300 A | 350 A | 520 A |
| Locked Rotor Amps (LRA) | 200-208 V AC | 800 A | 875 A | 1050 A | 1400 A | 1500 A | 2100 A | 2450 A | 3120 A |
| | 220-240 V AC | 800 A | 875 A | 1050 A | 1400 A | 1500 A | 2100 A | 2450 A | 3120 A |
| | 440-480 V AC | 800 A | 875 A | 1050 A | 1400 A | 1500 A | 2100 A | 2450 A | 3120 A |
| | 550-600 V AC | 800 A | 875 A | 1050 A | 1400 A | 1500 A | 2100 A | 2450 A | 3120 A |
| AC Resistance air heating | | | | | | | | | |
| Full Load Amps (FLA) | 600 V AC | 160 A | 200 A | 200 A | 250 A | 300 A | 400 A | 450 A | 520 A |
| Elevator control, load switching, 500 000 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.1 | | | | | | | | | |
| 3-phase | | | | | | | | | |
| Horse power rating | 200-208 V AC | 15 hp | 15 hp | 15 hp | 20 hp | 30 hp | 40 hp | 40 hp | 50 hp |
| | 220-240 V AC | 20 hp | 20 hp | 20 hp | 25 hp | 30 hp | 40 hp | 50 hp | 60 hp |
| | 440-480 V AC | 40 hp | 40 hp | 40 hp | 60 hp | 75 hp | 100 hp | 100 hp | 125 hp |
| | 550-600 V AC | 50 hp | 50 hp | 50 hp | 75 hp | 100 hp | 125 hp | 150 hp | 150 hp |
| Elevator control, 500 000 mechanical operating cycles, 5 electrical operating cycles acc. to CSA B44.1 / ASME 17.5. paragraph 19.2.2 | | | | | | | | | |
| 3-phase | | | | | | | | | |
| Horse power rating | 200-208 V AC | 30 hp | 40 hp | 40 hp | 50 hp | 60 hp | 75 hp | 100 hp | 125 hp |
| | 220-240 V AC | 40 hp | 50 hp | 50 hp | 60 hp | 75 hp | 100 hp | 125 hp | 150 hp |
| | 440-480 V AC | 75 hp | 100 hp | 100 hp | 125 hp | 150 hp | 200 hp | 250 hp | 300 hp |
| | 550-600 V AC | 100 hp | 125 hp | 125 hp | 150 hp | 200 hp | 250 hp | 300 hp | 350 hp |
| Lighting application - UL / CSA | | | | | | | | | |
| Tungsten lamps | | | | | | | | | |
| 1-phase per pole | 347 V AC | – | – | – | – | – | – | – | – |
| 3-phase break all lines | 600 V AC | – | – | – | – | – | – | – | – |
| Electrical discharge lamps (ballast) | | | | | | | | | |
| 1-phase per pole | 347 V AC | 160 A | 200 A | 200 A | 250 A | 300 A | 400 A | 450 A | 520 A |
| 3-phase break all lines | 600 V AC | 160 A | 200 A | 200 A | 250 A | 300 A | 400 A | 450 A | 520 A |

# AF09 ... AF38 3-pole contactors
## Technical data



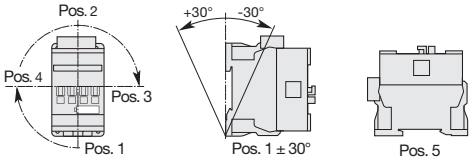
### General technical data

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 |
|---|---|---|---|---|---|---|---|
| Rated insulation voltage Ui | | | | | | | |
| acc. to IEC 60947-4-1 | | 690 V | | | | | |
| acc. to UL / CSA | | 600 V | | | | | |
| Rated impulse withstand voltage Uimp. | | 6 kV | | | | | |
| Electromagnetic compatibility | | Devices complying with IEC/EN 60947-1 - Environment A and B (1) | | | | | |
| Pollution degree | | 3 | | | | | |
| Ambient air temperature close to contactor | | | | | | | |
| Operation | Fitted with thermal overload relay | -25...+60 °C | | | | | |
| | Without thermal overload relay | -40...+70 °C | | | | | |
| Storage | | -60...+80 °C | | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | | |
| Mechanical durability | | | | | | | |
| Number of operating cycles | | 10 millions operating cycles | | | | | |
| Max. switching frequency | | 3600 cycles/h | | | | | |
| Shock withstand | | | | | | | |
| acc. to IEC/EN 60068-2-27 | | | | | | | |
| Mounting position 1 | | | | | | | |
|  | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | | | | |
| | A | 30 g | | | | | |
| | B1 | 25 g closed position / 5 g open position | | | | | |
| | B2 | 15 g | | | | | |
| | C1 | 25 g | | | | | |
| | C2 | 25 g | | | | | |
| Vibration withstand | | 5...300 Hz | | | | | |
| acc. to IEC 60068-2-6 | | 4 g closed position / 2 g open position | | | | | |



(1) Environment B: all AF09...AF38 produced since week 08.2013.
AF09...AF38-..-..-12 (48 ...130 V 50 / 60 Hz - DC) compliant to environment A only: for environment B, select AF09...AF38Z-..-..-22.

### Mounting characteristics and conditions for use

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 |
|---|---|---|---|---|---|---|---|
| Mounting positions | |  | | | | | |
| | | Max. N.C. built-in and add-on N.C. auxiliary contacts:<br>see accessory fitting details for a 3-pole contactor AF09 ... AF38 | | | | | |
| Mounting distances | | The contactors can be assembled side by side | | | | | |
| Fixing | | | | | | | |
| On rail according to IEC/EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | | | | | |
| By screws (not supplied) | | 2 x M4 screws placed diagonally | | | | | |

# AF09 ... AF38 3-pole contactors
## Technical data

### Magnet system characteristics for AF09 ... AF38 contactors - AC / DC operated

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 |
|---|---|---|---|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max.<br>At θ ≤ 70 °C 0.85 x Uc min...Uc max. | | | | | |
| | DC supply | At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max.<br>At θ ≤ 70 °C 0.85 x Uc min...Uc max. | | | | | |
| AC control voltage 50/60 Hz | | | | | | | |
| Rated control circuit voltage Uc | | 24...500 V AC | | | | | |
| Coil consumption | Average pull-in value | 50 VA | | | | | |
| | Average holding value | 2.2 VA / 2 W | | | | | |
| DC control voltage | | | | | | | |
| Rated control circuit voltage Uc | | 20...500 V DC | | | | | |
| Coil consumption | Average pull-in value | 50 W | | | | | |
| | Average holding value | 2 W | | | | | |
| PLC-output control | | Not suitable for direct control by PLC output | | | | | |
| Drop-out voltage | | ≤ 60 % of Uc min. | | | | | |
| Voltage sag immunity acc. to SEMI F47-0706 | | – | | | | | |
| Dips withstand -20 °C ≤ θ ≤ +60 °C | | – | | | | | |
| Operating time | | | | | | | |
| Between coil energization and: | N.O. contact closing | 40...95 ms | | | | | |
| | N.C. contact opening | 38...90 ms | | | | | |
| Between coil de-energization and: | N.O. contact opening | 11...95 ms | | | | | |
| | N.C. contact closing | 13...98 ms | | | | | |

### Magnet system characteristics for AF09Z ... AF38Z 24 DC operated - designed for PLC - coil 30

| Contactor types | DC operated | AF09Z | AF12Z | AF16Z | AF26Z | AF30Z | AF38Z |
|---|---|---|---|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | DC supply | At θ ≤ 60 °C 0.85...1.1 x Uc<br>At θ ≤ 70 °C Uc | | | | | |
| DC control voltage | | | | | | | |
| Rated control circuit voltage Uc | | 24 V DC | | | | | |
| Coil consumption | Average pull-in value | 6 W | | | | | |
| | Average holding value | 1.7 W | | | | | |
| PLC-output control | | ≥ 250 mA 24 V DC for PLCs and safety PLCs using broken wire detection | | | | | |
| Drop-out voltage | | ≤ 60 % of Uc min. | | | | | |
| Operating time | | | | | | | |
| Between coil energization and: | N.O. contact closing | 27...53 ms | | | | | |
| | N.C. contact opening | 20...35 ms | | | | | |
| Between coil de-energization and: | N.O. contact opening | 17...29 ms | | | | | |
| | N.C. contact closing | 22...57 ms | | | | | |

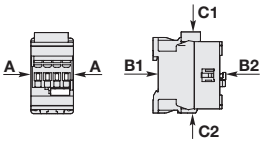
### Magnet system characteristics for AF09Z ... AF38Z for specific applications - coils 20, 21, 22, 23

| Contactor types | AC / DC operated | AF09Z | AF12Z | AF16Z | AF26Z | AF30Z | AF38Z |
|---|---|---|---|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max.<br>At θ ≤ 70 °C 0.85 x Uc min...Uc max. | | | | | |
| | DC supply | At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max. | | | | | |
| AC control voltage | | | | | | | |
| Rated control circuit voltage Uc | | 24...250 V AC | | | | | |
| Coil consumption | Average pull-in value | 16 VA | | | | | |
| | Average holding value | 1.7 VA / 1.5 W | | | | | |
| DC control voltage | | | | | | | |
| Rated control circuit voltage Uc | | 12...250 V DC | | | | | |
| Coil consumption | Average pull-in value | 12...16 W | | | | | |
| | Average holding value | 1.7 W | | | | | |
| PLC-output control | | (AF..Z coil 21) ≥ 500 mA 24 V DC for PLCs - not suitable for safety PLCs | | | | | |
| Drop-out voltage | | ≤ 60 % of Uc min. | | | | | |
| Voltage sag immunity acc. to SEMI F47-0706 | | (AF..Z coil 21, 22, 23) conditions of use on request | | | | | |
| Dips withstand -20 °C ≤ θ ≤ +60 °C | | (AF..Z coil 21, 22, 23) 20 ms average for Uc ≥ 24 V 50/60 Hz or Uc ≥ 20 V DC | | | | | |
| Operating time | | | | | | | |
| Between coil energization and: | N.O. contact closing | 40...95 ms | | | | | |
| | N.C. contact opening | 38...90 ms | | | | | |
| Between coil de-energization and: | N.O. contact opening | 11...95 ms | | | | | |
| | N.C. contact closing | 13...98 ms | | | | | |

# AF40 ... AF96 3-pole contactors
## Technical data



### General technical data

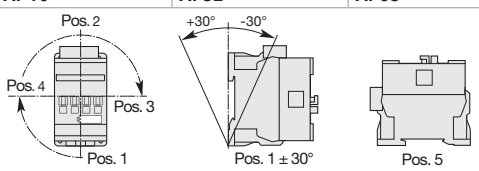
| Contactor types | AC / DC operated | AF40 | AF52 | AF65 | AF80 | AF96 |
|---|---|---|---|---|---|---|
| Rated insulation voltage Ui | | | | | | |
| acc. to IEC 60947-4-1 | | 690 V | | | 1000 V | |
| acc. to UL / CSA | | 600 V | | | | |
| Rated impulse withstand voltage Uimp. | | 6 kV | | | 8 kV | |
| Electromagnetic compatibility | | Devices complying with IEC/EN 60947-1 - Environment A and B | | | | |
| Pollution degree | | 3 | | | | |
| Ambient air temperature close to contactor | | | | | | |
| Operation | Fitted with thermal overload relay | -40...+70 °C | | | | |
| | Without thermal overload relay | -40...+70 °C | | | | |
| Storage | | -60...+80 °C | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | |
| Mechanical durability | | | | | | |
| Number of operating cycles | | 10 millions operating cycles | | | | |
| Max. switching frequency | | 3600 cycles/h | | | | |
| Shock withstand | | | | | | |
| acc. to IEC/EN 60068-2-27 | | | | | | |
| Mounting position 1 | | | | | | |
|  | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | | | |
| | A | 25 g | | | | |
| | B1 | 25 g closed position / 5 g open position | | | | |
| | B2 | 15 g | | | | |
| | C1 | 25 g | | | | |
| | C2 | 25 g | | | | |
| Vibration withstand | | 5...300 Hz | | | | |
| acc. to IEC 60068-2-6 | | 3 g closed position / 3 g open position | | | | |



### Magnet system characteristics

| Contactor types | AC / DC operated | AF40 | AF52 | AF65 | AF80 | AF96 |
|---|---|---|---|---|---|---|
| Coil operating limits | AC supply | At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max. | | | | |
| acc. to IEC 60947-4-1 | DC supply | At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max. | | | | |
| AC control voltage 50/60 Hz | | | | | | |
| Rated control circuit voltage Uc | | 24...500 V AC | | | | |
| Coil consumption | Average pull-in value | 25 VA | | | 40 VA | |
| | Average holding value | 4 VA / 2 W | | | | |
| DC control voltage | | | | | | |
| Rated control circuit voltage Uc | | 20...500 V DC | | | | |
| Coil consumption | Average pull-in value | 25 W | | | 40 W | |
| | Average holding value | 2 W | | | | |
| PLC-output control | | – | | | | |
| Drop-out voltage | | ≤ 60 % of Uc min. | | | | |
| Voltage sag immunity | | conditions of use on request | | | | |
| acc. to SEMI F47-0706 | | | | | | |
| Dips withstand | | 20 ms average | | | | |
| -20 °C ≤ θ ≤ +60 °C | | | | | | |
| Operating time | | | | | | |
| Between coil energization and: | N.O. contact closing | 42...100 ms | | | | |
| | N.C. contact opening | 38...95 ms | | | | |
| Between coil de-energization and: | N.O. contact opening | 17...100 ms | | | | |
| | N.C. contact closing | 19...105 ms | | | | |

### Mounting characteristics and conditions

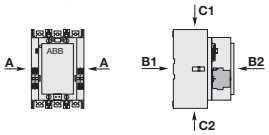
| Contactor types | AC / DC operated | AF40 | AF52 | AF65 | AF80 | AF96 |
|---|---|---|---|---|---|---|
| Mounting positions | |  | | | | |
| | | Max. N.C. built-in and add-on N.C. auxiliary contacts: see accessory fitting details for a 3-pole contactor AF40 ... AF96 | | | | |
| Mounting distances | | The contactors can be assembled side by side | | | | |
| Fixing | | | | | | |
| On rail according to IEC/EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | | | 35 x 15 mm | |
| By screws (not supplied) | | 2 x M4 or 2 x M6 screws placed diagonally | | | | |

# AF116 ... AF370 3-pole contactors

## Technical data

### General technical data

| Contactor types | AC / DC operated | AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|---|---|---|---|---|---|---|---|---|
| Rated insulation voltage Ui | | | | | | | | | |
| acc. to IEC 60947-4-1 | | 1000 V | | | | | | | |
| acc. to UL / CSA | | 1000 V | | | | | | | |
| Rated impulse withstand voltage Uimp. | | 8 kV | | | | | | | |
| Electromagnetic compatibility | | AF contactors complying with IEC/EN 60947-1 - Environment A | | | | | | | |
| Pollution degree | | 3 | | | | | | | |
| Ambient air temperature close to contactor | | | | | | | | | |
| Operation Fitted with thermal overload relay | | -25...+55 °C | | | | | | | |
| Without thermal overload relay | | -40...+70 °C | | | | | | | |
| Storage | | -40...+70 °C | | | | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | | | | |
| Mechanical durability | | | | | | | | | |
| Number of operating cycles | | 5 millions operating cycles | | | | | | | |
| Max. switching frequency | | 300 cycles/h | | | | | | | |
| Shock withstand | | | | | | | | | |
| acc. to IEC/EN 60068-2-27 | | | | | | | | | |
| Mounting position 1 | | No change in contact position, closed or open position | | | | | | | |
| | Shock direction | 1/2 sinusoidal shock for 11 ms | | | | 1/2 sinusoidal shock for 30 ms | | | |
| | A | 20 g | | | | 20 g | | | |
| | B1 | 15 g closed position / 3 g open position | | | | 15 g closed position / 3 g open position | | | |
| | B2 | 15 g closed position / 3 g open position | | | | 15 g closed position / 3 g open position | | | |
| | C1 | 20 g | | | | 20 g | | | |
| | C2 | 20 g | | | | 20 g | | | |
| Vibration withstand | | | | | | | | | |
| acc. to IEC 60068-2-6 | | 0.7 g closed position / 0.7 g open positionb 13.2...100 Hz | | | | | | | |



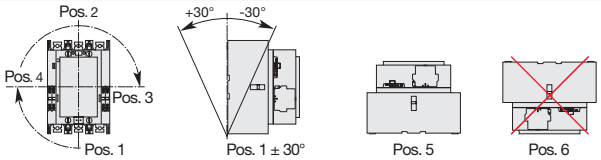

### Magnet system characteristics

| Contactor types | AC / DC operated | AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|---|---|---|---|---|---|---|---|---|
| Coil operating limits | AC supply | At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max. | | | | | | | |
| acc. to IEC 60947-4-1 | DC supply | At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max. | | | | | | | |
| Rated control circuit voltage Uc (1) | | 24...500 V AC | | | | | | | |
| Coil consumption | | | | | | | | | |
| AC control voltage | | | | | | | | | |
| 24...60 V AC | Average pull-in value | 225 VA | | | 165 VA | | 475 VA | | |
| | Average holding value | 5.5 VA / 2.5 W | | | 5 VA / 3 W | | 9 VA / 3 W | | |
| 48...130 V AC | Average pull-in value | 180 VA | | | 180 VA | | 340 VA | | |
| | Average holding value | 6 VA / 2 W | | | 6 VA / 2 W | | 17 VA / 3 W | | |
| 100...250 V AC | Average pull-in value | 130 VA | | | 220 VA | | 385 VA | | |
| | Average holding value | 8 VA / 2.5 W | | | 8 VA / 2.5 W | | 20 VA / 4.5 W | | |
| 250...500 V AC | Average pull-in value | 260 VA | | | 260 VA | | 550 VA | | |
| | Average holding value | 18 VA / 4 W | | | 18 VA / 4 W | | 27 VA / 4.5 W | | |
| DC control voltage | | | | | | | | | |
| 24...60 V AC | Average pull-in value | 210 W | | | 210 W | | 210 W | | |
| | Average holding value | 2.5 W | | | 2.5 W | | 2.5 W | | |
| 48...130 V AC | Average pull-in value | 150 W | | | 150 W | | 360 W | | |
| | Average holding value | 2.5 W | | | 2.5 W | | 2.5 W | | |
| 100...250 V AC | Average pull-in value | 135 W | | | 190 W | | 410 W | | |
| | Average holding value | 3 W | | | 2.5 W | | 4.5 W | | |
| 250...500 V AC | Average pull-in value | 230 W | | | 230 W | | 650 W | | |
| | Average holding value | 4 W | | | 4 W | | 4.7 W | | |
| Drop-out voltage | | 55 % of Uc min. | | | | | | | |
| Voltage sag immunity acc. to SEMI F47 | | Conditions of use on request | | | | | | | |
| Dips withstand | | ≥ 20 ms | | | | | | | |
| Operating time | | | | | | | | | |
| Coil supply between A1 - A2 | | | | | | | | | |
| Between coil energization and: | N.O. contact closing | 20...55 ms | | | 25...60 ms | | 30...60 ms | | |
| Between coil de-energization and (2): | N.O. contact opening | 40...70 ms | | | 45...80 ms | | 45...80 ms | | |

(1) For more detailed data, please consult your ABB local sales organization

(2) Less trhan 20ms when using code -33 and -34

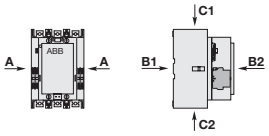
### Mounting characteristics and conditions

| Contactor types | AC / DC operated | AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|---|---|---|---|---|---|---|---|---|
| Mounting positions | |  | | | | | | | |
| | | Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for a 3-pole contactor AF116 ... AF370 | | | | | | | |
| Mounting distances | | The contactors can be assembled side by side | | | | | | | |
| Fixing | | | | | | | | | |
| On rail according to IEC/EN 60715 | | - | | | | | | | |
| By screws (not supplied) | | 4 x M4 | | | 4 x M5 | | | | |

# AF400 ... AF750 3-pole contactors
## Technical data



### General technical data

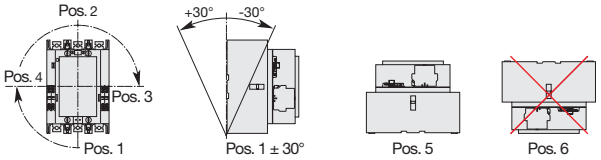
| Contactor types | AC / DC operated | AF400 | AF460 | AF580 | AF750 |
|---|---|---|---|---|---|
| Rated insulation voltage Ui | | | | | |
| acc. to IEC 60947-4-1 | | 1000 V | | | |
| acc. to UL / CSA | | 600 V | | | |
| Rated impulse withstand voltage Uimp. | | 8 kV | | | |
| Electromagnetic compatibility | | AF contactors complying with IEC/EN 60947-1 - Environment A | | | |
| Pollution degree | | 3 | | | |
| Ambient air temperature close to contactor | | | | | |
| Operation Fitted with electronic overload relay | | -25 to +70 °C | | | |
| Operation Without electronic overload relay | | -40 to +70 °C | | | |
| Storage | | -40 to +70 °C | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | |
| Mechanical durability | | | | | |
| Number of operating cycles | | 3 millions operating cycles (contacts needs to be replaced every 0,75 millions operating cycles) | | | |
| Max. switching frequency | | 300 cycles/h | | | |
| Shock withstand | | | | | |
| acc. to IEC/EN 60068-2-27 | | | | | |
| Mounting position 1 | | | | | |
|  | Shock direction | 1/2 sinusoidal shock for 30 ms: no change in contact position, closed or open position | | | |
| | A | 5 g | | | |
| | B1 | 5 g | | | |
| | B2 | 5 g | | | |
| | C1 | 5 g | | | |
| | C2 | 5 g | | | |
| Vibration withstand | | | | | |
| acc to IEC 60068-2-6 | | 0.7 g closed position / 0.7 g open position 13.2...100 Hz | | | |

### Magnet system characteristics

| Contactor types | AC / DC operated | AF400 | AF460 | AF580 | AF750 |
|---|---|---|---|---|---|
| Coil operating limits | AC supply | At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max | | | |
| acc. to IEC 60947-4-1 | DC supply | At θ ≤ 70 °C 0.80 x Uc min ... 1.1 x Uc max | | | |
| Rated control circuit voltage Uc (1) | | 48...500 V AC, 24...500 V DC | | | |
| Coil consumption | | | | | |
| AC control voltage 50/60 Hz | | | | | |
| 48...130 V AC | Average pull-in value | 1215 VA | | 1100 VA | |
| | Average holding value | 12 VA | | 12 VA | |
| 100...250 V AC | Average pull-in value | 955 VA | | 880 VA | |
| | Average holding value | 12 VA | | 12 VA | |
| 250 ... 500 V AC | Average pull-in value | 950 VA | | 985 VA | |
| | Average holding value | 12 VA | | 12 VA | |
| DC control voltage | | | | | |
| 24...60 V DC | Average pull-in value | 900 W | | 785 W | |
| | Average holding value | 5 W | | 5.5 W | |
| 48...130 V DC | Average pull-in value | 1150 W | | 1020 W | |
| | Average holding value | 5 W | | 5 W | |
| 100...250 V DC | Average pull-in value | 895 W | | 880 W | |
| | Average holding value | 5 W | | 5 W | |
| 250 ... 500 V DC | Average pull-in value | 885 W | | 910 W | |
| | Average holding value | 7.5 W | | 7.5 W | |
| Drop-out voltage | | 55 % of Uc min. | | | |
| Voltage sag immunity acc. to SEMI F47 | | Conditions of use on request | | | |
| Dips withstand | | ≥ 20 ms | | | |
| Operating time | | | | | |
| Coil supply between A1 - A2 | | | | | |
| Between coil energization and: | Main contact closing | 50...120 ms | | | |
| Between coil de-energization and: | Main contact opening | 33...70 ms | | | |
| Control input for PLC's | | | | | |
| Between coil energization and: | Main contact closing | 40...60 ms | | 40...90 ms | |
| Between coil de-energization and: | Main contact opening | 10...30 ms | | | |

(1) For more detailed data, please consult your ABB local sales organization

### Mounting characteristics and conditions for use

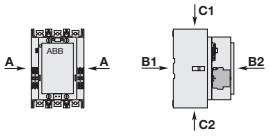
| Contactor types | AC / DC operated | AF400 | AF460 | AF580 | AF750 |
|---|---|---|---|---|---|
| Mounting positions | |  | | | |
| | | Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AF400 ... AF2650 | | | |
| Mounting distances | | The contactors can be assembled side by side | | | |
| Fixing | | | | | |
| On rail according to IEC/EN 60715 | | – | | | |
| By screws | | 4 x M5 | | 4 x M6 | |

# AF1250 ... AF2850 3-pole contactors

## Technical data

### General technical data

| Contactor types | AC / DC operated | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 | AF2850 |
|---|---|---|---|---|---|---|---|
| Rated insulation voltage Ui | | | | | | | |
| acc. to IEC 60947-4-1 | | 1000 | | | | | |
| acc. to UL / CSA | | 600 V | 1000 V | | | | |
| Rated impulse withstand voltage Uimp. | | 8 kV | | | | | |
| Electromagnetic compatibility | | AF contactors complying with IEC/EN 60947-1 - Environment A | | | | | |
| Pollution degree | | 3 | | | | | |
| Ambient air temperature close to contactor | | | | | | | |
| Operation | Fitted with electronic overload relay | -25 to +70 °C | | | | | |
| | Without electronic overload relay | -40 to +70 °C | | | | | |
| Storage | | -40 to +70 °C | | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | | |
| Mechanical durability | | | | | | | |
| Number of operating cycles | | 0.5 million operating cycles | | | | 0.3 million operating cycles | |
| Max. switching frequency | | 300 cycles/h | 60 cycles/h | | | | |
| Shock withstand | | | | | | | |
| acc. to IEC/EN 60068-2-27 | | | | | | | |
| Mounting position 1 | | | | | | | |




| Shock direction | | |
|---|---|---|
| A | 5 g | – |
| B1 | 5 g | – |
| B2 | 5 g | – |
| C1 | 5 g | – |
| C2 | 5 g | – |

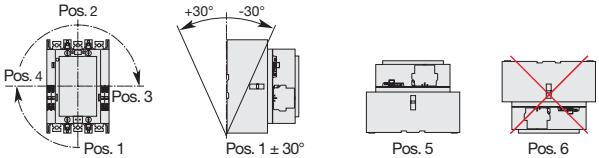
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Vibration withstand | | | | | | | |
| acc to IEC 60068-2-6 | | 0.7 g closed position / 0.7 g open position 13.2...100 Hz | | | | | |

### Magnet system characteristics

| Contactor types | AC / DC operated | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 | AF2850 |
|---|---|---|---|---|---|---|---|
| Coil operating limits | AC supply | At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max | | | | | |
| acc. to IEC 60947-4-1 | DC supply | At θ ≤ 70 °C 0.80 x Uc min ... 1.1 x Uc max | | | | | |
| Rated control circuit voltage Uc | | 48...500 V AC, | 100...250 V AC or DC | | | | |
| Coil consumption | | 24...500 V DC | | | | | |
| AC control voltage 50/60 Hz | | | | | | | |
| 48...130 V AC | Average pull-in value | 1100 VA | - | | | | |
| | Average holding value | 12 VA | - | | | | |
| 100...250 V AC | Average pull-in value | 880 VA | 2450 VA | | | | |
| | Average holding value | 12 VA | 48 VA | | | | |
| 250 ... 500 V AC | Average pull-in value | 985 VA | - | | | | |
| | Average holding value | 12 VA | - | | | | |
| DC control voltage | | | | | | | |
| 24...60 V DC | Average pull-in value | 785 W | - | | | | |
| | Average holding value | 5.5 W | - | | | | |
| 48...130 V DC | Average pull-in value | 1020 W | - | | | | |
| | Average holding value | 5 W | - | | | | |
| 100...250 V DC | Average pull-in value | 880 W | 2290 W | | | | |
| | Average holding value | 5 W | 20.5 W | | | | |
| 250 ... 500 V DC | Average pull-in value | 910 W | - | | | | |
| | Average holding value | 7.5 W | - | | | | |
| Drop-out voltage | | 55 % of Uc min. | | | | | |
| Voltage sag immunity | | | | | | | |
| acc. to SEMI F47 | | Conditions of use on request | | | | | |
| Dips withstand | | ≥ 20 ms | | | | | |
| Operating time | | | | | | | |
| Coil supply between A1 - A2 | | | | | | | |
| Between coil energization and: | Main contact closing | 50...120 ms | 50...80 ms | | | | |
| Between coil de-energization and: | Main contact opening | 33...70 ms | 35...55 ms | | | | |
| Control input for PLC's | | | | | | | |
| Between coil energization and: | Main contact closing | 40...90 ms | 40...65 ms | | | | |
| Between coil de-energization and: | Main contact opening | 10...30 ms | 10...30 ms | | | | |

### Mounting characteristics and conditions for use

| Contactor types | AC / DC operated | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 | AF2850 |
|---|---|---|---|---|---|---|---|
| Mounting positions | | | | | | | |




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AF400 ... AF2650 | | | | | |
| Mounting distances | | The contactors can be assembled side by side | | | | | |
| Fixing | | | | | | | |
| On rail according to IEC/EN 60715 | | – | | | | | |
| By screws | | 4 x M6 | 4 x M8 | | | | |

# AF09 ... AF38 3-pole contactors
## Technical data

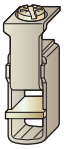
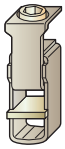


### Connecting characteristics

| Contactor types | AC / DC operated | | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 |
|---|---|---|---|---|---|---|---|---|
| Main terminals | | |  Screw terminals with cable clamp | | | | | |
| Connection capacity (min. ... max.) | | | | | | | | |
| Main conductors (poles) | | | | | | | | |
| Rigid | Solid (≤ 4 mm²) | 1 x | 1...6 mm² | | | 2.5...10 mm² | | |
| | Stranded (≥ 1 mm²) | 2 x | 1...6 mm² | | | 2.5...10 mm² | | |
| Flexible with non insulated ferrule | | 1 x | 0.75...6 mm² | | | 1.5...10 mm² | | |
| | | 2 x | 0.75...6 mm² | | | 1.5...10 mm² | | |
| Flexible with insulated ferrule | | 1 x | 0.75...4 mm² | | | 1.5...10 mm² | | |
| | | 2 x | 0.75...2.5 mm² | | | 1.5...4 mm² | | |
| L Bars or lugs | | L < | 9.6 mm | | | 12.5 mm | | |
| Connection capacity acc. to UL/CSA | | 1 or 2 x | AWG 16...10 | | | AWG 14...8 | | |
| Stripping length | | | 10 mm | | | 14 mm | | |
| Tightening torque | | | 1.5 Nm / 13 lb.in | | | 2.5 Nm / 22 lb.in | | |
| Auxiliary conductors (built-in auxiliary terminals + coil terminals) | | | | | | | | |
| Rigid solid/stranded | | 1 x | 1...2.5 mm² | | | | | |
| | | 2 x | 1...2.5 mm² | | | | | |
| Flexible with non insulated ferrule | | 1 x | 0.75...2.5 mm² | | | | | |
| | | 2 x | 0.75...2.5 mm² | | | | | |
| Flexible with insulated ferrule | | 1 x | 0.75...2.5 mm² | | | | | |
| | | 2 x | 0.75...1.5 mm² | | | | | |
| L Lugs | | L < | 8 mm | | | | | |
| Connection capacity acc. to UL/CSA | | 1 or 2 x | AWG 18...14 | | | | | |
| Stripping length | | | 10 mm | | | | | |
| Tightening torque | | | | | | | | |
| Coil terminals | | | 1.2 Nm / 11 lb.in | | | | | |
| Built-in auxiliary terminals | | | 1.2 Nm / 11 lb.in | | | | | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | | | | | |
| Main terminals | | | IP20 | | | | | |
| Coil terminals | | | IP20 | | | | | |
| Built-in auxiliary terminals | | | IP20 | | | | | |
| Screw terminals | | | Delivered in open position, screws of unused terminals must be tightened | | | | | |
| Main terminals | | | M3.5 | | | M4 | | |
| | Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 | | | Flat Ø 6.5 / Pozidriv 2 | | |
| Coil terminals | | | M3.5 | | | | | |
| | Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 | | | | | |
| Built-in auxiliary terminals | | | M3.5 | | | | | |
| | Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 | | | | | |

# AF40 ... AF96 3-pole contactors
## Technical data

### Connecting characteristics

| Contactor types | AC / DC operated | AF40 | AF52 | AF65 | AF80 | AF96 |
|---|---|---|---|---|---|---|
| Main terminals | |  Screw terminals with double connector 2 x (9.3 width x 7.9/10.3 depth) | | |  Screw terminals with double connector 2 x (12.4 width x 9.3/11.1 depth) | |
| Connection capacity (min. ... max.) | | | | | | |
| Main conductors (poles) | | | | | | |
| Rigid Stranded (≥ 6 mm²) | 1 x | 6...35 mm² | | | 6...70 mm² | |
| | 2 x | 6...35 mm² | | | 6...50 mm² | |
| Flexible with non insulated ferrule | 1 x | 4...35 mm² | | | 6...50 mm² | |
| | 2 x | 4...35 mm² | | | 6...50 mm² | |
| Flexible with insulated ferrule | 1 x | 4...35 mm² | | | 6...50 mm² | |
| | 2 x | 4...35 mm² | | | 6...50 mm² | |
| L Bars or lugs | L < | 9.2 mm | | | 12.2 mm | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 10...2 | | | AWG 6...1 | |
| Stripping length | | 16 mm | | | 17 mm | |
| Tightening torque | | 4 Nm / 35 lb.in | | | 6 Nm / 53 lb.in | |
| Auxiliary conductors (built-in auxiliary terminals + coil terminals) | | | | | | |
| Rigid solid/stranded | 1 x | 1...2.5 mm² | | | | |
| | 2 x | 1...2.5 mm² | | | | |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² | | | | |
| | 2 x | 0.75...2.5 mm² | | | | |
| Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² | | | | |
| | 2 x | 0.75...1.5 mm² | | | | |
| L Lugs | L < | 8 mm | | | | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 18...14 | | | | |
| Stripping length | | 10 mm | | | | |
| Tightening torque | | | | | | |
| Coil terminals | | 1.2 Nm / 11 lb.in | | | | |
| Built-in auxiliary terminals | | 1.2 Nm / 11 lb.in | | | | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | | | |
| Main terminals | | IP10 * | | | | |
| Coil terminals | | IP20 | | | | |
| Built-in auxiliary terminals | | IP20 | | | | |
| Screw terminals | | Delivered in open position, screws of unused terminals must be tightened | | | | |
| Main terminals | | M6 | | | M8 | |
| | Screwdriver type | Flat Ø 6.5 / Pozidriv 2 | | | Hexagon socket (s = 4 mm) | |
| Coil terminals | | M3.5 | | | | |
| | Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | | | | |
| Built-in auxiliary terminals | | M3.5 | | | | |
| | Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | | | | |

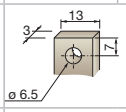
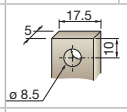
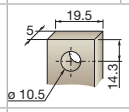
* For IP20 degree of protection, use LT terminal shroud accessory.

# AF116 ... AF370 3-pole contactors

## Technical data



### Connecting characteristics

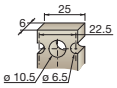
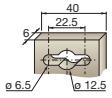
| Contactor types | AC / DC operated | AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|---|---|---|---|---|---|---|---|---|
| Main terminals Flat type | |   | | |   | |   | | |
| Connection capacity (min. ... max.) | | | | | | | | | |
| Main conductors (poles) | | | | | | | | | |
| Cu cable - Stranded | 1 x | 10...95 mm² | | | 6...150 mm² | | 16...300 mm² | | |
| Clamp type | | LD... included (1) | | | 1SDA066917R1 | | 1SDA055016R1 | | |
| Tightening torque | | 8 Nm | | | 14 Nm | | 25 Nm | | |
| Cu cable - Stranded | 2 x | 10...95 mm² | | | 50...120 mm² | | 70...185 mm² | | |
| Clamp type | | LD... included (1) | | | 1SFN074709R1000, LZ185-2C/120 | | 1SCA022194R0890, OZXB4 | | |
| Tightening torque | | 8 Nm | | | 16 Nm | | 22 Nm | | |
| Al cable - Stranded | 1 x | – | | | 95...185 mm² | | 185...240 mm² | | |
| Clamp type | | – | | | 1SDA054988R1 | | 1SDA055020R1 | | |
| Tightening torque | | – | | | 31 Nm | | 43 Nm | | |
| Cu cable - Flexible | 1 x | 10...70 mm² | | | 6...120 mm² | | 16...240 mm² | | |
| Clamp type | | LD... included (1) | | | 1SDA066917R1 | | 1SDA055016R1 | | |
| Tightening torque | | 8 Nm | | | 14 Nm | | 25 Nm | | |
| Cu cable - Flexible | 2 x | 10...70 mm² | | | 50...95 mm² | | 70...185 mm² | | |
| Clamp type | | LD... included (1) | | | 1SFN074709R1000, LZ185-2C/120 | | 1SCA022194R0890, OZXB4 | | |
| Tightening torque | | 8 Nm | | | 16 Nm | | 22 Nm | | |
| Lugs | L ≤ | 22 mm (.866 in) | | | 24 mm (.945 in) | | 32 mm (1.260 in) | | |
| | Ø > | 6 mm (.236 in) | | | 8 mm (.315 in) | | 10 mm (.394 in) | | |
| Socket type | | LL... included | | | LL... included | | LL... included | | |
| Tightening torque | | 9 Nm / 80 lb.in | | | 18 Nm / 160 lb.in | | 28 Nm / 248 lb.in | | |
| Connection capacity acc. to UL / CSA | 1 x | AWG 6...3/0 | | | 6...300 MCM | | 4...400 MCM | | |
| Clamp type | | LD... included (1) | | | ATK185 (2) | | ATK300 (2) | | |
| Tightening torque | | 8 Nm / 71 lb.in | | | 34 Nm / 301 lb.in | | 42 Nm / 372 lb.in | | |
| Connection capacity acc. to UL / CSA | 2 x | AWG 6...3/0 | | | – | | 4...500 MCM | | |
| Clamp type | | LD... included (1) | | | – | | ATK300/2 (2) | | |
| Tightening torque | | 8 Nm / 71 lb.in | | | – | | 42 Nm / 372 lb.in | | |
| Auxiliary conductors (coil terminals) | | | | | | | | | |
| Rigid Solid/Stranded | 1 x | 1...4 mm² | | | | | | | |
| | 2 x | 1...4 mm² | | | | | | | |
| Flexible | 1 x | 0.75...2.5 mm² | | | | | | | |
| | 2 x | 0.75...2.5 mm² | | | | | | | |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² | | | | | | | |
| | 2 x | 0.75...2.5 mm² | | | | | | | |
| Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² | | | | | | | |
| | 2 x | 0.75...2.5 mm² | | | | | | | |
| Lugs | L < | 8 mm | | | | | | | |
| | I > | 3.5 mm | | | | | | | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 | | | | | | | |
| Stripping length | | 9 mm | | | | | | | |
| Tightening torque | | 1.00 Nm / 9 lb.in | | | | | | | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | | | | | | |
| Main terminals | | IP00 | | | | | | | |
| Coil terminals | | IP20 | | | | | | | |
| Screw terminals | | | | | | | | | |
| Main terminals | | M6 | | | M8 | | M10 | | |
| Screwdriver type | | Screws and bolts | | | | | | | |
| Coil terminals (delivered in open position) | | M3.5 | | | | | | | |
| Screwdriver type | | Flat Ø 5.5 mm / Pozidriv 2 | | | | | | | |

(1) LD... not included for AF116 ... AF146-30-..B.
(2) Available in North America only.

# AF400 ... AF750 3-pole contactors

## Technical data

### Connecting characteristics

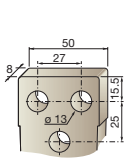
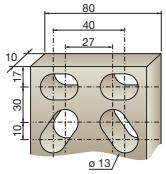
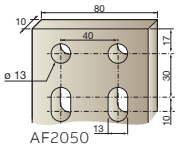
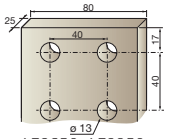
| Contactor types | AC / DC operated | AF400 | AF460 | AF580 | AF750 |
|---|---|---|---|---|---|
| Main terminals Flat type | |  | |  AF580 AF750 | |
| Connection capacity (min. ... max.) | | | | | |
| Main conductors (poles) | | | | | |
| Cu cable - Stranded | 2 x | 240 mm² | | – | |
| Clamp type | | 1SDA013922R1 | | – | |
| Tightening torque | | 35 Nm | | – | |
| Cu cable - Stranded | 3 x | – | 185 mm² | | |
| Clamp type | | – | 1SDA013956R1 | | |
| Tightening torque | | 35 Nm | 45 Nm | | |
| Al cable - Stranded | 2 x | 240 mm² | | – | |
| Clamp type | | 1SDA013922R1 | | – | |
| Tightening torque | | 35 Nm | | – | |
| | 3 x | – | 185 mm² | | |
| Clamp type | | – | 1SDA013956R1 | | |
| Tightening torque | | 35 Nm | 45 Nm | | |
| Lugs | L ≤ | 47 mm | 50 mm | | |
| | Ø > | 10 mm | 12 mm | | |
| Tightening torque | | 35 Nm / 310 lb.in | 45 Nm / 398 lb.in | | |
| Connection capacity acc. to UL / CSA | 2 x | 250-500 MCM alt. 2/0 AWG-500 MCM | – | | |
| Clamp type | | K6TH alt. ATK580 | – | | |
| Tightening torque | | 275 lb.in | – | | |
| Connection capacity acc. to UL / CSA | 3 x | 2/0 AWG-400 MCM | 2/0 AWG-500 MCM | | |
| Clamp type | | K6TJ | ATK750/3 | | |
| Tightening torque | | 275 lb.in | 375 lb.in | | |
| Auxiliary conductors (coil terminals) | | | | | |
| Rigid Solid/Stranded | 1 x | 1...4 mm² | | | |
| | 2 x | 1...4 mm² | | | |
| Flexible | 1 x | 0.75...2.5 mm² | | | |
| | 2 x | 0.75...2.5 mm² | | | |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² | | | |
| | 2 x | 0.75...2.5 mm² | | | |
| Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² | | | |
| | 2 x | 0.75...2.5 mm² | | | |
| Lugs | L ≤ | 8 mm | | | |
| | l > | 3.7 mm | | | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 | | | |
| Tightening torque Recommended | | 1.00 Nm / 9 lb.in | | | |
| Max. | | 1.20 Nm | | | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | | |
| Main terminals | | IP00 | | | |
| Coil terminals | | IP20 | | | |
| Screw terminals | | | | | |
| Main terminals | | M10 | M12 | | |
| | | Screws and bolts | | | |
| Coil terminals (delivered in open position) | | M3.5 | | | |
| Screwdriver type | | Flat Ø 5.5 mm / Pozidriv 2 | | | |

# AF1250 ... AF2850 3-pole contactors

## Technical data



### Connecting characteristics

| Contactor types | AC / DC operated | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 | AF2850 |
|---|---|---|---|---|---|---|---|
| Main terminals<br>Flat type | | <br>AF1250 | <br>AF1350, AF1650 | | <br>AF2050 | <br>AF2650, AF2850 | |
| Connection capacity (min. ... max.) | | | | | | | |
| Main conductors (poles) | | | | | | | |
| Cu cable - Stranded | 2 x | – | | | | | |
| Clamp type | | – | | | | | |
| Tightening torque | | – | | | | | |
| Cu cable - Stranded | 3 x | – | | | | | |
| Clamp type | | – | | | | | |
| Tightening torque | | – | | | | | |
| Al cable - Stranded | 2 x | – | | | | | |
| Clamp type | | – | | | | | |
| Tightening torque | | – | | | | | |
| | 3 x | – | | | | | |
| Clamp type | | – | | | | | |
| Tightening torque | | – | | | | | |
| Lugs | L ≤ | 50 mm | 100 mm | | | | |
| | Ø > | 12 mm | | | | | |
| Tightening torque | | 45 Nm / 398 lb.in | | | | | |
| Connection capacity acc. to UL / CSA | 2 x | 2// 3 x 0.25 in | 4/0 AWG - 500 MCM | | 4//4 x 0.25 in | | |
| Clamp type | | bars, use LW1250 | K7TK<br>ATK1350/4 | K7TK | bars | | |
| Tightening torque | | | 375 lb.in | | – | | |
| Connection capacity acc. to UL / CSA | 3 x | 2/0 AWG-500 MCM | 1/0-750 MCM | | – | | |
| Clamp type | | – | K8TL, K8TM,<br>ATK1650/4 | K8TL,<br>K8TM,<br>ATK1650/4,<br>ATK1650/6 | – | | |
| Tightening torque | | 375 lb.in | 500 lb.in | | – | | |
| Auxiliary conductors<br>(coil terminals) | | | | | | | |
| Rigid Solid/Stranded | 1 x | 1...4 mm² | | | | | |
| | 2 x | 1...4 mm² | | | | | |
| Flexible | 1 x | 0.75...2.5 mm² | | | | | |
| | 2 x | 0.75...2.5 mm² | | | | | |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² | | | | | |
| | 2 x | 0.75...2.5 mm² | | | | | |
| Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² | | | | | |
| | 2 x | 0.75...2.5 mm² | | | | | |
| Lugs | L ≤ | 8 mm | | | | | |
| | I > | 3.7 mm | | | | | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 | | | | | |
| Tightening torque Recommended | | 1.00 Nm / 9 lb.in | | | | | |
| Max. | | 1.20 Nm | | | | | |
| Degree of protection<br>acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | | | | |
| Main terminals | | IP00 | | | | | |
| Coil terminals | | IP20 | | | | | |
| Screw terminals | | | | | | | |
| Main terminals | | M12 | | | | | |
| | | Screws and bolts | | | | | |
| Coil terminals (delivered in open position) | | M3.5 | | | | | |
| Screwdriver type | | Flat Ø 5.5 mm / Pozidriv 2 | | | | | |

# AF09 ... AF96 3-pole contactors
## Technical data

### Built-in auxiliary contacts according to IEC

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational voltage Ue max. | | 690 V | | | | | | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | | | | | | |
| Conventional free air thermal current Ith - θ ≤ 40 °C | | 16 A | | | | | | | | | | |
| Ie / Rated operational current AC-15 | | | | | | | | | | | | |
| acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A | | | | | | | | | | |
| | 220-240 V 50/60 Hz | 4 A | | | | | | | | | | |
| | 400-440 V 50/60 Hz | 3 A | | | | | | | | | | |
| | 500 V 50/60 Hz | 2 A | | | | | | | | | | |
| | 690 V 50/60 Hz | 2 A | | | | | | | | | | |
| Making capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | | | | | | | | | | |
| Breaking capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | | | | | | | | | | |
| Ie / Rated operational current DC-13 | | | | | | | | | | | | |
| acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W | | | | | | | | | | |
| | 48 V DC | 2.8 A / 134 W | | | | | | | | | | |
| | 72 V DC | 1 A / 72 W | | | | | | | | | | |
| | 110 V DC | 0.55 A / 60 W | | | | | | | | | | |
| | 125 V DC | 0.55 A / 69 W | | | | | | | | | | |
| | 220 V DC | 0.27 A / 60 W | | | | | | | | | | |
| | 250 V DC | 0.27 A / 68 W | | | | | | | | | | |
| | 400 V DC | 0.15 A / 60 W | | | | | | | | | | |
| | 500 V DC | 0.13 A / 65 W | | | | | | | | | | |
| | 600 V DC | 0.1 A / 60 W | | | | | | | | | | |
| Short-circuit protection device gG type fuse | | 10 A | | | | | | | | | | |
| Conditional short-circuit current | | 1 kA | | | | | | | | | | |
| Rated short-time withstand current Icw | for 1.0 s | 100 A | | | | | | | | | | |
| | for 0.1 s | 140 A | | | | | | | | | | |
| Minimum switching capacity | | 12 V / 3 mA | | | | | | | | | | |
| with failure rate acc. to IEC 60947-5-4 | | $10^{-7}$ | | | | | | | | | | |
| Non-overlapping time between N.O. and N.C. contacts | | ≥ 2 ms | | | | | | | | | | |
| Power dissipation per pole at 6 A | | 0.1 W | | | | | | | | | | |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h | | | | | | | | | | |
| | DC-13 | 900 cycles/h | | | | | | | | | | |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA4, CAL4, CAT4 aux. contact blocks) are mechanically linked contacts. | | | | | | | | | | |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA4, CAL4, CAT4 aux. contact blocks) are mirror contacts. | | | | | | | | | | |

### Built-in auxiliary contacts according to UL / CSA

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Max. operational voltage | | 600 V AC, 600 V DC | | | | | | | | | | |
| Pilot duty | | A600, Q600 | | | | | | | | | | |
| AC thermal rated current | | 10 A | | | | | | | | | | |
| AC maximum volt-ampere making | | 7200 VA | | | | | | | | | | |
| AC maximum volt-ampere breaking | | 720 VA | | | | | | | | | | |
| DC thermal rated current | | 2.5 A | | | | | | | | | | |
| DC maximum volt-ampere making-breaking | | 69 VA | | | | | | | | | | |

# 3-pole contactors

## Electrical durability and utilization categories



**General**

Utilization categories determine the current making and breaking conditions relating to the characteristics of the loads to be controlled by the contactors. International standard IEC 60947-4-1 and European standard EN 60947-4-1 are the standards to be referred to.

If Ic is the current to be broken by the contactor and Ie the rated operational current normally drawn by the load, then:

- Categories AC-1 and AC-3 Ic = Ie
- Category AC-2 Ic = 2.5 x Ie
- Category AC-4 Ic = 6 x Ie

Generally speaking Ic = m x Ie where m is a multiple of the load operational current.

On next pages, the curves corresponding to categories AC-1, AC-3 and AC-4 represent the electrical durability variation of standard contactors in relation to the breaking current Ic. Electrical durability is expressed in millions of operating cycles.

**Curve utilization mode**

Electrical durability forecast and contactor selection for categories AC-1, AC-2, AC-3 or AC-4

| Characteristics | Load to be controlled |
|---|---|
| Operational voltage | Ue |
| Current normally drawn | Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents") |
| Utilization category | AC-1, AC-2, AC-3 or AC-4 |
| Breaking current | Ic = Ie for AC-1 and for AC-3 ; Ic = 2.5 x Ie for AC-2 ; Ic = 6 x Ie for AC-4 |

- Define the number of operating cycles N required.
- On the diagram corresponding to the operational category, select the contactor with the curve immediately above the intersection point (Ic ; N).

**Electrical durability forecast and contactor selection for mixed duty motor control: AC-3 (Ic = Ie) type switching off while "motor running" and, occasionally, AC-4 (Ic = 6 x Ie) type switching off while "motor accelerating"**

| Characteristics | Load to be controlled |
|---|---|
| Operational voltage | Ue |
| Current normally drawn while "motor running" | Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents") |
| Utilization category | AC-3 or AC-4 |
| Breaking current for AC-3 | Ic = Ie |
| Breaking current for AC-4 while "motor accelerating" | Ic = 6 x Ie |
| Percentage of AC-4 operating cycles | K (on the basis of the total number of operating cycles) |

- Define the total number of operating cycles N required.
- Note the smallest contactor rating compatible for AC-3 (Ue / Ie) on Main pole utilization characteristic table (see “Technical data”).
- For the selected contactor make a note of the following in relation to the voltage using diagram AC-3 in next pages:
  - The number of operating cycles A for Ic = Ie (AC-3)
  - The number of operating cycles B for Ic = 6 x Ie (AC-4)
- Calculate the estimated number of cycles N’ (N’ is always below A)

$$N' = \frac{A}{1 + 0.01\ K\ (A/B - 1)}$$

- If N' is too low in relation to the target N, calculate the estimated number of cycles for a higher contactor rating.

**Case of uninterrupted duty**

For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us).

The combinated effect of environmental conditions and the proper temperature of the product may require some disposals. As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

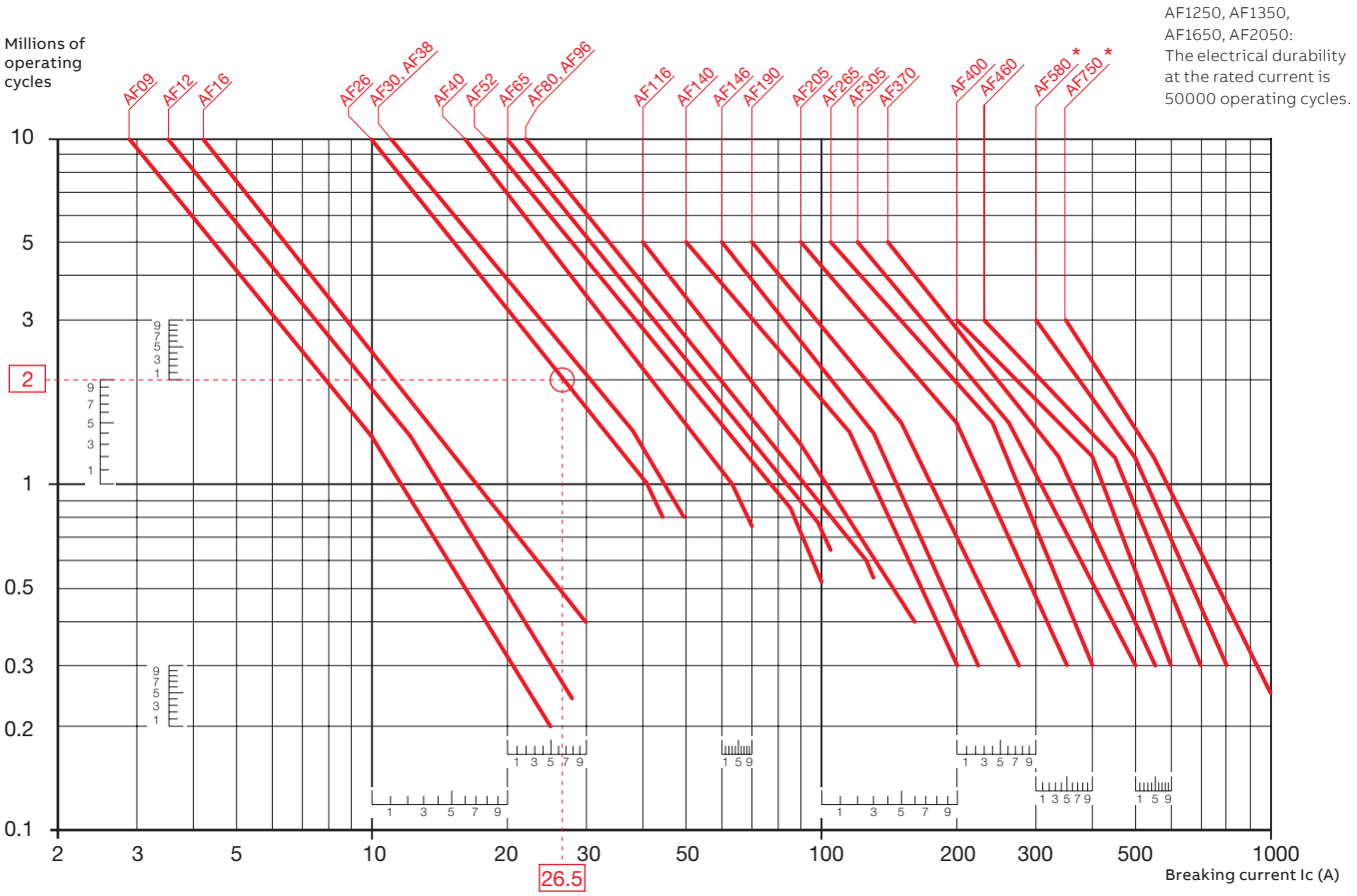
# 3-pole contactors

## Electrical durability

**Electrical durability for AC-1 utilization category - Ue ≤ 690 V**

Switching non-inductive or slightly inductive loads. The breaking current Ic for AC-1 is equal to the rated operational current of the load.

Ambient temperature and maximum electrical switching frequency: see "Technical data".




Note: * For AF580 and AF750 contacts needs to be replaced after 750k operations.

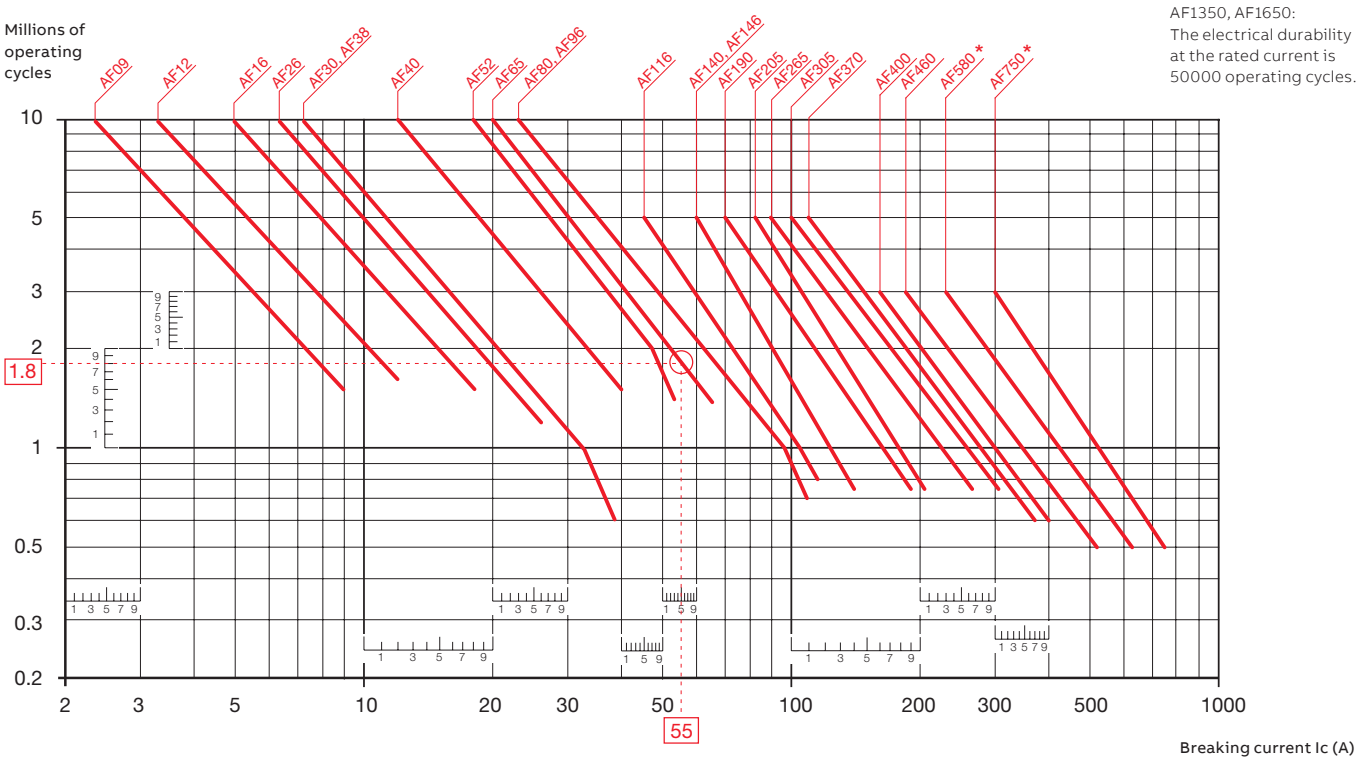
**Example:**

Ic / AC-1 = 26.5 A – Electrical durability required = 2 millions operating cycles.

Using the AC-1 curves above select the AF26 contactor at intersection "○" (26.5 A / 2 millions operating cycles).

# 3-pole contactors
## Electrical durability

**Electrical durability for AC-3 utilization category - Ue ≤ 440 V.**
Switching cage motors: starting and switching off running motors. The breaking current Ic for AC-3 is equal to the rated operational current Ie (Ie = motor full load current).
Ambient temperature and maximum electrical switching frequency: see "Technical data".



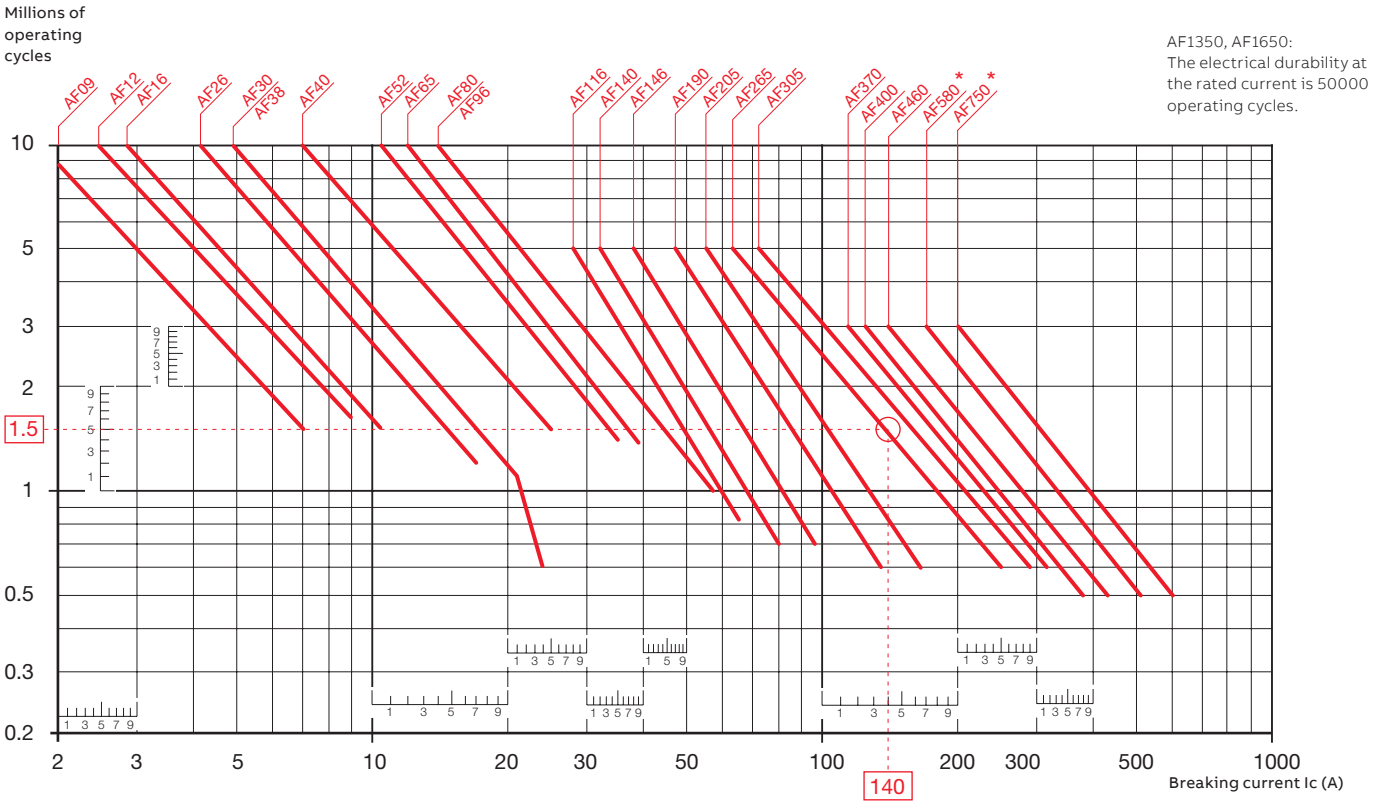

Note: * For AF580 and AF750 contacts needs to be replaced after 750k operations.

**Example:**
Motor power 30 kW for AC-3 - Ue = 400 V and Ie = 55 A utilization – Electrical durability required = 1.8 million operating cycles.
For AC-3: Ic = Ie. Select the AF65 contactor at intersection "○" (55 A / 1.8 million operating cycles) on the curves (AC-3 - Ue ≤ 440 V).

# 3-pole contactors

## Electrical durability

**Electrical durability for AC-3 utilization category - 440 V < Ue ≤ 690 V.**
Switching cage motors: starting and switching off running motors. The breaking current Ic for AC-3 is equal to the rated operational current Ie (Ie = motor full load current).
Ambient temperature and maximum electrical switching frequency: see "Technical data".



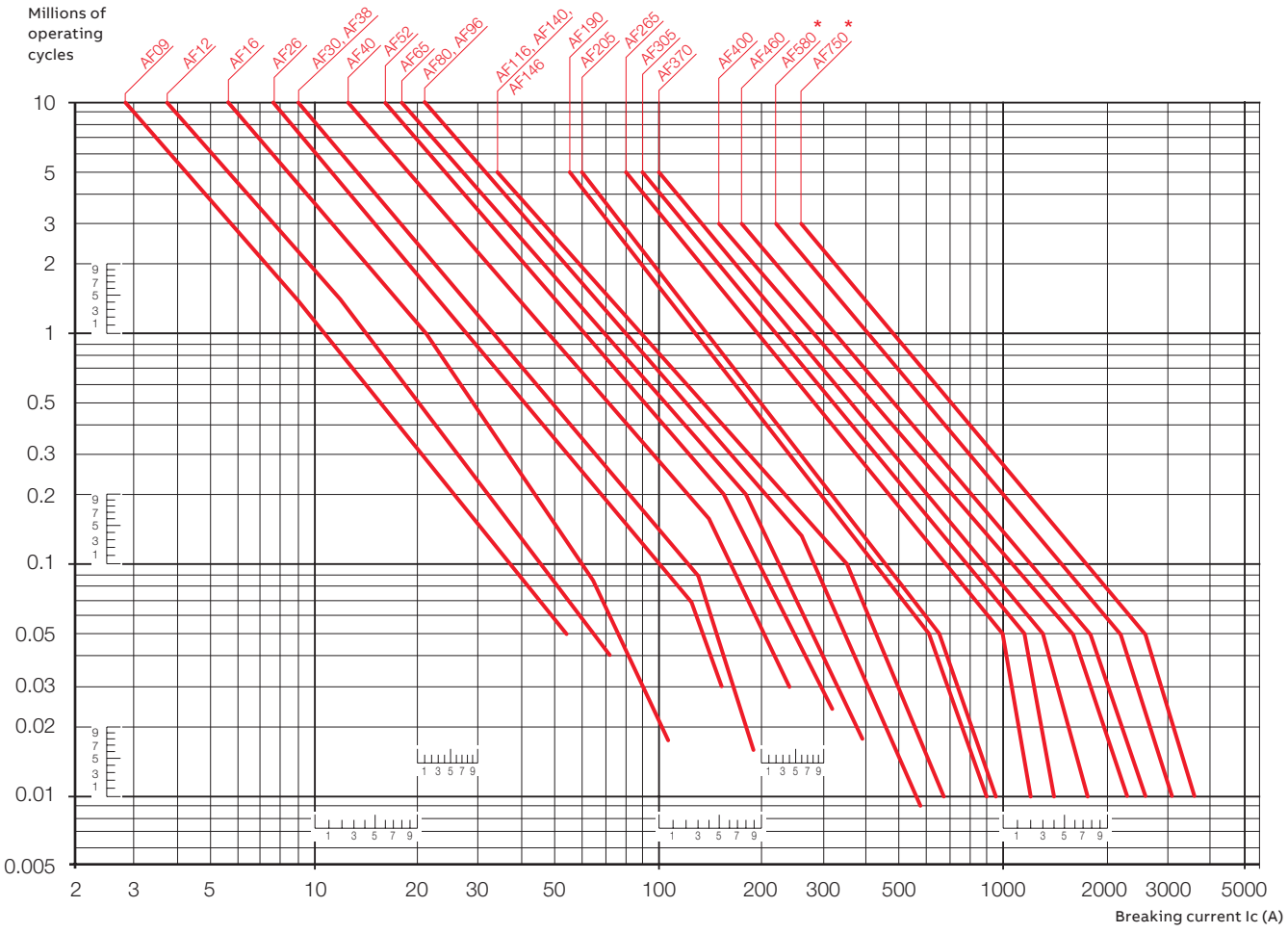

Note: * For AF580 and AF750 contacts needs to be replaced after 750k operations.

**Example:**
Motor power 132 kW for AC-3 - Ue = 660 V and Ie = 140 A utilization – Electrical durability required = 1.5 million operating cycles.
For AC-3: Ic = Ie. Select the AF265 contactor at intersection "○" (140 A / 1.5 million operating cycles) on the curves (AC-3 - 440 V < Ue ≤ 690 V).

# 3-pole contactors
## Electrical durability

**Electrical durability for AC-2 or AC-4 utilization category - Ue ≤ 440 V**
Ambient temperature ≤ 60 °C for AF09 ... AF370, ≤ 55 °C for AF400 ... AF1650
Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current Ic is equal to 2.5 x Ie for AC-2 and 6 x Ie for AC-4, keeping in mind that Ie is the motor rated operational current (Ie = motor full-load current).

Maximum electrical switching frequency: see "Technical data".

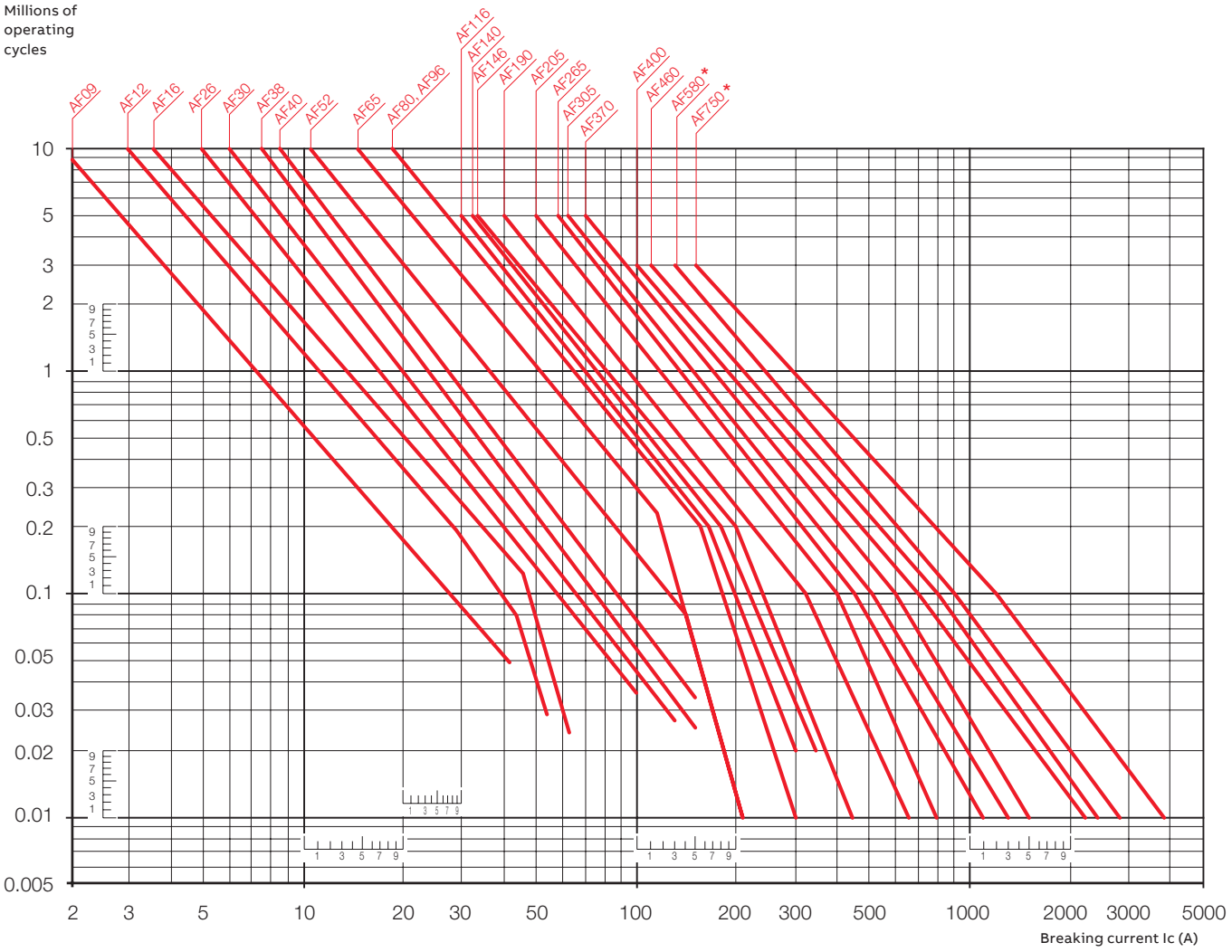



Note: * For AF580 and AF750 contacts needs to be replaced after 750k operations.

# 3-pole contactors

## Electrical durability

**Electrical durability for AC-2 or AC-4 utilization category - 440 V < Ue ≤ 690 V**
**Ambient temperature ≤ 60 °C for AF09 ... AF370, ≤ 55 °C for AF400 ... AF750**
Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current Ic is equal to 2.5 x Ie for AC-2 and 6 x Ie for AC-4, keaping in mind tha Ie is the motor rated operational current (Ie = motor full load current). Maximum electrical switching frequency: see "Technical data".




Note: * For AF580 and AF750 contacts needs to be replaced after 750k operations.



**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**1SBL137005R1310**

# Push-in Spring motor starting solution


**3/**117 **Presentation and Overview**

**Ordering details**
**4 to 18.5 kW**

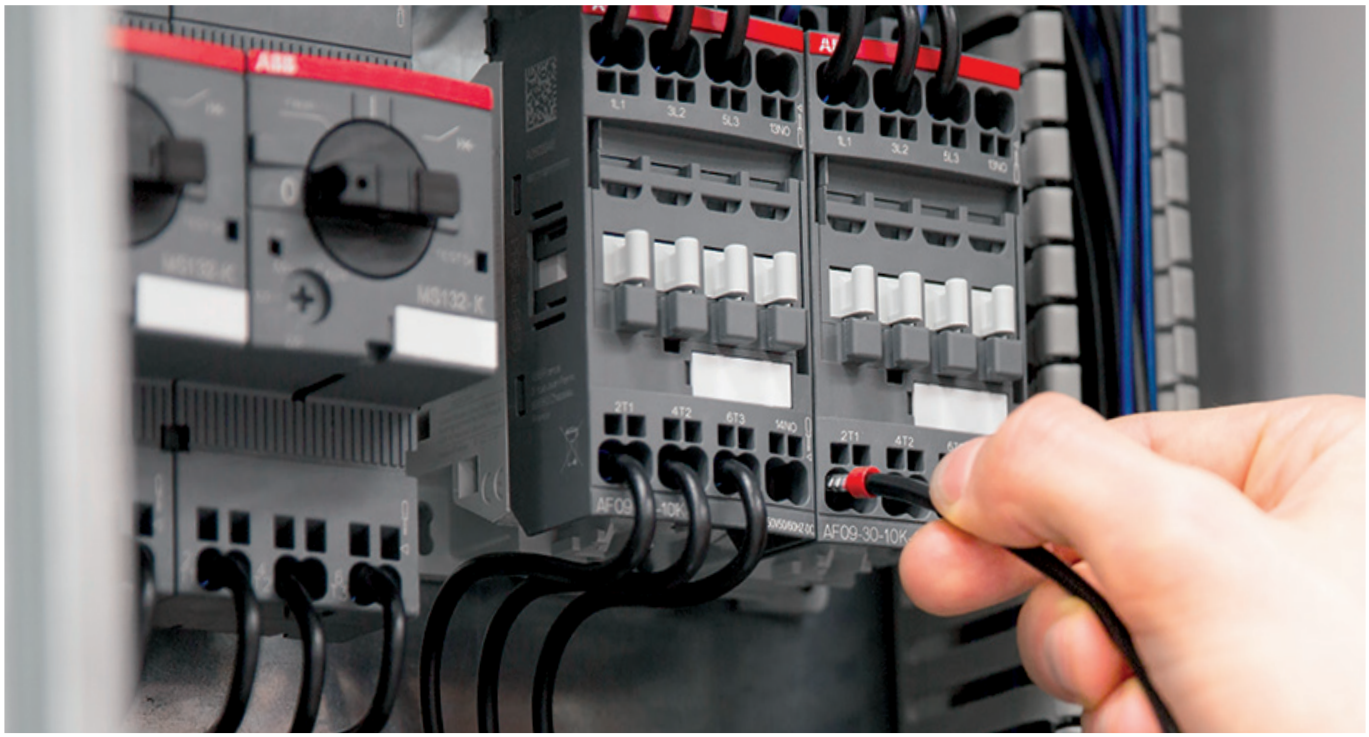
**3/**126 AF09..K ... AF38..K AC / DC operated
**3/**127 AF09Z..K ... AF16Z..K 24 V DC designed for PLC
**3/**128 AF09Z..K ... AF38Z..K AC / DC operated for specific applications

**3/**129 **Main accessories**

**3/**130 **Technical data**

**3/**137 **Electrical durability**

# Just push it
# Push-in Spring motor starting solution




With the new Push-in Spring motor starting solution, one push is all you need for extremely fast wiring. No tool is required, so you can save up to 50% wiring time with Push-in Spring compared to conventional spring solutions. And the connections are just as reliable. So for speed, ease and reliability, just push it.

## Speed up your projects

**Faster than ever installation**

Imagine a motor starting solution that's twice as fast to install. With Push-in Spring, you no longer need to imagine – it's a reality. Push-in mode allows you to insert both ferruled and rigid cables without the need to use any tools, boosting your productivity like never before.

## Easy to install

**Easier than ever wiring**

Push-in Spring technology opens up new possibilities. With its unmatched ease of use, wiring becomes far more intuitive. This eliminates the need for special training and reduces the chance of wiring error. What possibilities will it open up for you?

## Continuous operation

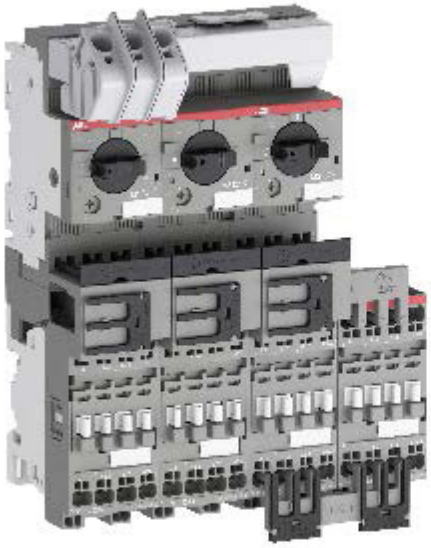
**Reliable as ever connections**

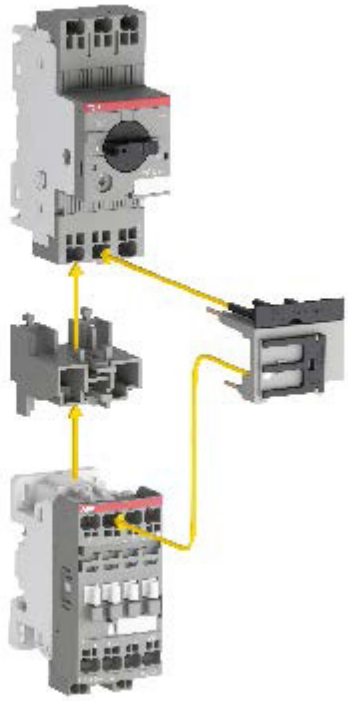
The speed and ease of Push-in Spring comes with the added reassurance of connections that are as reliable as ever. This gives you complete peace of mind when using the Push-in Spring motor starting solution.

# Just push it!

## The next evolution in motor starter solutions is here.

So up to 18.5 kW, one push is all you need!

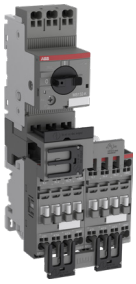




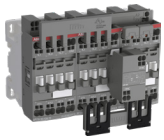
—
Save up to 50% wiring time with Push-in Spring compared to conventional spring solutions. And the connections are just as reliable. So for speed, ease and reliability, just push it.



—
Direct on-line Starter



—
Reversing Starter



—
Star-Delta Starter

## Also available with Push-in technology



—
**Sentry safety relays**



—
**Monitoring relays**

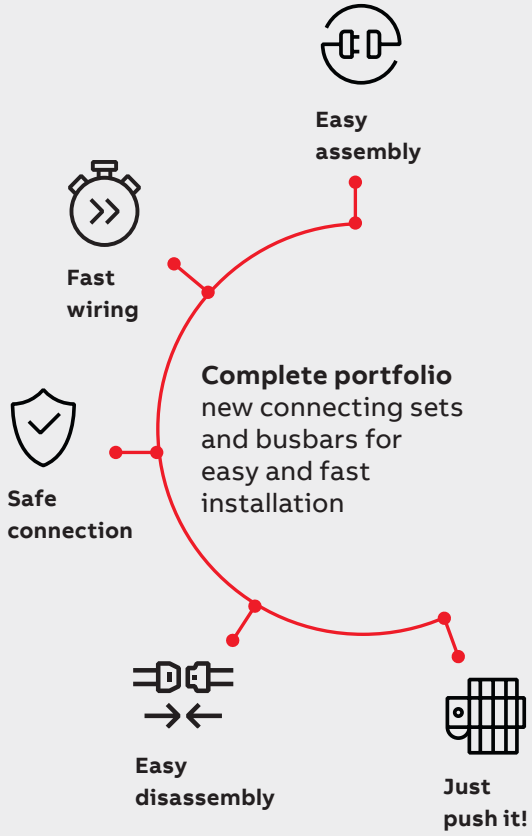


—
**Time relays**



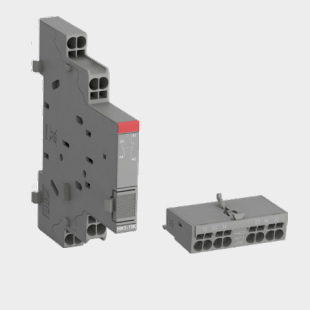
## Benefits / Features

- Fast and intuitive wiring
- Tool-free mounting
- Vibration & shock proof
- Robust design for higher up-time
- Future proof connection technology
- Terminals accessible from the front
- One-hand mounting
- 2-in-1 Push-in Spring
- Higher connection capacity
- No mounting plate required for starters
- Enabled for automated wiring

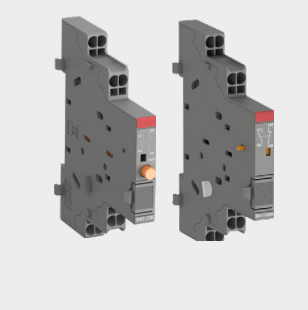




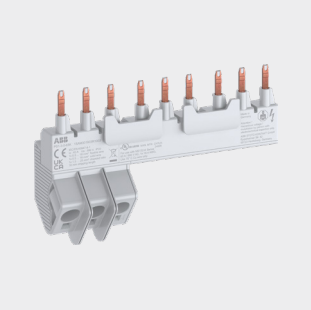

—
**CA4..K, CAL4-11K 1, 2 and 4 pole auxiliary contacts**



—
**HK1-K, HKF1-K auxiliary contacts**



—
**SK1-K and SK1-ARK signaling contacts**



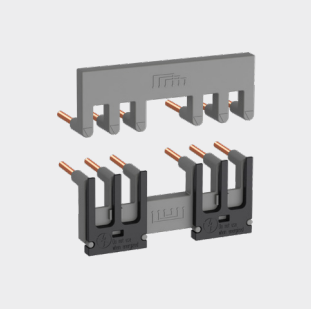
—
**PS1-...-65K busbars for 2, 3, 4 or 5 manual motor starters**



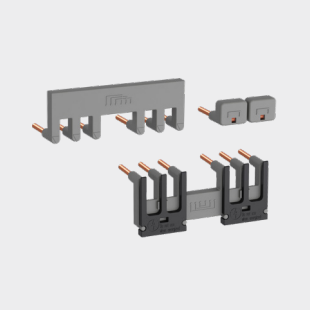
—
**TS1-M3-K terminal spacer for UL Type E/F combination motor controllers**



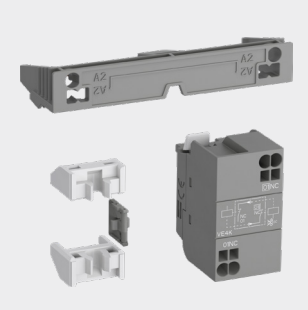
—
**BEA16-4KF and BEA38-4KF connecting links with manual motor starters**



—
**BER16-4KF and BER38-4KF connection sets for reversing starters**



—
**BEY16-4KF and BEY38-4KF connection sets for Star-Delta starters**



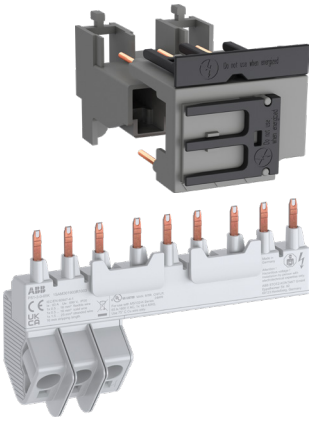
—
**VEM4K mechanical and electrical interlock set**

# Faster than ever installation



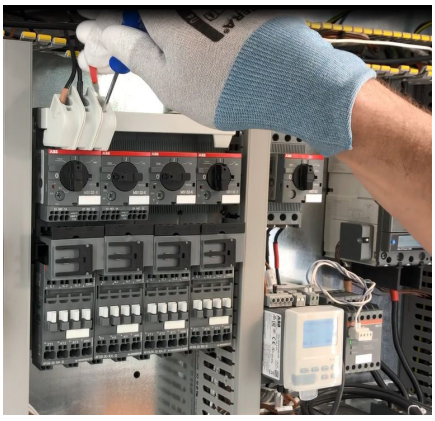
## 2-in-1 connection

For the very first time, ABB's 2-in-1 connection allows you to use ferruled and rigid cables (Push-in mode) or cables without ferrules (Spring mode) in the same terminal. In Push-in mode, cables can be inserted by just simply pushing them in by hand.



## Smart accessories

100% tool-free connecting kits and busbars significantly reduce installation time.



## Complete solution

High connection capacities are optimized for motor starting solutions up to 18.5 kW 400 V AC-3 and 50 A AC-1 (25 hp 480 V and 45 A general use). This includes short-circuit fuseless protection up to 100 kA. Push-in Spring accessories can be also mounted on the standard screw range of manual motor starters and contactors.

# Easier than ever wiring



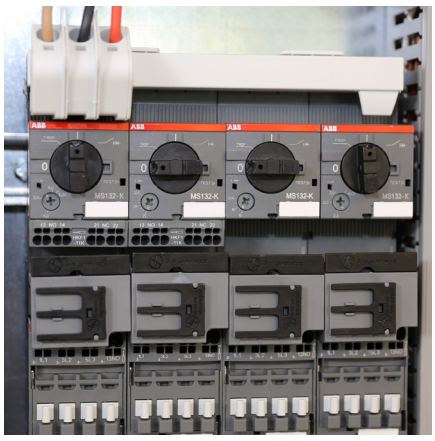

## Intuitive wiring

With Push-in Spring, all cables, busbars and connecting links use the same round shape entry, whilst the square terminals are clearly marked with screwdriver symbols. The result? Wiring and de-wiring that’s intuitive and easily repeatable without cabling error, with little to no training required.




## Just one screwdriver required

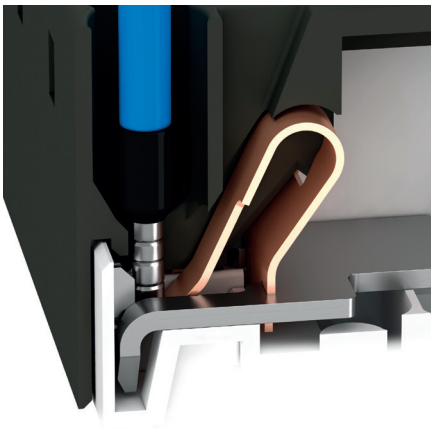
For de-wiring, only one screwdriver size is needed for the entire range. No twisting or turning is required either, so there's less chance of damage to the terminals and to your installation as a whole.



## Automated wiring

The Push-in Spring motor starting solution features 90° cable insertion for all terminals. Front access to terminals aids smooth, robust insertion of cables and makes automated robot wiring possible.

# Reliable as ever connections



## Robust electrical contact

The special spring design guarantees excellent electrical contact. The design provides strict control of contact strength, independent from operator, giving you complete assurance.



## Vibration-proof

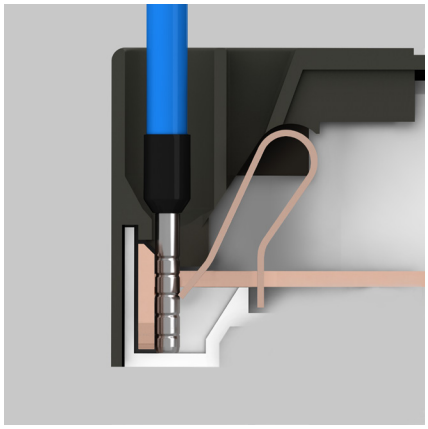
You can count on Push-in Spring connections, even in harsh environments. Push-in Spring technology has been shock and vibration tested according to IEC 60068-2-27 and IEC 60068-2-6 standards.



## No need to re-tighten

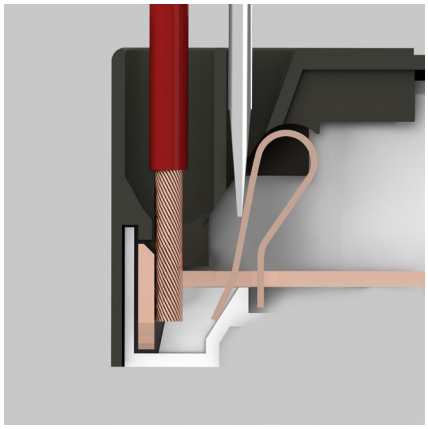
With self-tightening terminals, there's no need to re-tighten after transportation or during the life cycle of the product. High connection strength is guaranteed throughout the whole lifetime of the device.





## Push-in mode

Connect rigid cables or ferruled cables simply by pushing them into the cable holes – no need to use any tools. Push-in mode saves up to 50% wiring time compared to conventional spring solutions and makes installation a breeze. Benefit from intuitive wiring, self-tightening terminals and less chance of wiring error.

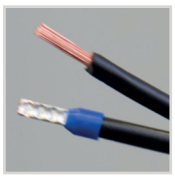


## Spring Mode

This mode is used for small cable cross-sections or for cables without ferrules. It is also used for de-wiring the solution. Before inserting the cable, simply push a screwdriver into the clearly marked holes to open the terminal. ABB's Spring mode is easier to use than conventional spring technology, with less chance of damage to terminals as no twisting or turning is required.

# Push-in Spring solution
# Complete range, complete efficiency

The Push-in Spring motor starting solution products provide you with a range of benefits.



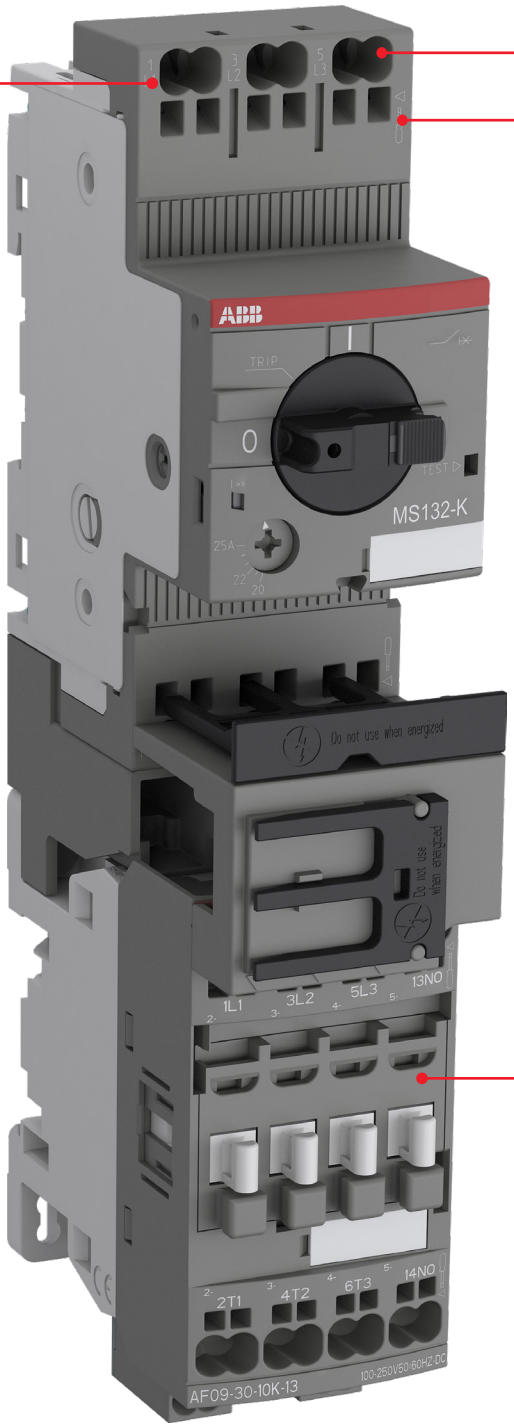
**2-in-1**
Benefit from both Push-in mode and Spring mode and use ferruled cables or cables without ferrules in the same terminal.

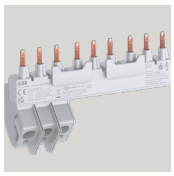


**Tool-free connecting links**
100% tool-free mounting connecting links.



**Compatible with screw range**
Mount accessories for control circuits on the screw range up to 45 kW AC-3 400 V on manual motor starters and up to 45 kW AC-3 400 V, 130 A AC-1 on contactors.



**Tool-free busbars**
Parallel connection of manual motor starters without the need for tools (also certified for UL Type E/ Type F applications)



**Just one tool for everything**
You only need a 3 mm screwdriver in Spring mode as well as for de-wiring the complete solution.



**Higher connecting capacity**
The solution ranges up to 18.5 kW 400 V AC-3 and 50 A AC-1 (25 hp 480 V and 45 A 600 V general use).

# 3-pole contactors and motor protection





| AC / DC Control supply | | | | Type | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|---|---|---|---|---|---|---|---|---|---|---|
| **IEC** | AC-3 | Rated operational power | θ ≤ 60 °C, 380 - 400 V | kW | 4 | 5.5 | 7.5 | 11 | 15 | 18.5 |
| | | Rated operational current | 380 - 400 V | A | 9 | 12 | 18 | 26 | 32 | 38 |
| | AC-1 | Rated operational current | θ ≤ 40 °C, 690 V | A | 25 | 28 | 30 | 45 | 50 | 50 |
| **UL/CSA** | 3-phase Motor Rating | | 440 - 480 V | hp | 5 | 7.5 | 10 | 15 | 20 | 25 |
| | General Use Rating | | 600 V | A | 25 | 28 | 30 | 42 | 45 | 45 |
| **NEMA** | NEMA size | | | | 00 | 0 | – | 1 | – | – |

## Main accessories for contactors

| | | | |
|---|---|---|---|
| Auxiliary contact blocks |  | Front mounting | CA4-10K (1 N.O.)<br>CA4-01K (1 N.C.) |
| | | Side mounting | CAL4-11K (1 N.O. + 1 N.C.) |
| Interlocking units | | Mechanical | VM4 |
| | | Mechanical / Electrical | VEM4K |
| Surge protection | | | Built-in surge protection |

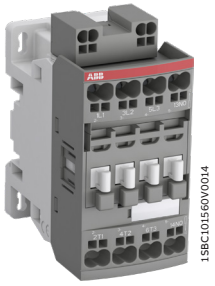
## Accessories

| | | | |
|---|---|---|---|
| Connecting link for contactor mounting | | BEA16-4KF | BEA38-4KF |
| Auxiliary contact blocks | Front mounting | HKF1-..K (1 N.O. + 1N.C.)<br>(2 N.O.) | |
| | Side mounting | HK1-..K (1 N.O. + 1N.C.)<br>(2 N.O.)<br>(2 N.C.) | |
| Signaling contact | For trip alarm | SK1-..K (1 N.O. + 1N.C.)<br>(2 N.O.)<br>(2 N.C.) | |

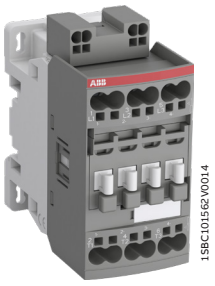
# AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

## 4 to 18.5 kW

## AC / DC operated




AF09-30-10K

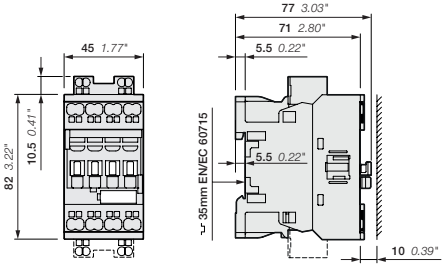



AF26-30-00K

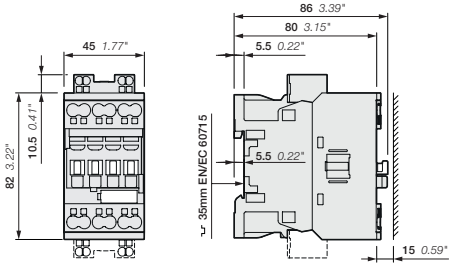
AF09..K ... AF38..K contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power | current θ ≤ 40 °C | 3-phase motor rating | General use rating | | | | | | Pkg (1 pce) |
| 400 V | | 480 V | 600 V AC | | | | | | |
| AC-3 | AC-1 | | | | | | | | |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 4 | 25 | 5 | 25 | 24 ... 60 | 20 ... 60 | 1 0 | AF09-30-10K-11 | 1SBL137005R1110 | 0.285 |
| | | | | | | 0 1 | AF09-30-01K-11 | 1SBL137005R1101 | 0.285 |
| | | | | 48 ... 130 | 48 ... 130 | 1 0 | AF09-30-10K-12 | 1SBL137005R1210 | 0.285 |
| | | | | | | 0 1 | AF09-30-01K-12 | 1SBL137005R1201 | 0.285 |
| | | | | 100 ... 250 | 100 ... 250 | 1 0 | AF09-30-10K-13 | 1SBL137005R1310 | 0.285 |
| | | | | | | 0 1 | AF09-30-01K-13 | 1SBL137005R1301 | 0.285 |
| | | | | 250 ... 500 | 250 ... 500 | 1 0 | AF09-30-10K-14 | 1SBL137005R1410 | 0.325 |
| | | | | | | 0 1 | AF09-30-01K-14 | 1SBL137005R1401 | 0.325 |
| 5.5 | 28 | 7.5 | 28 | 24 ... 60 | 20 ... 60 | 1 0 | AF12-30-10K-11 | 1SBL157005R1110 | 0.285 |
| | | | | | | 0 1 | AF12-30-01K-11 | 1SBL157005R1101 | 0.285 |
| | | | | 48 ... 130 | 48 ... 130 | 1 0 | AF12-30-10K-12 | 1SBL157005R1210 | 0.285 |
| | | | | | | 0 1 | AF12-30-01K-12 | 1SBL157005R1201 | 0.285 |
| | | | | 100 ... 250 | 100 ... 250 | 1 0 | AF12-30-10K-13 | 1SBL157005R1310 | 0.285 |
| | | | | | | 0 1 | AF12-30-01K-13 | 1SBL157005R1301 | 0.285 |
| | | | | 250 ... 500 | 250 ... 500 | 1 0 | AF12-30-10K-14 | 1SBL157005R1410 | 0.325 |
| | | | | | | 0 1 | AF12-30-01K-14 | 1SBL157005R1401 | 0.325 |
| 7.5 | 30 | 10 | 30 | 24 ... 60 | 20 ... 60 | 1 0 | AF16-30-10K-11 | 1SBL177005R1110 | 0.285 |
| | | | | | | 0 1 | AF16-30-01K-11 | 1SBL177005R1101 | 0.285 |
| | | | | 48 ... 130 | 48 ... 130 | 1 0 | AF16-30-10K-12 | 1SBL177005R1210 | 0.285 |
| | | | | | | 0 1 | AF16-30-01K-12 | 1SBL177005R1201 | 0.285 |
| | | | | 100 ... 250 | 100 ... 250 | 1 0 | AF16-30-10K-13 | 1SBL177005R1310 | 0.285 |
| | | | | | | 0 1 | AF16-30-01K-13 | 1SBL177005R1301 | 0.285 |
| | | | | 250 ... 500 | 250 ... 500 | 1 0 | AF16-30-10K-14 | 1SBL177005R1410 | 0.325 |
| | | | | | | 0 1 | AF16-30-01K-14 | 1SBL177005R1401 | 0.325 |
| 11 | 45 | 15 | 42 | 24 ... 60 | 20 ... 60 | 0 0 | AF26-30-00K-11 | 1SBL237005R1100 | 0.325 |
| | | | | 48 ... 130 | 48 ... 130 | 0 0 | AF26-30-00K-12 | 1SBL237005R1200 | 0.325 |
| | | | | 100 ... 250 | 100 ... 250 | 0 0 | AF26-30-00K-13 | 1SBL237005R1300 | 0.325 |
| | | | | 250 ... 500 | 250 ... 500 | 0 0 | AF26-30-00K-14 | 1SBL237005R1400 | 0.365 |
| 15 | 50 | 20 | 45 | 24 ... 60 | 20 ... 60 | 0 0 | AF30-30-00K-11 | 1SBL277005R1100 | 0.330 |
| | | | | 48 ... 130 | 48 ... 130 | 0 0 | AF30-30-00K-12 | 1SBL277005R1200 | 0.330 |
| | | | | 100 ... 250 | 100 ... 250 | 0 0 | AF30-30-00K-13 | 1SBL277005R1300 | 0.330 |
| | | | | 250 ... 500 | 250 ... 500 | 0 0 | AF30-30-00K-14 | 1SBL277005R1400 | 0.370 |
| 18.5 | 50 | 25 | 45 | 24 ... 60 | 20 ... 60 | 0 0 | AF38-30-00K-11 | 1SBL297005R1100 | 0.330 |
| | | | | 48 ... 130 | 48 ... 130 | 0 0 | AF38-30-00K-12 | 1SBL297005R1200 | 0.330 |
| | | | | 100 ... 250 | 100 ... 250 | 0 0 | AF38-30-00K-13 | 1SBL297005R1300 | 0.330 |
| | | | | 250 ... 500 | 250 ... 500 | 0 0 | AF38-30-00K-14 | 1SBL297005R1400 | 0.370 |




AF09..K, AF12..K, AF16..K




AF26..K, AF30..K, AF38..K

Main dimensions mm, inches

# AF09Z..K ... AF16Z..K 3-pole contactors - with Push-in Spring terminals

## 4 to 18.5 kW

## 24 V DC operated - designed for PLC



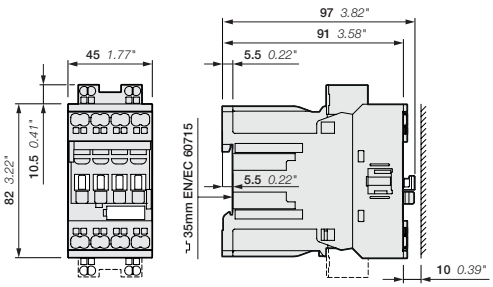

AF09Z-30-10K

AF09Z..K ... AF16Z..K contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: DC operated with electronic coil interface allowing low holding consumption up to 1.7 W and reduced panel energy consumption
  - allow direct control by PLC-output ≥ 250 mA 24 V DC
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|
| Rated operational power | current θ ≤ 40 °C | 3-phase motor rating | General use rating | Uc min. ... Uc max. | | | | Pkg (1 pce) |
| 400 V | | 480 V | 600 V AC | | | | | |
| AC-3 | AC-1 | | | | | | | |
| kW | A | hp | A | V DC | | | | kg |
| 4 | 25 | 5 | 25 | 24 | 1 0 | AF09Z-30-10K-30 | 1SBL136005R3010 | 0.435 |
| | | | | | 0 1 | AF09Z-30-01K-30 | 1SBL136005R3001 | 0.435 |
| 5.5 | 28 | 7.5 | 28 | 24 | 1 0 | AF12Z-30-10K-30 | 1SBL156005R3010 | 0.435 |
| | | | | | 0 1 | AF12Z-30-01K-30 | 1SBL156005R3001 | 0.435 |
| 7.5 | 30 | 10 | 30 | 24 | 1 0 | AF16Z-30-10K-30 | 1SBL176005R3010 | 0.435 |
| | | | | | 0 1 | AF16Z-30-01K-30 | 1SBL176005R3001 | 0.435 |

Note: AF..Z contactors with 24V DC control voltage need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.
For product availability, please consult your ABB local sales organization.



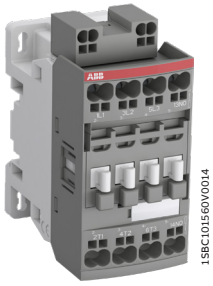

AF09Z..K, AF12Z..K, AF16Z..K

Main dimensions mm, inches

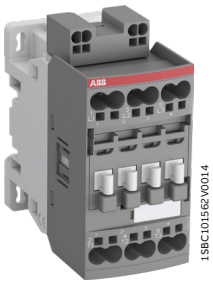
# AF09Z..K ... AF38Z..K 3-pole contactors - with Push-in Spring terminals

## 4 to 18.5 kW

## AC / DC operated - for specific applications




AF09Z-30-10K



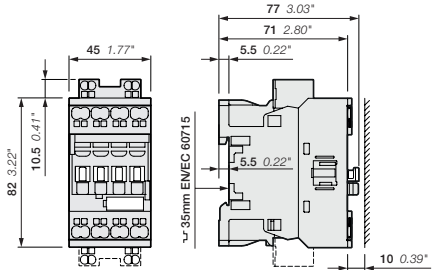

AF26Z-30-00K

AF09Z..K ... AF38Z..K contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

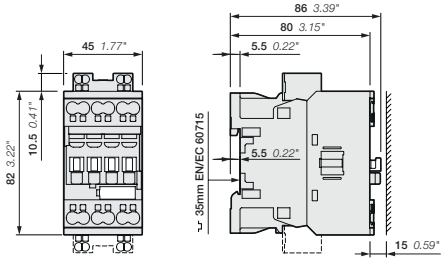
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - can manage large control voltage variations
  - allow direct control by PLC-output ≥ 24 V DC 500 mA
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request)
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power | current θ ≤ 40 °C | 3-phase motor rating | General use rating | | | | | | Pkg (1 pce) |
| 400 V | | 480 V | 600 V AC | | | | | | |
| AC-3 | AC-1 | | | | | | | | |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 4 | 25 | 5 | 25 | – | 12 ... 20 | 1 0 | AF09Z-30-10K-20 | 1SBL136005R2010 | 0.315 |
| | | | | | | 0 1 | AF09Z-30-01K-20 | 1SBL136005R2001 | 0.315 |
| | | | | 24 ... 60 | 20 ... 60 | 1 0 | AF09Z-30-10K-21 | 1SBL136005R2110 | 0.315 |
| | | | | | | 0 1 | AF09Z-30-01K-21 | 1SBL136005R2101 | 0.315 |
| | | | | 48 ... 130 | 48 ... 130 | 1 0 | AF09Z-30-10K-22 | 1SBL136005R2210 | 0.315 |
| | | | | | | 0 1 | AF09Z-30-01K-22 | 1SBL136005R2201 | 0.315 |
| | | | | 100 ... 250 | 100 ... 250 | 1 0 | AF09Z-30-10K-23 | 1SBL136005R2310 | 0.315 |
| | | | | | | 0 1 | AF09Z-30-01K-23 | 1SBL136005R2301 | 0.315 |
| 5.5 | 28 | 7.5 | 28 | – | 12 ... 20 | 1 0 | AF12Z-30-10K-20 | 1SBL156005R2010 | 0.315 |
| | | | | | | 0 1 | AF12Z-30-01K-20 | 1SBL156005R2001 | 0.315 |
| | | | | 24 ... 60 | 20 ... 60 | 1 0 | AF12Z-30-10K-21 | 1SBL156005R2110 | 0.315 |
| | | | | | | 0 1 | AF12Z-30-01K-21 | 1SBL156005R2101 | 0.315 |
| | | | | 48 ... 130 | 48 ... 130 | 1 0 | AF12Z-30-10K-22 | 1SBL156005R2210 | 0.315 |
| | | | | | | 0 1 | AF12Z-30-01K-22 | 1SBL156005R2201 | 0.315 |
| | | | | 100 ... 250 | 100 ... 250 | 1 0 | AF12Z-30-10K-23 | 1SBL156005R2310 | 0.315 |
| | | | | | | 0 1 | AF12Z-30-01K-23 | 1SBL156005R2301 | 0.315 |
| 7.5 | 30 | 10 | 30 | – | 12 ... 20 | 1 0 | AF16Z-30-10K-20 | 1SBL176005R2010 | 0.315 |
| | | | | | | 0 1 | AF16Z-30-01K-20 | 1SBL176005R2001 | 0.315 |
| | | | | 24 ... 60 | 20 ... 60 | 1 0 | AF16Z-30-10K-21 | 1SBL176005R2110 | 0.315 |
| | | | | | | 0 1 | AF16Z-30-01K-21 | 1SBL176005R2101 | 0.315 |
| | | | | 48 ... 130 | 48 ... 130 | 1 0 | AF16Z-30-10K-22 | 1SBL176005R2210 | 0.315 |
| | | | | | | 0 1 | AF16Z-30-01K-22 | 1SBL176005R2201 | 0.315 |
| | | | | 100 ... 250 | 100 ... 250 | 1 0 | AF16Z-30-10K-23 | 1SBL176005R2310 | 0.315 |
| | | | | | | 0 1 | AF16Z-30-01K-23 | 1SBL176005R2301 | 0.315 |
| 11 | 45 | 15 | 42 | – | 12 ... 20 | 0 0 | AF26Z-30-00K-20 | 1SBL236005R2000 | 0.355 |
| | | | | 24 ... 60 | 20 ... 60 | 0 0 | AF26Z-30-00K-21 | 1SBL236005R2100 | 0.355 |
| | | | | 48 ... 130 | 48 ... 130 | 0 0 | AF26Z-30-00K-22 | 1SBL236005R2200 | 0.355 |
| | | | | 100 ... 250 | 100 ... 250 | 0 0 | AF26Z-30-00K-23 | 1SBL236005R2300 | 0.355 |
| 15 | 50 | 20 | 45 | – | 12 ... 20 | 0 0 | AF30Z-30-00K-20 | 1SBL276005R2000 | 0.360 |
| | | | | 24 ... 60 | 20 ... 60 | 0 0 | AF30Z-30-00K-21 | 1SBL276005R2100 | 0.360 |
| | | | | 48 ... 130 | 48 ... 130 | 0 0 | AF30Z-30-00K-22 | 1SBL276005R2200 | 0.360 |
| | | | | 100 ... 250 | 100 ... 250 | 0 0 | AF30Z-30-00K-23 | 1SBL276005R2300 | 0.360 |
| 18.5 | 50 | 25 | 45 | – | 12 ... 20 | 0 0 | AF38Z-30-00K-20 | 1SBL296005R2000 | 0.360 |
| | | | | 24 ... 60 | 20 ... 60 | 0 0 | AF38Z-30-00K-21 | 1SBL296005R2100 | 0.360 |
| | | | | 48 ... 130 | 48 ... 130 | 0 0 | AF38Z-30-00K-22 | 1SBL296005R2200 | 0.360 |
| | | | | 100 ... 250 | 100 ... 250 | 0 0 | AF38Z-30-00K-23 | 1SBL296005R2300 | 0.360 |

Note: Only AF..Z contactors with 12...20 V DC control voltage need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.




AF09Z..K, AF12Z..K, AF16Z..K




AF26Z..K, AF30Z..K, AF38Z..K

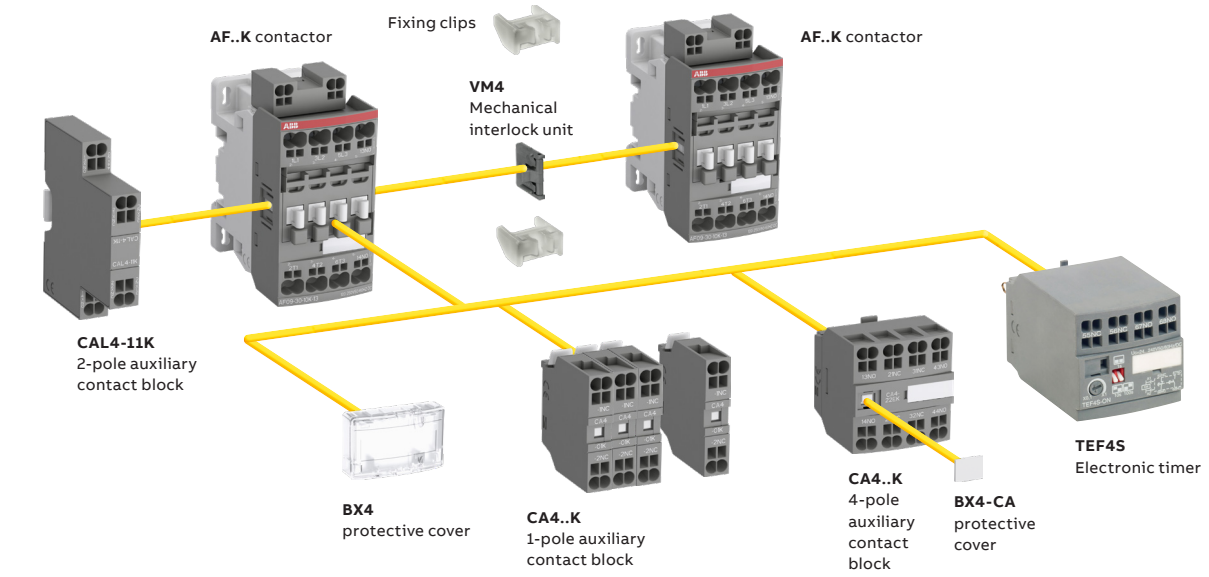
Main dimensions mm, inches

# AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

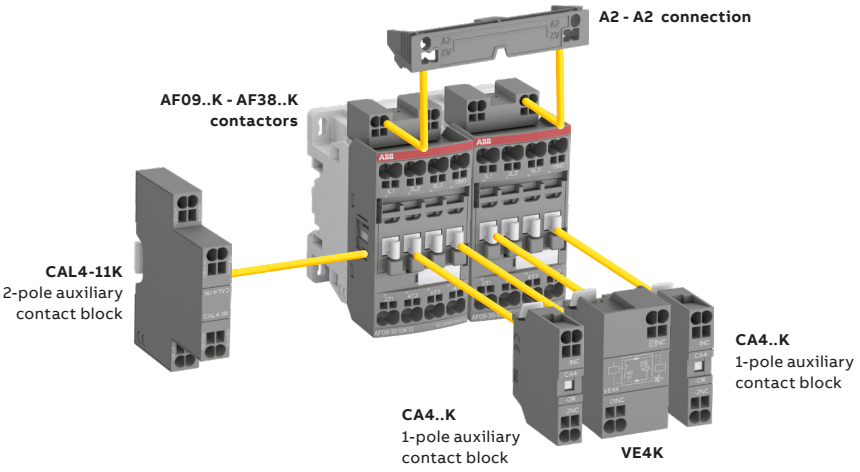
## Main accessories

### Contactor and main accessories (other accessories available)

**AF09..K ... AF38..K**




VEM4K mechanical and electrical interlock set including:
- VM4 mechanical interlock unit with 2 fixing clips
- VE4K electrical inlerlock block with A2-A2 connection




**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories | | | | | Side-mounted accessories | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Auxiliary contact blocks | | Electronic timer | Mechanical interlock unit | | Auxiliary contact blocks | |
| | | | | | | (between 2 contactors) | | Left side | Right side |
| | | | 1-pole CA4..K | 4-pole CA4..K | TEF4S | VM4 | | 2-pole CAL4-11K | |
| **AF09(Z)..K ... AF38(Z)..K (1)** | | | | | | | | | |
| AF09..K ... AF16..K | 3 | 0 0 1 | 4 max. | **or** 1 | **or** 1 | – | + | 1 | – |
| AF09..K ... AF16..K | 3 | 0 1 0 | 2 max. | – | **or** 1 | – | + | 1 | + 1 |
| AF26..K ... AF38..K | 3 | 0 0 0 | 4 max. | **or** 1 | **or** 1 | + 1 | + | 1 | **or** 1 |
| **AF09Z..K ... AF16Z..K 24 V DC designed for PLC - coil 30 (1)** | | | | | | | | | |
| AF09Z..K ... AF16Z..K | 3 | 0 0 1 | 4 max. | **or** 1 | **or** 1 | + 1 | **or** | 1 | + 1 |
| AF09Z..K ... AF16Z..K | 3 | 0 1 0 | 2 max. | – | **or** 1 | + 1 | + | 1 | **or** 1 |
| | | | | | 1 | - | + | 1 | + 1 |

(1) Including add-on and built-in contacts: 4 N.C. auxiliary contacts max. on positions 1, 2, 3, 4 and 3 N.C. auxiliary contacts max. on positions 1 ±30°, 5

# AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

## Technical data



### Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|---|---|---|---|---|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1 | | | | | |
| Rated operational voltage Ue max. | | 690 V | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | |
| Conventional free-air thermal current Ith acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 35 A | 35 A | 35 A | 50 A | 50 A | 50 A |
| With conductor cross-sectional area | | 6 mm² | 6 mm² | 6 mm² | 10 mm² | 10 mm² | 10 mm² |
| AC-1 Utilization category For air temperature close to contactor Ie / Rated operational current AC-1 | θ ≤ 40 °C | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A |
| Ue max. ≤ 690 V, 50/60 Hz | θ ≤ 60 °C | 25 A | 28 A | 30 A | 40 A | 42 A | 42 A |
| | θ ≤ 70 °C | 22 A | 24 A | 26 A | 32 A | 37 A | 37 A |
| With conductor cross-sectional area | | 4 mm² | 6 mm² | 6 mm² | 10 mm² | 10 mm² | 10 mm² |
| AC-3, AC-3e Utilization category For air temperature close to contactor θ ≤ 60 °C Ie / Max. rated operational current AC-3, AC-3e (1) | | | | | | | |
| | 220-230-240 V | 9 A | 12 A | 18 A | 26 A | 33 A | 40 A |
| | 380-400 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A |
| | 415 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A |
| 3-phase motors | 440 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A |
| | 500 V | 9.5 A | 12.5 A | 15 A | 23 A | 28 A | 33 A |
| | 690 V | 7 A | 9 A | 10.5 A | 17 A | 21 A | 24 A |
| | 1000 V | – | | | | | |
| Rated operational power AC-3, AC-3e (1) | | | | | | | |
| | 220-230-240 V | 2.2 kW | 3 kW | 4 kW | 6.5 kW | 9 kW | 11 kW |
| | 380-400 V | 4 kW | 5.5 kW | 7.5 kW | 11 kW | 15 kW | 18.5 kW |
| 1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors | 415 V | 4 kW | 5.5 kW | 9 kW | 11 kW | 15 kW | 18.5 kW |
| | 440 V | 4 kW | 5.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW |
| | 500 V | 5.5 kW | 7.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW |
| | 690 V | 5.5 kW | 7.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW |
| | 1000 V | – | | | | | |
| Rated making capacity AC-3, AC-3e | | 10 x Ie AC-3, 12 x Ie AC-3e acc. to IEC 60947-4-1 | | | | | |
| Rated breaking capacity AC-3, AC-3e | | 8 x Ie AC-3, 8.5 x Ie AC-3e acc. to IEC 60947-4-1 | | | | | |
| AC-8a Utilization category (without thermal overload relay Ue 400 V 50/60 Hz θ ≤ 40 °C) Ie / Rated operational current AC-8a | | 12 A | 16 A | 22 A | 30 A | 40 A | 50 A |
| Rated operational power AC-8a | | 5.5 kW | 7.5 kW | 11 kW | 15 kW | 20 kW | 25 kW |
| Short-circuit protection device for contactors without thermal overload relay in free air Motor protection excluded (2) Ue ≤ 500 V AC - gG type fuse | | 25 A | 32 A | 32 A | 50 A | 63 A | 63 A |
| Rated short-time withstand current Icw | 1 s | 300 A | 300 A | 300 A | 700 A | 700 A | 700 A |
| at 40 °C ambient temperature, | 10 s | 150 A | 150 A | 150 A | 350 A | 350 A | 350 A |
| in free air from a cold state | 30 s | 80 A | 80 A | 80 A | 225 A | 225 A | 225 A |
| | 1 min | 60 A | 60 A | 60 A | 150 A | 150 A | 150 A |
| | 15 min | 35 A | 35 A | 35 A | 50 A | 50 A | 50 A |
| Maximum breaking capacity cos ϕ = 0.45 | at 440 V | 250 A | 250 A | 250 A | 500 A | 500 A | 500 A |
| | at 690 V | 106 A | 106 A | 106 A | 200 A | 200 A | 200 A |
| Power dissipation per pole | Ie / AC-1 | 1.14 W | 1.43 W | 1.64 W | 2 W | 2.44 W | 2.44 W |
| | Ie / AC-3, AC-3e | 0.15 W | 0.26 W | 0.6 W | 0.66 W | 1 W | 1.41 W |
| Max. electrical switching frequency | AC-1 | 600 cycles/h | | | | | |
| | AC-3, AC-3e | 1200 cycles/h | | | | | |
| | AC-2, AC-4 | 300 cycles/h | | | 150 cycles/h | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

# AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

## Technical data

### Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC / DC operated | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|---|---|---|---|---|---|---|---|
| Standards | | UL 60947-4-1, CSA-C22.2 No. 60947-4-1 | | | | | |
| Maximum operational voltage | | 600 V | | | | | |
| NEMA size | | 00 | 0 | - | 1 | - | - |
| NEMA continuous amp rating | Thermal current | 9 A | 18 A | | 27 A | | |
| NEMA maximum horse power ratings 1-phase, 60 Hz | 115 V AC | 1/3 hp | 1 hp | | 2 hp | | |
| | 230 V AC | 1 hp | 2 hp | | 3 hp | | |
| NEMA maximum horse power ratings 3-phase, 60 Hz | 200 V AC | 1-1/2 hp | 3 hp | | 7-1/2 hp | | |
| | 230 V AC | 1-1/2 hp | 3 hp | | 7-1/2 hp | | |
| | 460 V AC | 2 hp | 5 hp | | 10 hp | | |
| | 575 V AC | 2 hp | 5 hp | | 10 hp | | |
| UL / CSA general use rating | | | | | | | |
| 600 V AC | | 25 A | 28 A | 30 A | 42 A | 45 A | 45 A |
| With conductor cross-sectional area | | AWG 10 | AWG 10 | AWG 10 | AWG 8 | AWG 8 | AWG 8 |
| 1 pole | 80 V DC | 25 A | 28 A | 30 A | 42 A | 45 A | 45 A |
| 2 poles in serie | 160 V DC | 25 A | 28 A | 30 A | 42 A | 45 A | 45 A |
| 3 poles in serie | 240 V DC | 25 A | 28 A | 30 A | 42 A | 45 A | 45 A |
| With conductor cross-sectional area | | AWG 10 | AWG 10 | AWG 10 | AWG 8 | AWG 8 | AWG 8 |
| UL / CSA maximum 1-phase motor rating | | | | | | | |
| Full load current | 120 V AC | 13.8 A | 16 A | 20 A | 24 A | 24 A | 24 A |
| | 240 V AC | 10 A | 12 A | 17 A | 17 A | 28 A | 28 A |
| Horse power rating | 120 V AC | 3/4 hp | 1 hp | 1-1/2 hp | 2 hp | 2 hp | 2 hp |
| | 240 V AC | 1-1/2 hp | 2 hp | 3 hp | 3 hp | 5 hp | 5 hp |
| UL / CSA maximum 3-phase motor rating | | | | | | | |
| Full load current (1) | 200-208 V AC | 7.8 A | 11 A | 17.5 A | 25.3 A | 32.2 A | 32.2 A |
| | 220-240 V AC | 6.8 A | 9.6 A | 15.2 A | 22 A | 28 A | 28 A |
| | 440-480 V AC | 7.6 A | 11 A | 14 A | 21 A | 27 A | 34 A |
| | 550-600 V AC | 9 A | 11 A | 17 A | 22 A | 27 A | 32 A |
| Horse power rating (1) | 200-208 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp |
| | 220-240 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp |
| | 440-480 V AC | 5 hp | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp |
| | 550-600 V AC | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp |
| UL / CSA - DC motor starting - 3 poles in series | | | | | | | |
| Full Load Amps (FLA) | 125 V DC | 9.5 A | 13.2 A | 17 A | 25 A | 25 A | 25 A |
| | 250 V DC | 8.5 A | 12.2 A | 12.2 A | 20 A | 29 A | 29 A |
| Horse power rating | 125 V DC | 1 hp | 1-1/2 hp | 2 hp | 3 hp | 3 hp | 3 hp |
| | 250 V DC | 2 hp | 3 hp | 3 hp | 5 hp | 7-1/2 hp | 7-1/2 hp |
| Short-circuit protection device for contactors without thermal overload relay Motor protection excluded | | | | | | | |
| Fuse rating | | 30 A | | 60 A | | 100 A | |
| Fuse type, 600 V | | RK5 | | | | | |
| Maximum electrical switching frequency | | | | | | | |
| For general use | | 600 cycles/h | | | | | |
| For motor use | | 1200 cycles/h | | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

# AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

## Technical data



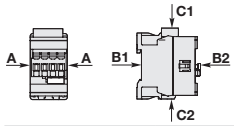
### Main pole - Utilization characteristics - 3 N.O. non reversing contactors

| Contactor types | AC / DC operated | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|---|---|---|---|---|---|---|---|
| AC Resistance air heating | | | | | | | |
| Full Load Amps (FLA) | 600 V AC | 20 A | 25 A | 30 A | 42 A | 45 A | 45 A |
| Elevator control, load switching, 500,000 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.1 | | | | | | | |
| 1-phase | | | | | | | |
| Horse power rating | 110-120 V AC | 1/4 hp | 1/3 hp | – | 1-1/2 hp | 2 hp | 2 hp |
| | 220-240 V AC | 1/2 hp | 3/4 hp | – | 3 hp | 3 hp | 5 hp |
| 3-phase | | | | | | | |
| Horse power rating | 200-208 V AC | 1 hp | 2 hp | – | 5 hp | 7-1/2 hp | 7-1/2 hp |
| | 220-240 V AC | 1 hp | 2 hp | – | 5 hp | 7-1/2 hp | 10 hp |
| | 440-480 V AC | 3 hp | 5 hp | – | 15 hp | 20 hp | 20 hp |
| | 550-600 V AC | 3 hp | 5 hp | – | 15 hp | 20 hp | 20 hp |
| Elevator control, 500,000 mechanical operating cycles, 5 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.2 | | | | | | | |
| 1-phase | | | | | | | |
| Horse power rating | 110-120 V AC | 3/4 hp | 1 hp | 1-1/2 hp | 2 hp | 2 hp | 3 hp |
| | 220-240 V AC | 1-1/2 hp | 2 hp | 3 hp | 3 hp | 5 hp | 7-1/2 hp |
| 3-phase | | | | | | | |
| Horse power rating | 200-208 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp |
| | 220-240 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp |
| | 440-480 V AC | 5 hp | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp |
| | 550-600 V AC | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp |
| Lighting application - UL/CSA | | | | | | | |
| Tungsten lamps | | | | | | | |
| 1-phase per pole | 347 V AC | 20 A | 25 A | 30 A | 42 A | 45 A | 45 A |
| 3-phase break all lines | 600 V AC | 20 A | 25 A | 30 A | 42 A | 45 A | 45 A |
| Electrical discharge lamps (ballast) | | | | | | | |
| 1-phase per pole | 347 V AC | 20 A | 25 A | 30 A | 42 A | 45 A | 45 A |
| 3-phase break all lines | 600 V AC | 20 A | 25 A | 30 A | 42 A | 45 A | 45 A |

# AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

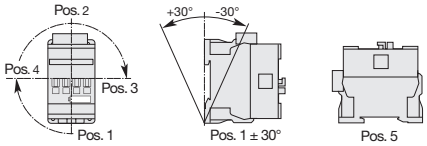
## Technical data

### General technical data

| Contactor types | AC / DC operated | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|---|---|---|---|---|---|---|---|
| Rated insulation voltage Ui | | | | | | | |
| acc. to IEC 60947-4-1 | | 690 V | | | | | |
| acc. to UL / CSA | | 600 V | | | | | |
| Rated impulse withstand voltage Uimp. | | 6 kV | | | | | |
| Electromagnetic compatibility | | Devices complying with IEC/EN 60947-1 - Environment A and B (1) | | | | | |
| Pollution degree | | 3 | | | | | |
| Ambient air temperature close to contactor | | | | | | | |
| Operation Without thermal overload relay | | -40 ... +70 °C | | | | | |
| Storage | | -60 ... +80 °C | | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | | |
| Mechanical durability | | | | | | | |
| Number of operating cycles | | 10 million operating cycles | | | | | |
| Maximum switching frequency | | 3600 cycles/h | | | | | |
| Shock withstand | | | | | | | |
| acc. to IEC/EN 60068-2-27 | | | | | | | |
| Mounting position 1 | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | | | | |
|  | A | 30 g | | | | | |
| | B1 | 25 g closed position / 5 g open position | | | | | |
| | B2 | 15 g | | | | | |
| | C1 | 25 g | | | | | |
| | C2 | 25 g | | | | | |
| Vibration withstand | | 5 ... 300 Hz | | | | | |
| acc. to IEC 60068-2-6 | | 4 g Closed position / 2 g Open position | | | | | |

(1) AF09 ... AF38-..-..-12 (48...130 V 50/60 Hz-DC) compliant to environment A only. For environment B: select AF09 ... AF38Z-..-..-22.

### Mounting characteristics and conditions for use

| Contactor types | AC / DC operated | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|---|---|---|---|---|---|---|---|
| Mounting positions | |  Max. N.C. built-in and add-on N.C. auxiliary contacts: see accessory fitting details for a 3-pole contactor AF09 ... AF38 | | | | | |
| Mounting distances | | The contactors can be assembled side by side | | | | | |
| Fixing | | | | | | | |
| On rail according to IEC/EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | | | | | |
| By screws (not supplied) | | 2 x M4 screws placed diagonally | | | | | |

# AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

## Technical data



### Magnet System Characteristics for AF09..K ... AF38..K contactors - AC / DC operated

| Contactor types | AC / DC operated | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|---|---|---|---|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max.<br>At θ ≤ 70 °C 0.85 x Uc min...Uc max. | | | | | |
| | DC supply | At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max.<br>At θ ≤ 70 °C 0.85 x Uc min...Uc max. | | | | | |
| AC control voltage 50/60 Hz | | | | | | | |
| Rated control circuit voltage Uc | | 24 ... 500 V AC | | | | | |
| Coil consumption | Average pull-in value | 50 VA | | | | | |
| | Average holding value | 2.2 VA / 2 W | | | | | |
| DC control voltage | | | | | | | |
| Rated control circuit voltage Uc | | 20 ... 500 V DC | | | | | |
| Coil consumption | Average pull-in value | 50 W | | | | | |
| | Average holding value | 2 W | | | | | |
| PLC-output control | | Not suitable for direct control by PLC-output | | | | | |
| Drop-out voltage | | ≤ 60 % Uc min. | | | | | |
| Operating time | | | | | | | |
| Between coil energization and: | | | | | | | |
| | N.O. contact closing | 40 ... 95 ms | | | | | |
| | N.C. contact opening | 38 ... 90 ms | | | | | |
| Between coil de-energization and: | | | | | | | |
| | N.O. contact opening | 11 ... 95 ms | | | | | |
| | N.C. contact closing | 13 ... 98 ms | | | | | |

### Magnet System Characteristics for AF09Z..K ... AF38Z..K contactors 24V DC operated - designed for PLC - coil 30

| Contactor types | AC / DC operated | AF09Z..K | AF12Z..K | AF16Z..K | AF26Z..K | AF30Z..K | AF38Z..K |
|---|---|---|---|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | DC supply | At θ ≤ 60 °C 0.85 ... 1.1 x Uc<br>At θ ≤ 70 °C Uc | | | | | |
| DC control voltage | | | | | | | |
| Rated control circuit voltage Uc | | 24 V DC | | | | | |
| Coil consumption | Average pull-in value | 6 W | | | | | |
| | Average holding value | 1.7 W | | | | | |
| PLC-output control | | ≥ 250 mA 24 V DC for PLCs and safety PLCs using broken wire detection | | | | | |
| Drop-out voltage | | ≤ 60 % of Uc min. | | | | | |
| Operating time | | | | | | | |
| Between coil energization and: | | | | | | | |
| | N.O. contact closing | 27 ... 53 ms | | | | | |
| | N.C. contact opening | 20 ... 35 ms | | | | | |
| Between coil de-energization and: | | | | | | | |
| | N.O. contact opening | 17 ... 29 ms | | | | | |
| | N.C. contact closing | 22 ... 57 ms | | | | | |

### Magnet System Characteristics for AF09Z..K ... AF38Z..K contactors - for specific applications - coils 20, 21, 22, 23

| Contactor types | AC / DC operated | AF09Z..K | AF12Z..K | AF16Z..K | AF26Z..K | AF30Z..K | AF38Z..K |
|---|---|---|---|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At θ ≤ 60 °C 0.85 x Uc min ... 1.1 x Uc max<br>At θ ≤ 70 °C 0.85 x Uc min ... Uc max | | | | | |
| | DC supply | At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max | | | | | |
| AC control voltage 50/60 Hz | | | | | | | |
| Rated control circuit voltage Uc | | 24 ... 250 V AC | | | | | |
| Coil consumption | Average pull-in value | 16 VA | | | | | |
| | Average holding value | 1.7 VA / 1.5 W | | | | | |
| DC control voltage | | | | | | | |
| Rated control circuit voltage Uc | | 12 ... 250 V DC | | | | | |
| Coil consumption | Average pull-in value | 12 ... 16 W | | | | | |
| | Average holding value | 1.7 W | | | | | |
| PLC-output control | | (AF..Z coil 21) ≥ 500 mA 24 V DC for PLCs - Not suitable for safety PLCs | | | | | |
| Drop-out voltage | | ≤ 60 % of Uc min. | | | | | |
| Voltage sag immunity acc. to SEMI F47-0706 | | (AF..Z coil 21, 22, 23) conditions of use on request | | | | | |
| Dips withstand -20 °C ≤ θ ≤ +60°C | | (AF..Z coil 21, 22, 23) 20 ms average for Uc ≥ 24 V 50/60 Hz or Uc ≥ 20 V DC | | | | | |
| Operating time | | | | | | | |
| Between coil energization and: | | | | | | | |
| | N.O. contact closing | 40 ... 95 ms | | | | | |
| | N.C. contact opening | 38 ... 90 ms | | | | | |
| Between coil de-energization and: | | | | | | | |
| | N.O. contact opening | 11 ... 95 ms | | | | | |
| | N.C. contact closing | 13 ... 98 ms | | | | | |

# AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

## Technical data

### Connecting characteristics

| Contactor types | AC / DC operated | | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|---|---|---|---|---|---|---|---|---|
| Main terminals | | |  Push-in Spring terminals | | | | | |
| Connection capacity (min. ... max.) | | | | | | | | |
| Main conductors (poles) | | | | | | | | |
| Rigid | Solid (≤ 2.5 mm²) | 1 x | 1 ... 6 mm² | | | 1 ... 10 mm² | | |
| | Stranded (≥ 4 mm²) | 2 x | 1 ... 6 mm² | | | 1 ... 10 mm² | | |
| Flexible | | 1 x | 1 (push-in) / 0.5 (spring) ... 4 mm² | | | 1 ... 6 mm² | | |
| with non insulated ferrule | | 2 x | 1 (push-in) / 0.5 (spring) ... 4 mm² | | | 1 ... 6 mm² | | |
| Flexible with insulated ferrule | | 1 x | 1 (push-in) / 0.5 (spring) ... 4 mm² | | | 1 ... 6 mm² | | |
| | | 2 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm² | | | 1 ... 6 mm² | | |
| Flexible without ferrule | | 1 x | (spring) 0.5 ... 4 mm² | | | (spring) 1 ... 6 mm² | | |
| | | 2 x | (spring) 0.5 ... 4 mm² | | | (spring) 1 ... 6 mm² | | |
| Connection capacity acc. to UL/CSA | (Solid ≤ AWG 14) | 1 or 2 x | AWG 18 ... 10 | | | AWG 18 ... 8 | | |
| Stripping length | | | 12 mm | | | 14 mm | | |
| Auxiliary conductors (built-in auxiliary terminals + coil terminals) | | | | | | | | |
| Rigid solid | | 1 x | 1 ... 2.5 mm² | | | | | |
| | | 2 x | 1 ... 2.5 mm² | | | | | |
| Flexible with | | 1 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm² | | | | | |
| non insulated ferrule | | 2 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm² | | | | | |
| Flexible with insulated ferrule | | 1 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm² | | | | | |
| | | 2 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm² | | | | | |
| Flexible without ferrule | | 1 x | (spring) 0.5 ... 2.5 mm² | | | | | |
| | | 2 x | (spring) 0.5 ... 2.5 mm² | | | | | |
| Connection capacity acc. to UL/CSA | | 1 or 2 x | AWG 18 ... 14 | | | | | |
| Stripping length | | | 10 mm | | | | | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | | | | | |
| Main terminals | | | IP20 | | | | | |
| Coil terminals | | | IP20 | | | | | |
| Built-in auxiliary terminals | | | IP20 | | | | | |
| Screwdriver type | All terminals | | Flat Ø 3 mm x 0.5 mm | | | | | |

# AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

## Technical data



### Built-in auxiliary contacts according to IEC

| Contactor types | AC / DC operated | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|---|---|---|---|---|---|---|---|
| Rated operational voltage Ue max. | | 690 V | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | |
| Conventional free air thermal current Ith - θ ≤ 40 °C | | 16 A | | | | | |
| Ie / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A | | | | | |
| | 220-240 V 50/60 Hz | 4 A | | | | | |
| | 400-440 V 50/60 Hz | 3 A | | | | | |
| | 500 V 50/60 Hz | 2 A | | | | | |
| | 690 V 50/60 Hz | 2 A | | | | | |
| Making capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | | | | | |
| Breaking capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | | | | | |
| Ie / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W | | | | | |
| | 48 V DC | 2.8 A / 134 W | | | | | |
| | 72 V DC | 1 A / 72 W | | | | | |
| | 110 V DC | 0.55 A / 60 W | | | | | |
| | 125 V DC | 0.55 A / 69 W | | | | | |
| | 220 V DC | 0.27 A / 60 W | | | | | |
| | 250 V DC | 0.27 A / 68 W | | | | | |
| | 400 V DC | 0.15 A / 60 W | | | | | |
| | 500 V DC | 0.13 A / 65 W | | | | | |
| | 600 V DC | 0.1 A / 60 W | | | | | |
| Short-circuit protection device gG type fuse | | 10 A | | | | | |
| Rated short-time withstand current Icw | for 1.0 s | 100 A | | | | | |
| | for 0.1 s | 140 A | | | | | |
| Minimum switching capacity | | 12 V / 3 mA | | | | | |
| with failure rate acc. to IEC 60947-5-4 | | $10^{-7}$ | | | | | |
| Non-overlapping time between N.O. and N.C. contacts | | ≥ 2 ms | | | | | |
| Power dissipation per pole at 6 A | | 0.1 W | | | | | |
| Maximum electrical switching frequency | AC-15 | 1200 cycles/h | | | | | |
| | DC-13 | 900 cycles/h | | | | | |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA4, CAL4 aux. contact blocks) are mechanically linked contacts. | | | | | |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA4, CAL4 aux. contact blocks) are mirror contacts. | | | | | |

### Built-in auxiliary contacts according to UL / CSA

| Contactor types | AC / DC operated | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|---|---|---|---|---|---|---|---|
| Maximum operational voltage | | 600 V AC, 600 V DC | | | | | |
| Pilot duty | | A600, Q600 | | | | | |
| AC thermal rated current | | 10 A | | | | | |
| AC maximum volt-ampere making | | 7200 VA | | | | | |
| AC maximum volt-ampere breaking | | 720 VA | | | | | |
| DC thermal rated current | | 2.5 A | | | | | |
| DC maximum volt-ampere making-breaking | | 69 VA | | | | | |

# AF09..K ... AF38..K 3-pole contactors with Push-in Spring terminals

## Electrical durability and utilization categories

### General

Utilization categories determine the current making and breaking conditions relating to the characteristics of the loads to be controlled by the contactors. International standard IEC 60947-4-1 and European standard EN 60947-4-1 are the standards to be referred to.
If Ic is the current to be broken by the contactor and Ie the rated operational current normally drawn by the load, then:

- Categories AC-1 and AC-3 Ic = Ie
- Category AC-2 Ic = 2.5 x Ie
- Category AC-4 Ic = 6 x Ie

Generally speaking Ic = m x Ie where m is a multiple of the load operational current.

On next pages, the curves corresponding to categories AC-1, AC-3 and AC-4 represent the electrical durability variation of standard contactors in relation to the breaking current Ic. Electrical durability is expressed in millions of operating cycles.

### Curve utilization mode

Electrical durability forecast and contactor selection for categories AC-1, AC-2, AC-3 or AC-4

| Characteristics | Load to be controlled |
|---|---|
| Operational voltage | Ue |
| Current normally drawn | Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents") |
| Utilization category | AC-1, AC-2, AC-3 or AC-4 |
| Breaking current | Ic = Ie for AC-1 and for AC-3 ; Ic = 2.5 x Ie for AC-2 ; Ic = 6 x Ie for AC-4 |

- Define the number of operating cycles N required.
- On the diagram corresponding to the operational category, select the contactor with the curve immediately above the intersection point (Ic ; N).

### Electrical durability forecast and contactor selection for mixed duty motor control: AC-3 (Ic = Ie) type switching off while "motor running" and, occasionally, AC-4 (Ic = 6 x Ie) type switching off while "motor accelerating"

| Characteristics | Load to be controlled |
|---|---|
| Operational voltage | Ue |
| Current normally drawn while "motor running" | Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents") |
| Utilization category | AC-3 or AC-4 |
| Breaking current for AC-3 | Ic = Ie |
| Breaking current for AC-4 while "motor accelerating" | Ic = 6 x Ie |
| Percentage of AC-4 operating cycles | K (on the basis of the total number of operating cycles) |

- Define the total number of operating cycles N required.
- Note the smallest contactor rating compatible for AC-3 (Ue / Ie) on Main pole utilization characteristic table (see “Technical data”).
- For the selected contactor make a note of the following in relation to the voltage using diagram AC-3 in next pages:
  - The number of operating cycles A for Ic = Ie (AC-3)
  - The number of operating cycles B for Ic = 6 x Ie (AC-4)
- Calculate the estimated number of cycles N’ (N’ is always below A)

$$N' = \frac{A}{1 + 0.01\ K\ (A/B - 1)}$$

- If N' is too low in relation to the target N, calculate the estimated number of cycles for a higher contactor rating.

### Case of uninterrupted duty

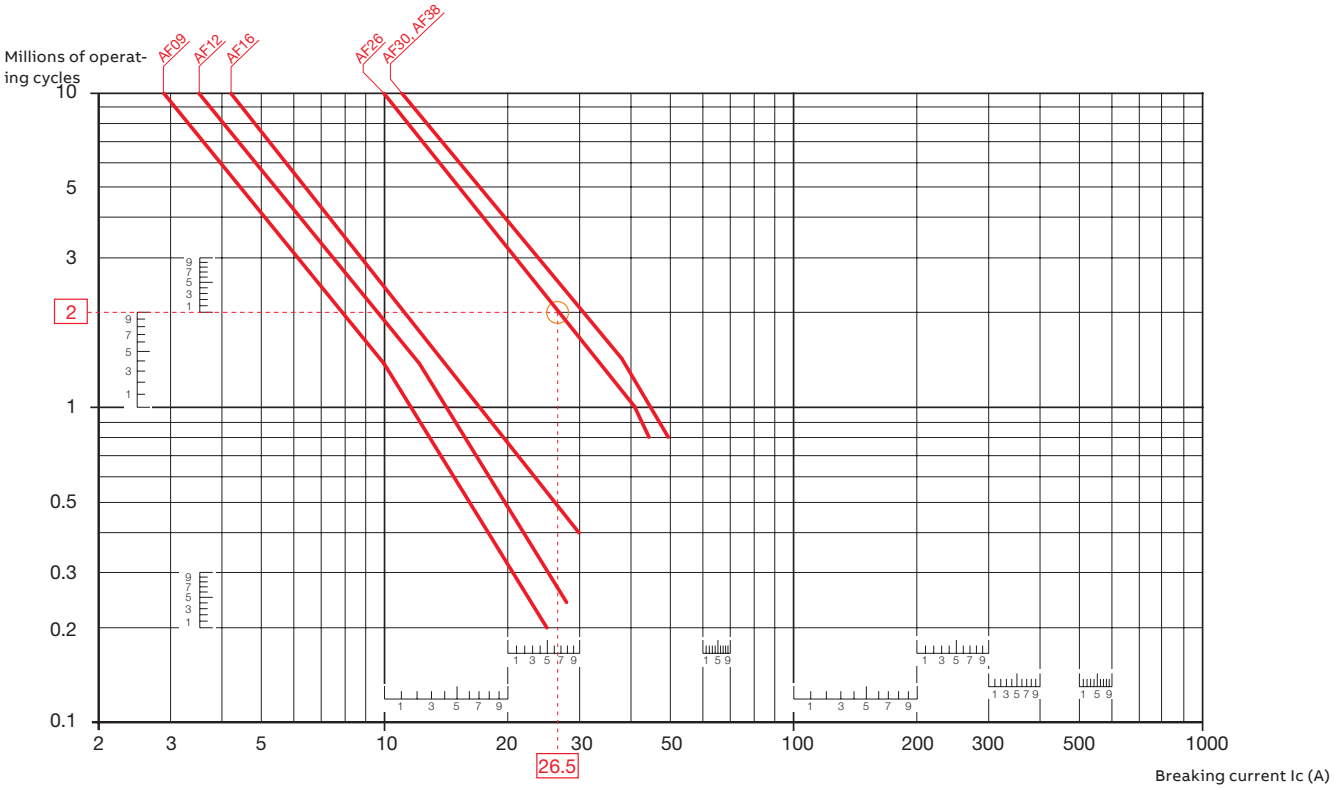
For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us).
The combinated effect of environmental conditions and the proper temperature of the product may require some disposals. As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

# AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

## Electrical durability



**Electrical Durability for AC-1 Utilization Category - Ue ≤ 690 V.**
Switching non-inductive or slightly inductive loads. The breaking current Ic for AC-1 is equal to the rated operational current of the load.
Ambient temperature and maximum electrical switching frequency: see "Technical Data".




**Example:**

Ic / AC-1 = 26.5 A – Electrical durability required = 2 millions operating cycles.
Using the AC-1 curves above select the AF26 contactor at intersection "○" (26.5 A / 2 millions operating cycles).

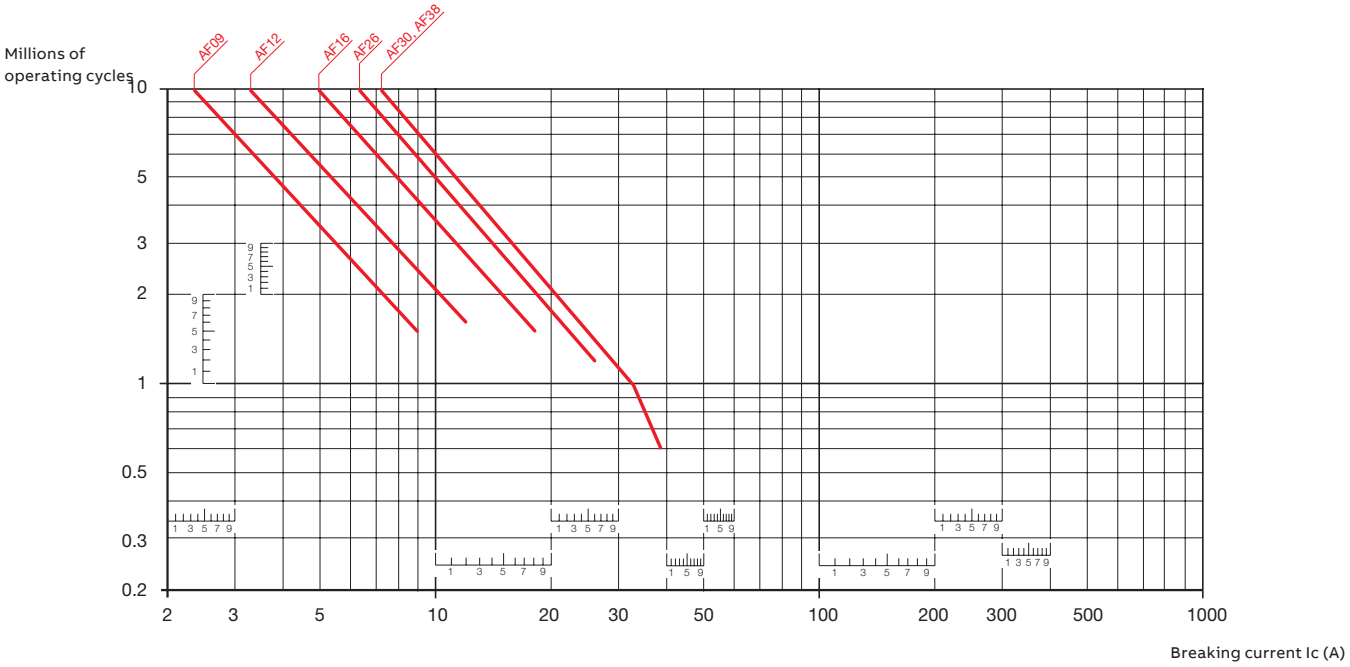
# AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

## Electrical durability

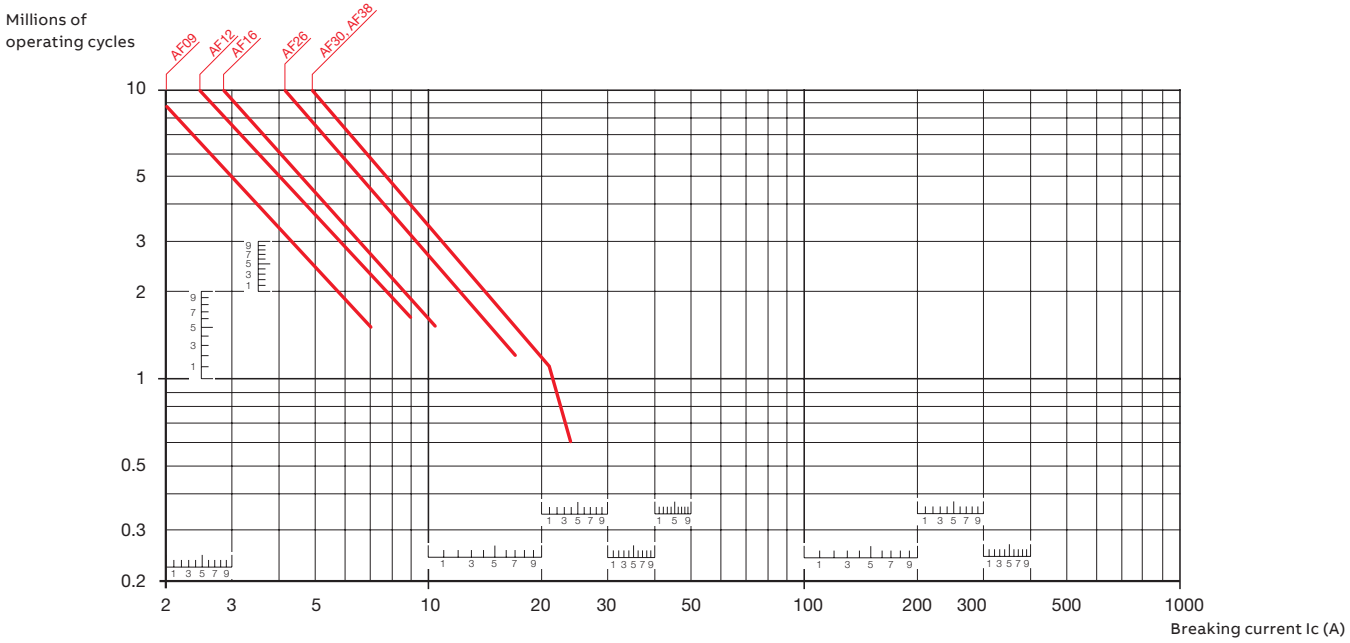
**Electrical Durability for AC-3 Utilization Category**

Switching cage motors: starting and switching off running motors. The breaking current Ic for AC-3 is equal to the rated operational current Ie (Ie = motor full load current). Ambient temperature and maximum electrical switching frequency: see "Technical Data".

### AC-3 - Ue ≤ 440 V




### AC-3 - 440 V < Ue ≤ 690 V



# AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

## Electrical durability

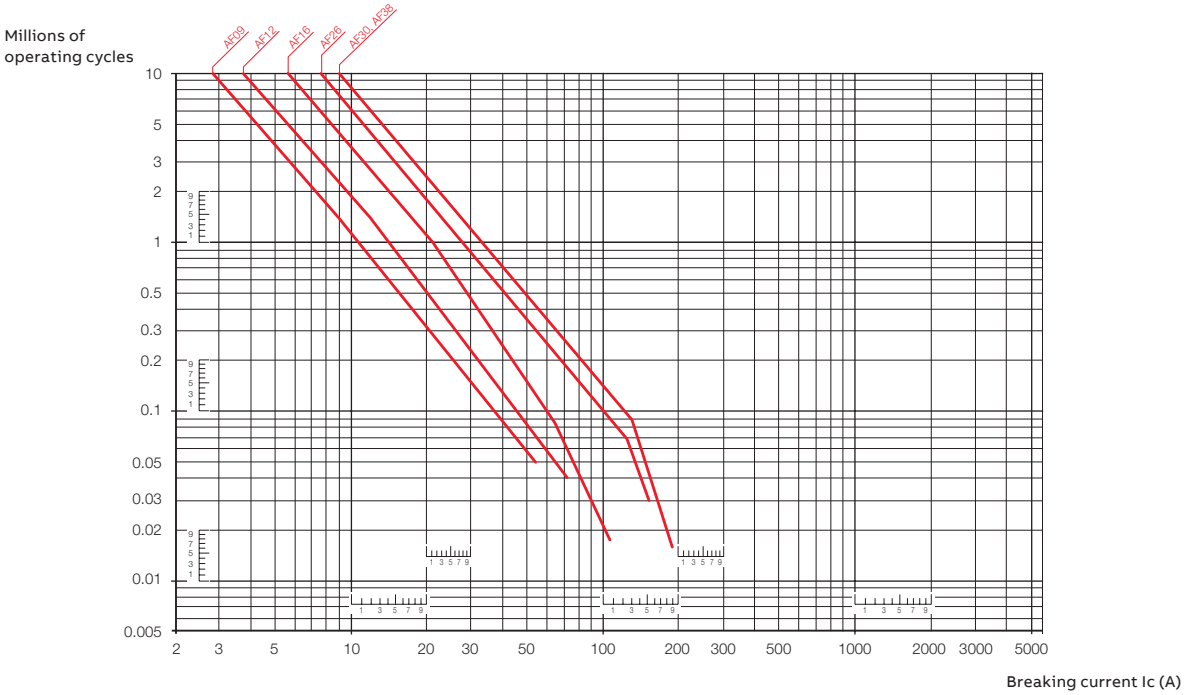


**Electrical Durability for AC-2 or AC-4 Utilization Category**

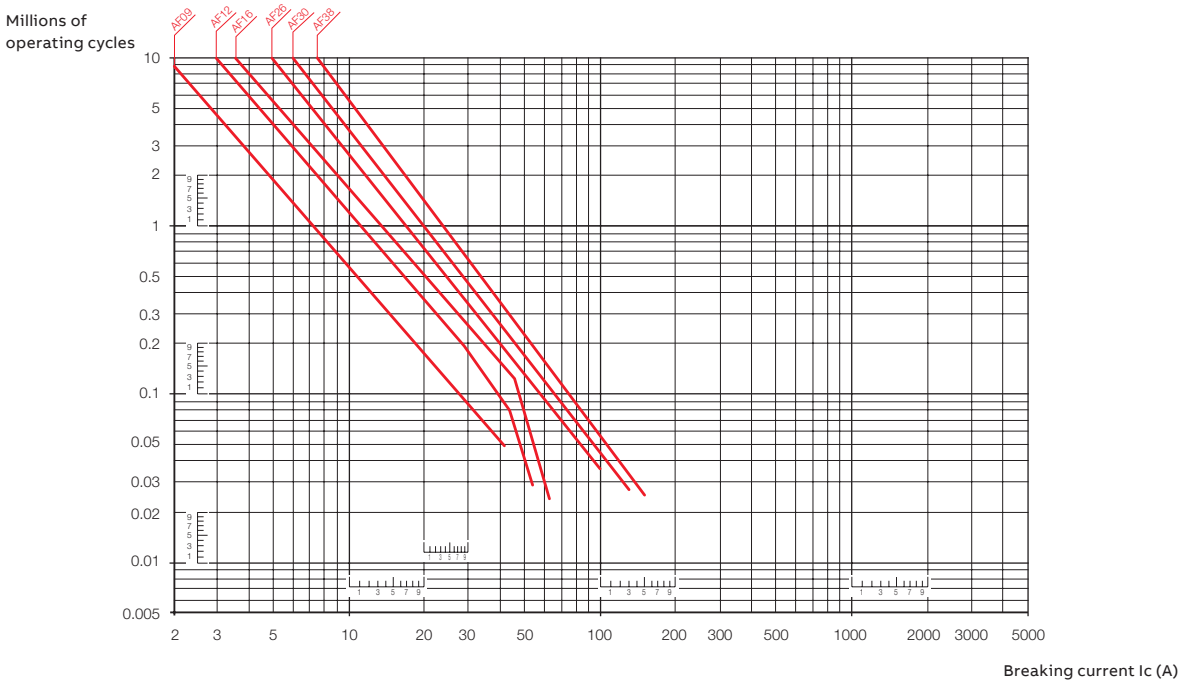
Switching cage motors: starting reverse operation and step-by-step operation. The breaking current Ic is equal to 2.5 x $I_e$ for AC-2 and 6 x $I_e$ for AC-4, keeping in mind that $I_e$ is the motor rated operational current Ie (Ie = motor full load current).

Ambient temperature ≤ 60 °C. Maximum electrical switching frequency: see "Technical Data".

### AC-2 or AC-4 - Ue ≤ 440 V




### AC-2 or AC-4 - 440 V < Ue ≤ 690 V



# Notes




**For direct product details information, use product type or order code, ex:**

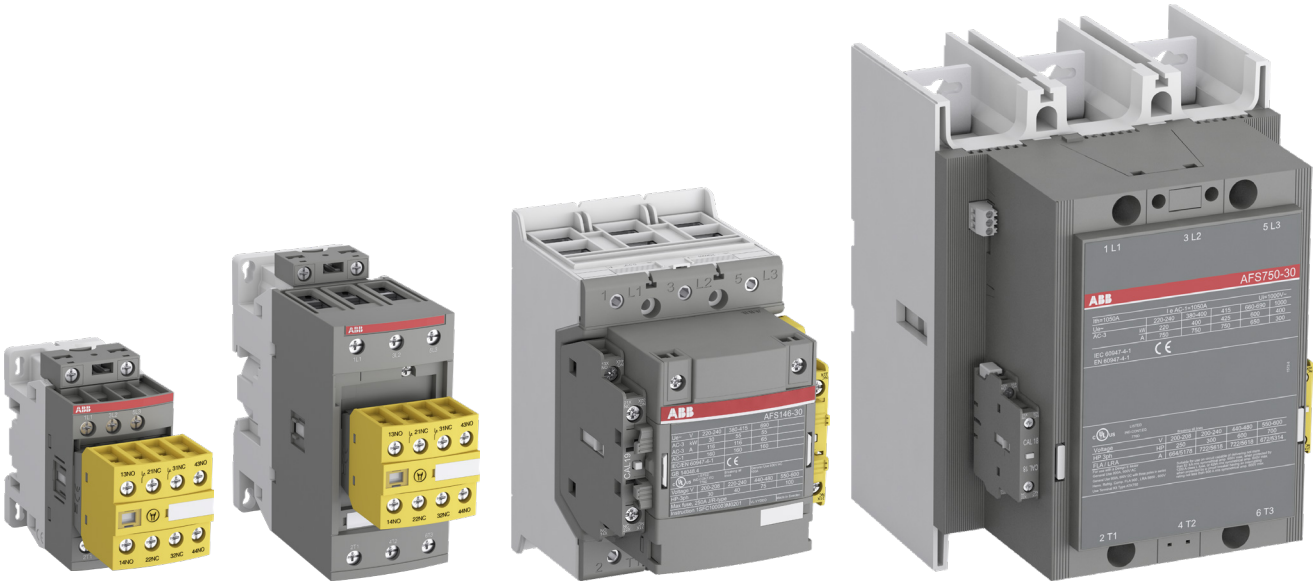
new.abb.com/products/**1SBL136082R3022**

# AFS 3-pole contactors dedicated for safety applications




| | | |
|---|---|---|
| **3/**144 | **Overview** | |
| | **Ordering details** | |
| | **4 to 45 kW** | |
| **3/**150 | AFS09 ... AFS38 | AC / DC operated with 2 N.O. + 2 N.C. |
| **3/**151 | AFS40 ... AFS96 | AC / DC operated with 2 N.O. + 2 N.C. |
| **3/**152 | AFS09 ... AFS96 | Contactors and main accessories |
| | **55 to 200 kW** | |
| **3/**153 | AFS116 ... AFS146 | AC / DC operated with 1 N.O. + 2 N.C. |
| **3/**154 | AFS116 ... AFS146 | AC / DC operated with 1 N.O. + 2 N.C. with built-in PLC interface |
| **3/**155 | AFS190 ... AFS370 | AC / DC operated with 1 N.O. + 2 N.C. |
| **3/**156 | AFS190 ... AFS370 | AC / DC operated with 1 N.O. + 2 N.C. with built-in PLC interface |
| **3/**157 | AFS09 ... AFS370 | Contactors and main accessories |
| | **200 to 400 kW** | |
| **3/**158 | AFS400 ... AFS750 | AC / DC operated with 1 N.O. + 2 N.C. |
| **3/**159 | AFS400 ... AFS750 | Contactors and main accessories |
| **3/**160 | **Technical data** | |
| **3/**174 | **Terminal marking and positioning** | |
| **3/**175 | **Electrical durability** | |

# AFS 3-pole contactors
## Dedicated for safety applications




Designed for machine safety applications, AFS contactors now complete ABB's safety component portfolio.
With a range stretching from 9 A up to 750 A for motor starting applications and with a design complying with the latest safety standard, the AFS range of contactors is the given choice for any application that puts the users safety first.

### Safety and protection
ABB's AFS contactors can be easily integrated in machine manufacturer's systems complying with main standards EN ISO 13849 and EN 62061 - guaranteeing the safe use of your machinery and equipment. An easily identifiable yellow low energy auxiliary contact block ensures the status feedback circuits required in machine safety applications.

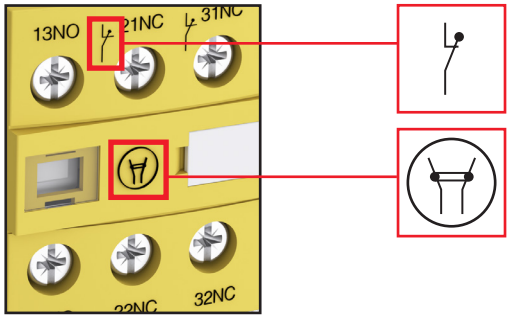
### Continuous operation
The AFS contactor secures system uptime. Featuring ABB's tested and proven AF technology, AFS contactors are reliable in any network. Direct control by safety PLCs or safety relays ensures the required safety performance.

### Speed up your projects
AFS design makes integration easier. With energy efficient coils smaller transformers can be used and panel space more efficiently used. Wide voltage range coils and easily available safety data simplifies product selection. In addition, all the safety data for the AFS contactors is available using common safety design tools.

# AFS 3-pole contactors
## Dedicated for safety applications

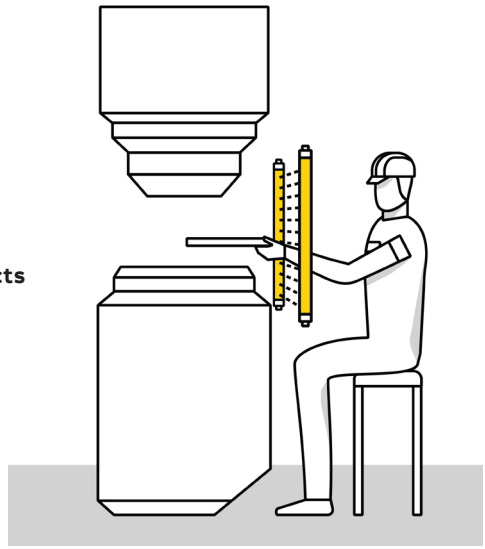
**Guaranteed contactor status**
ABB's permanently fixed auxiliary contact blocks guarantee the correct contactor status at all times. Mechanically linked and mirror contacts provide the performance required in feedback circuits. This prevents any unexpected state changes of auxiliary contact if main contacts become welded or stuck and ensures an accurate depiction of the safety system status displayed at all times. Mechanically linked and mirror contact symbols are marked on the yellow auxiliary block.

**Fast response for increased safety**
In safety applications speed is essential to protect operators. AFS contactors feature fast opening times, down to 20 ms for certain PLC controlled contactors, ensuring that when a dangerous failure is detected the operator is kept out of harms way.

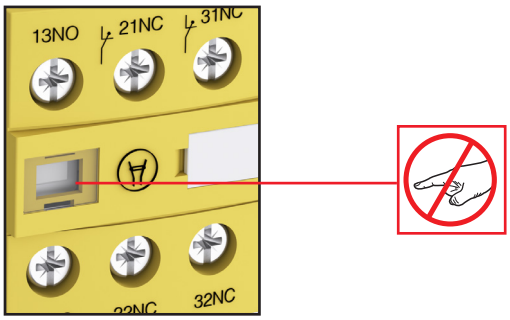



**Mirror contacts**

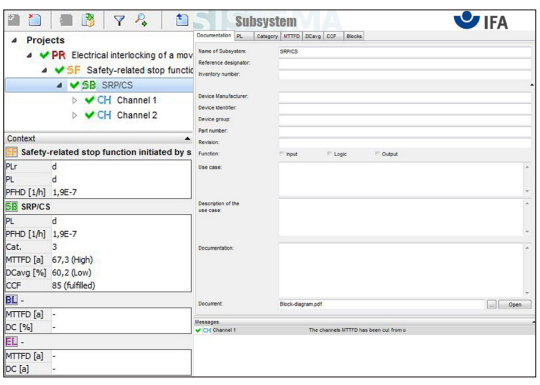
**Mechanically linked contacts**



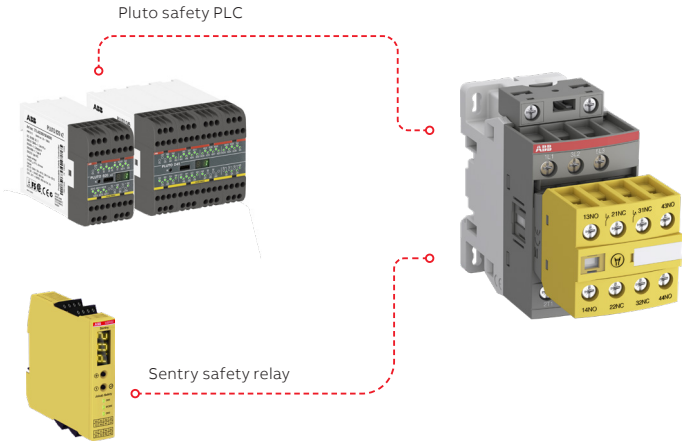
**Prevent unexpected operations**
Factory fitted auxiliary contact blocks that are permanently fixed protects devices against accidental operation and misuse. A factory-fitted transparent cover on contactors up to 96 A shields the contactor status indicator, providing additional protection from misuse.



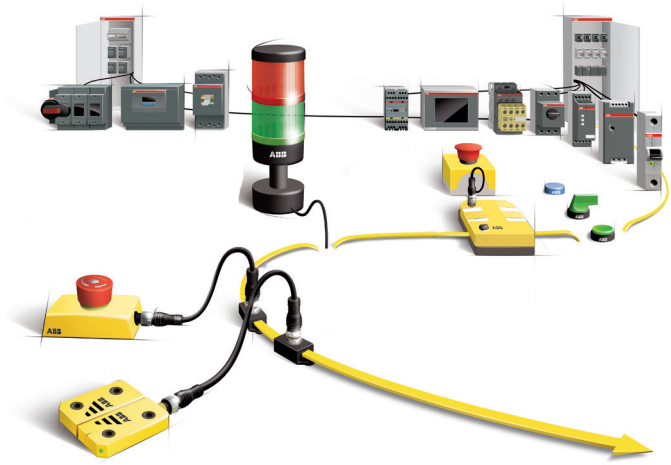

**Simplify calculation of your installation safety level**
AFS contactor safety data is available in safety design tools Sistema and FSDT, dedicated software for determining the Performance Level (PL) and Safety Integrity Level (SIL) of safety functions and generating technical documentations.



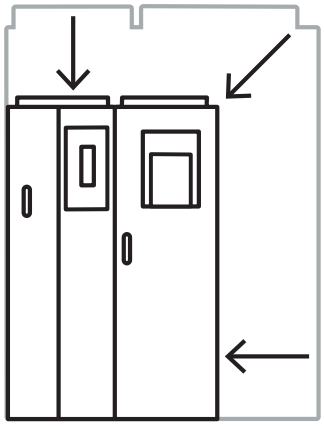
**Control by safety PLCs or safety relays**
ABB’s AFS contactors can be controlled directly by safety PLCs or safety relays, or by a power relay depending on size. AFS contactors is part of the ABB safety family, and selected sizes are tested together with ABB's Pluto safety PLC and the Sentry safety relay. For full coordination please advise ABB. The auxiliary contacts only require a minimum switching capacity of 3 V / 1 mA. They guarantee system status feedback, making the system safe and reliable.



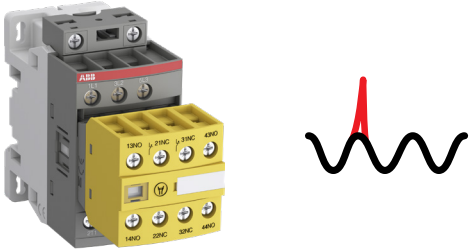

**Easy safety chain identification**
The yellow housing of ABB’s AFS contactors makes identifying the safety product in your panel quicker. During routine maintenance work, ABB’s intuitive design saves valuable time.



**Panel size reduction**
Utilizing AF technology, AFS coils needs up to 60% less energy than conventional contactor coils. This allows for smaller transformers to be used for contactor control, which in turn allows for more efficient use of panel space. Using AFS contactors saves money and precious space.

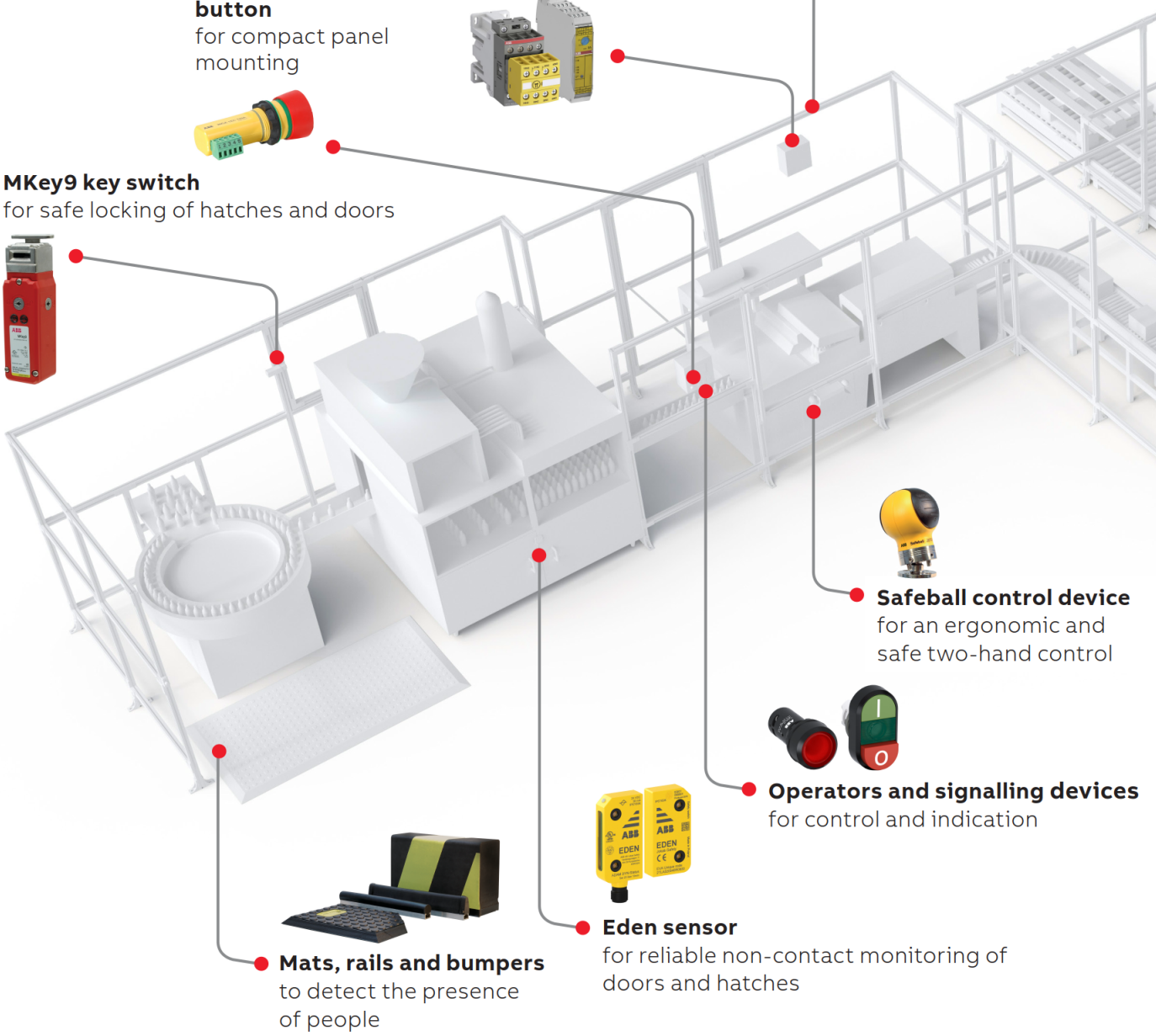


**Built-in surge suppression**
Unlike conventional contactors, ABB's AFS contactors have built-in surge suppression, preventing surges from ever reaching the control circuit. With no need for the usual external surge suppressor add-ons, ABB’s solution means one less device to install and one less complication to manage.



# AFS 3-pole contactors

## A part of ABB's complete safety solutions



**Magne magnetic lock**
to keep doors and hatches locked during a process



**Pluto programmable safety controller, Vital safety controller and Sentry safety relays**
for flexible monitoring of safety devices



**Smile emergency stop button**
to safely stop machinery in hazardous situations




**Orion light guards**
for a production friendly safety detection






**Knox safety lock**
for safe locking of doors



**JSDH4 three-position device**
for safe and ergonomic inspection and troubleshooting



**LineStrong pull wire emergency stop switch**
for easy access of emergency stop function

03

# AFS09 ... AFS38 3-pole contactors for safety applications

## 4 to 18.5 kW

## AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts




AFS16-30-22




AFS38-30-22

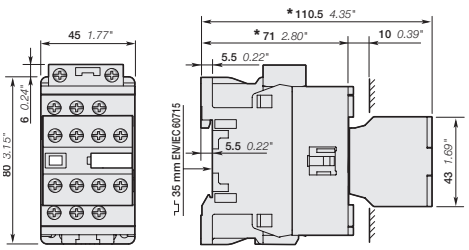
AFS09 ... AFS38 contactors are designed for machine safety applications. They are delivered with fixed front-mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits.

Mechanically linked and mirror contacts make your system safer.

- control circuit with electronic coil interface:
  - dedicated 24 V DC for direct control by PLC-output ≥ 250 mA, low holding consumption up to 1.7 W
  - 24...60 V AC, 20...60 V DC and 100...250 V AC / DC operated accepting a wide control voltage range
  - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- front-mounted auxiliary contact block:
  - permanently fixed
  - protective cover to prevent manual operation
  - yellow housing for easy identification
  - minimum switching capacity 12 V / 3 mA, with a failure rate $10^{-7}$ acc. to IEC 60947-5-4
- built-in surge suppression

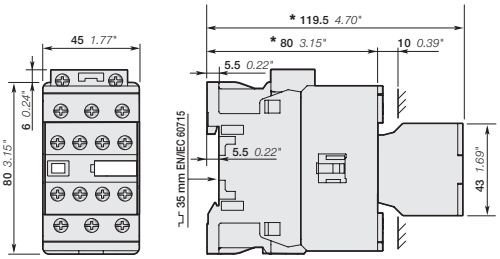
| IEC | | UL/CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3, AC3-e | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 4 | 25 | 5 | 25 | - | 24 | 2 2 | AFS09Z-30-22-30 | 1SBL136082R3022 | 0.490 |
| | | | | 24 ... 60 | 20 ... 60 (1) | 2 2 | AFS09-30-22-11 | 1SBL137082R1122 | 0.320 |
| | | | | 100 ... 250 | 100 ... 250 | 2 2 | AFS09-30-22-13 | 1SBL137082R1322 | 0.320 |
| 5.5 | 28 | 7-1/2 | 28 | - | 24 | 2 2 | AFS12Z-30-22-30 | 1SBL156082R3022 | 0.490 |
| | | | | 24 ... 60 | 20 ... 60 (1) | 2 2 | AFS12-30-22-11 | 1SBL157082R1122 | 0.320 |
| | | | | 100 ... 250 | 100 ... 250 | 2 2 | AFS12-30-22-13 | 1SBL157082R1322 | 0.320 |
| 7.5 | 30 | 10 | 30 | - | 24 | 2 2 | AFS16Z-30-22-30 | 1SBL176082R3022 | 0.490 |
| | | | | 24 ... 60 | 20 ... 60 (1) | 2 2 | AFS16-30-22-11 | 1SBL177082R1122 | 0.320 |
| | | | | 100 ... 250 | 100 ... 250 | 2 2 | AFS16-30-22-13 | 1SBL177082R1322 | 0.320 |
| 11 | 45 | 15 | 45 | - | 24 | 2 2 | AFS26Z-30-22-30 | 1SBL236082R3022 | 0.540 |
| | | | | 24 ... 60 | 20 ... 60 (1) | 2 2 | AFS26-30-22-11 | 1SBL237082R1122 | 0.360 |
| | | | | 100 ... 250 | 100 ... 250 | 2 2 | AFS26-30-22-13 | 1SBL237082R1322 | 0.360 |
| 15 | 50 | 20 | 50 | - | 24 | 2 2 | AFS30Z-30-22-30 | 1SBL276082R3022 | 0.540 |
| | | | | 24 ... 60 | 20 ... 60 | 2 2 | AFS30-30-22-11 | 1SBL277082R1122 | 0.360 |
| | | | | 100 ... 250 | 100 ... 250 (1) | 2 2 | AFS30-30-22-13 | 1SBL277082R1322 | 0.360 |
| 18.5 | 50 | 25 | 50 | - | 24 | 2 2 | AFS38Z-30-22-30 | 1SBL296082R3022 | 0.540 |
| | | | | 24 ... 60 | 20 ... 60 (1) | 2 2 | AFS38-30-22-11 | 1SBL297082R1122 | 0.360 |
| | | | | 100 ... 250 | 100 ... 250 | 2 2 | AFS38-30-22-13 | 1SBL297082R1322 | 0.360 |

(1) AFS..-30-..-11 for control by transistor outputs of safety PLCs and safety relays use interface relay RA4 1SBN060100R1000.




AFS09, AFS12, AFS16

* For AFS09Z, AFS12Z, AFS16Z-30-22-30: depth + 20 mm (+ 0.79")




AFS26, AFS30, AFS38

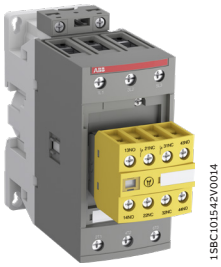
* For AFS26Z, AFS30Z, AFS38Z-30-22-30: depth + 20 mm (+ 0.79")

Main dimensions mm, inches

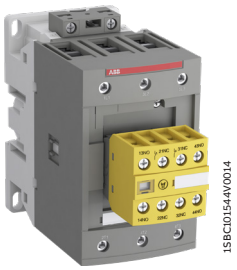
# AFS40 ... AFS96 3-pole contactors for safety applications

18.5 to 45 kW

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts




AFS65-30-22



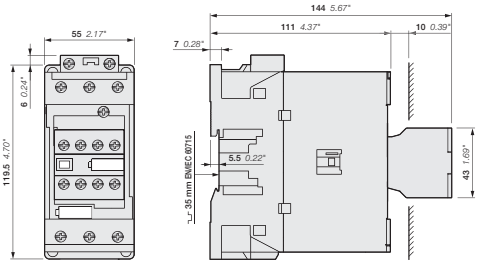

AFS96-30-22

AFS40 ... AFS96 contactors are designed for machine safety applications. They are delivered with fixed front-mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits. Mechanically linked and mirror contacts make your system safer.

- control circuit with electronic coil interface:
  - 24...60 V AC, 20...60 V DC and 100...250 V AC / DC operated accepting a wide control voltage range
  - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- front-mounted auxiliary contact block:
  - permanently fixed
  - protective cover to prevent manual operation
  - yellow housing for easy identification
  - minimum switching capacity 12 V / 3 mA, with a failure rate $10^{-7}$ acc. to IEC 60947-5-4
- built-in surge suppression

| IEC | | UL/CSA | | Rated control circuit voltage Uc min. ... Uc max. | | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3, AC3-e | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | | kg |
| 18.5 | 70 | 30 | 60 | 24 ... 60 | 20 ... 60 | (1) | 2 2 | AFS40-30-22-11 | 1SBL347082R1122 | 1.020 |
| | | | | 100 ... 250 | 100 ... 250 | | 2 2 | AFS40-30-22-13 | 1SBL347082R1322 | 1.000 |
| 22 | 100 | 40 | 80 | 24 ... 60 | 20 ... 60 | (1) | 2 2 | AFS52-30-22-11 | 1SBL367082R1122 | 1.020 |
| | | | | 100 ... 250 | 100 ... 250 | | 2 2 | AFS52-30-22-13 | 1SBL367082R1322 | 1.000 |
| 30 | 105 | 50 | 90 | 24 ... 60 | 20 ... 60 | (1) | 2 2 | AFS65-30-22-11 | 1SBL387082R1122 | 1.020 |
| | | | | 100 ... 250 | 100 ... 250 | | 2 2 | AFS65-30-22-13 | 1SBL387082R1322 | 1.000 |
| 37 | 125 | 60 | 105 | 24 ... 60 | 20 ... 60 | (1) | 2 2 | AFS80-30-22-11 | 1SBL397082R1122 | 1.270 |
| | | | | 100 ... 250 | 100 ... 250 | | 2 2 | AFS80-30-22-13 | 1SBL397082R1322 | 1.220 |
| 45/55 | 130 | 60/75 | 115 | 24 ... 60 | 20 ... 60 | (1) | 2 2 | AFS96-30-22-11 | 1SBL407082R1122 | 1.270 |
| | | | | 100 ... 250 | 100 ... 250 | | 2 2 | AFS96-30-22-13 | 1SBL407082R1322 | 1.220 |

(1) AFS..-30-..-11 for control by transistor outputs of safety PLCs and safety relays use interface relay RA4 1SBN060100R1000.



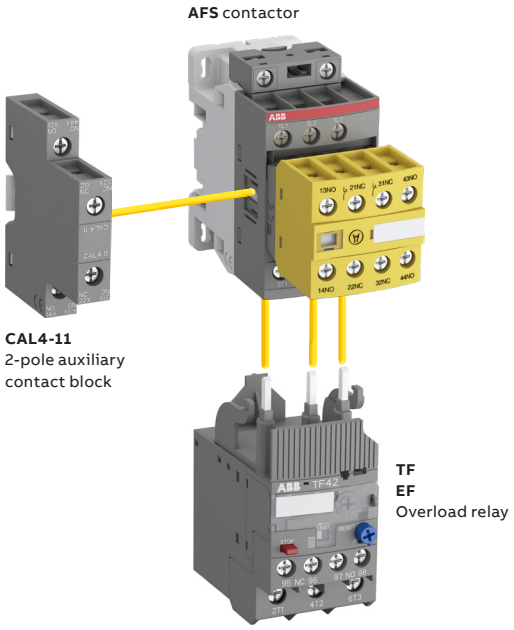

AFS40, AFS52, AFS65

AFS80, AFS96

Main dimensions mm, inches

# AFS09 ... AFS96 3-pole contactors for safety applications

## Contactors and main accessories




**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories Auxiliary contact blocks 1-pole CA4 | 2-pole CAT4-11 | 4-pole CA4 | Electronic timer TEF4 | Mechanical interlock unit (between 2 contactors) VM.. | | Side-mounted accessories Auxiliary contact blocks 2-pole CAL4-11 Left side | Right side |
|---|---|---|---|---|---|---|---|---|---|---|
| AFS09 ... AFS38 | 3 0 | 2 2 | – | – | – | – | 1 | + | 1 | **or** 1 |
| AFS09Z ... AFS38Z | 3 0 | 2 2 | – | – | – | – | 1 | | – | – |
| AFS40 ... AFS96 | 3 0 | 2 2 | – | – | – | – | – | + | 1 | + 1 |
| | | | – | – | – | – | 1 | + | 1 | **or** 1 |

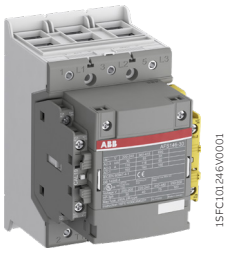
**Overload relays fitting details** (1)

| Contactor types | Thermal overload relays | Electronic overload relays |
|---|---|---|
| AFS09 ... AFS38 | TF42 (0.10...38 A) | EF19 (0.10...19 A) |
| AFS26 ... AFS38 | TF42 (0.10...38 A) | EF45 (9...45 A) |
| AFS40 ... AFS65 | TF65 (22...67 A) | EF65 (20...70 A) |
| AFS80, AFS96 | TF96 (40...96 A) | EF96 (36...100 A) |

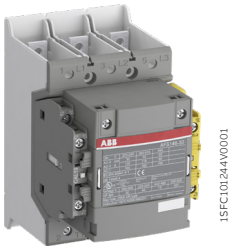
The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.
(1) Direct mounting - No kit required.

# AFS116 ... AFS146 3-pole contactors for safety applications
# 55 to 75 kW

## AC / DC operated with 1 N.O. + 2 N.C. auxiliary contacts




AFS146-30-12




AFS146-30-12B

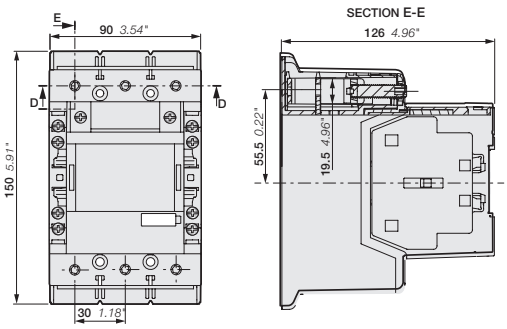
AFS116 ... AFS146 contactors are designed for machine safety applications. They are delivered with fixed 1 left (1 N.O + 1 N.C.) and 1 right (1 N.C.) side mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits.

Mechanically linked contacts make your system safer.

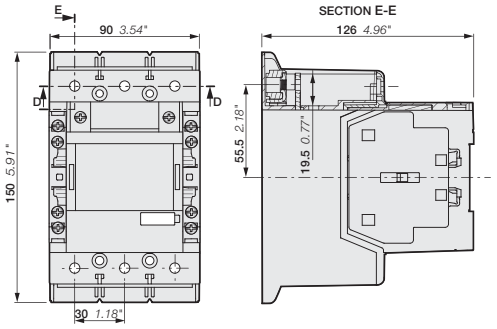
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- side-mounted auxiliary contact blocks:
  - permanently fixed
  - yellow housing for easy identification
  - minimum switching capacity 3 V / 1 mA, with a failure rate $10^{-7}$ acc. to IEC 60947-5-4
- built-in surge suppression

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| **For connection with built-in cable clamps** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 1 2 | AFS116-30-12-11 | 1SFL427081R1112 | 1.750 |
| | | | | 48...130 | 48...130 | 1 2 | AFS116-30-12-12 | 1SFL427081R1212 | 1.750 |
| | | | | 100...250 | 100...250 | 1 2 | AFS116-30-12-13 | 1SFL427081R1312 | 1.750 |
| | | | | 250...500 | 250...500 | 1 2 | AFS116-30-12-14 | 1SFL427081R1412 | 1.750 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 1 2 | AFS146-30-12-11 | 1SFL467081R1112 | 1.750 |
| | | | | 48...130 | 48...130 | 1 2 | AFS146-30-12-12 | 1SFL467081R1212 | 1.750 |
| | | | | 100...250 | 100...250 | 1 2 | AFS146-30-12-13 | 1SFL467081R1312 | 1.750 |
| | | | | 250...500 | 250...500 | 1 2 | AFS146-30-12-14 | 1SFL467081R1412 | 1.750 |
| **With bar connections** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 1 2 | AFS116-30-12B-11 | 1SFL427082R1112 | 1.500 |
| | | | | 48...130 | 48...130 | 1 2 | AFS116-30-12B-12 | 1SFL427082R1212 | 1.500 |
| | | | | 100...250 | 100...250 | 1 2 | AFS116-30-12B-13 | 1SFL427082R1312 | 1.500 |
| | | | | 250...500 | 250...500 | 1 2 | AFS116-30-12B-14 | 1SFL427082R1412 | 1.500 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 1 2 | AFS146-30-12B-11 | 1SFL467082R1112 | 1.500 |
| | | | | 48...130 | 48...130 | 1 2 | AFS146-30-12B-12 | 1SFL467082R1212 | 1.500 |
| | | | | 100...250 | 100...250 | 1 2 | AFS146-30-12B-13 | 1SFL467082R1312 | 1.500 |
| | | | | 250...500 | 250...500 | 1 2 | AFS146-30-12B-14 | 1SFL467082R1412 | 1.500 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.




AFS116, AFS146-30-12

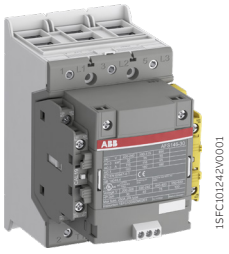



AFS116, AFS146-30-12B

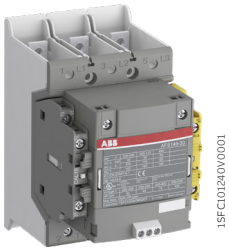
Main dimensions mm, inches

# AFS116 ... AFS146 3-pole contactors for safety applications with built-in PLC interface - 55 to 75 kW

## AC / DC operated with 1 N.O. + 2 N.C. auxiliary contacts




AFS146-30-12




AFS146-30-12B

AFS116 ... AFS146 contactors are designed for machine safety applications. They are delivered with fixed 1 left (1 N.O + 1 N.C.) and 1 right (1 N.C.) side mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits.

Mechanically linked contacts make your system safer.

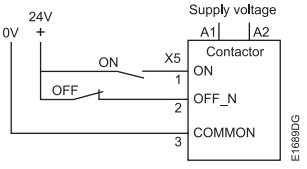
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- side-mounted auxiliary contact blocks:
  - permanently fixed
  - yellow housing for easy identification
  - minimum switching capacity 3 V / 1 mA, with a failure rate $10^{-7}$ acc. to IEC 60947-5-4
- built-in surge suppression

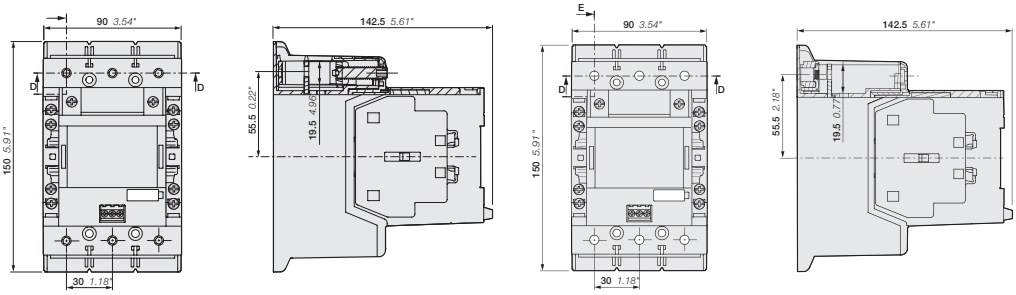
| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| **For connection with built-in cable clamps** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 100...250 | 100...250 | 1 2 | AFS116-30-12-33 | 1SFL427081R3312 | 1.750 |
| | | | | 250...500 | 250...500 | 1 2 | AFS116-30-12-34 | 1SFL427081R3412 | 1.750 |
| 75 | 225 | 100 | 200 | 100...250 | 100...250 | 1 2 | AFS146-30-12-33 | 1SFL467081R3312 | 1.750 |
| | | | | 250...500 | 250...500 | 1 2 | AFS146-30-12-34 | 1SFL467081R3412 | 1.750 |
| **With bar connections** | | | | | | | | | |
| 55 | 160 | 75 | 160 | 100...250 | 100...250 | 1 2 | AFS116-30-12B-33 | 1SFL427082R3312 | 1.500 |
| | | | | 250...500 | 250...500 | 1 2 | AFS116-30-12B-34 | 1SFL427082R3412 | 1.500 |
| 75 | 225 | 100 | 200 | 100...250 | 100...250 | 1 2 | AFS146-30-12B-33 | 1SFL467082R3312 | 1.500 |
| | | | | 250...500 | 250...500 | 1 2 | AFS146-30-12B-34 | 1SFL467082R3412 | 1.500 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AFS116 ... AFS146 are equipped with low voltage inputs for control, for example by a PLC.

### Control inputs



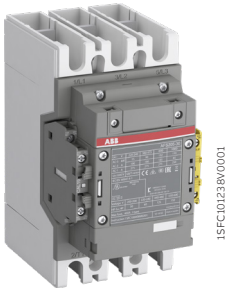

AFS116, AFS146-30-12

AFS116, AFS146-30-12B

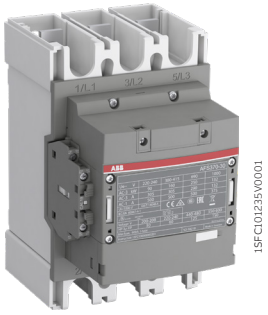
Main dimensions mm, inches

# AFS190 ... AFS370 3-pole contactors for safety applications 90 to 200 kW

## AC / DC operated with 1 N.O. + 2 N.C. auxiliary contacts




AFS205-30-12



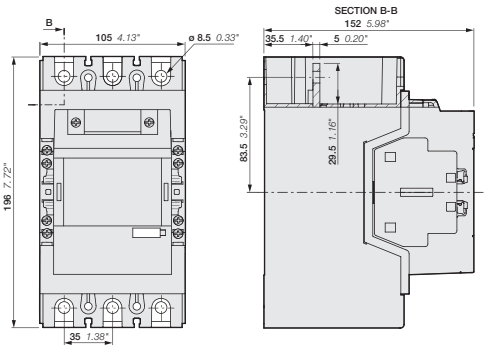

AFS370-30-12

AFS190 ... AFS370 contactors are designed for machine safety applications. They are delivered with fixed 1 left (1 N.O + 1 N.C.) and 1 right (1 N.C.) side mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits.

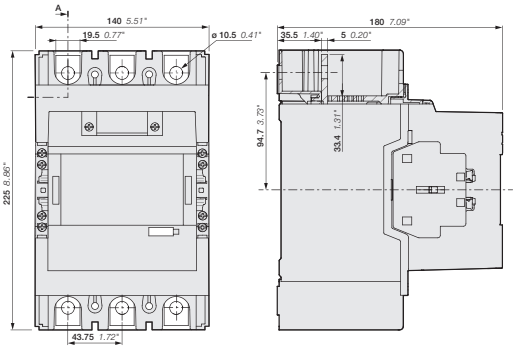
Mechanically linked contacts make your system safer.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- side-mounted auxiliary contact blocks:
  - permanently fixed
  - yellow housing for easy identification
  - minimum switching capacity 3 V / 1 mA, with a failure rate $10^{-7}$ acc. to IEC 60947-5-4
- built-in surge suppression

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 90 | 275 | 125 | 275 | 24...60 | 20...60 | 1 2 | AFS190-30-12-11 | 1SFL487082R1112 | 3.000 |
| | | | | 48...130 | 48...130 | 1 2 | AFS190-30-12-12 | 1SFL487082R1212 | 3.000 |
| | | | | 100...250 | 100...250 | 1 2 | AFS190-30-12-13 | 1SFL487082R1312 | 3.000 |
| | | | | 250...500 | 250...500 | 1 2 | AFS190-30-12-14 | 1SFL487082R1412 | 3.000 |
| 110 | 350 | 150 | 300 | 24...60 | 20...60 | 1 2 | AFS205-30-12-11 | 1SFL527082R1112 | 3.000 |
| | | | | 48...130 | 48...130 | 1 2 | AFS205-30-12-12 | 1SFL527082R1212 | 3.000 |
| | | | | 100...250 | 100...250 | 1 2 | AFS205-30-12-13 | 1SFL527082R1312 | 3.000 |
| | | | | 250...500 | 250...500 | 1 2 | AFS205-30-12-14 | 1SFL527082R1412 | 3.000 |
| 132 | 400 | 200 | 350 | 24...60 | 20...60 | 1 2 | AFS265-30-12-11 | 1SFL547082R1112 | 4.675 |
| | | | | 48...130 | 48...130 | 1 2 | AFS265-30-12-12 | 1SFL547082R1212 | 4.675 |
| | | | | 100...250 | 100...250 | 1 2 | AFS265-30-12-13 | 1SFL547082R1312 | 4.675 |
| | | | | 250...500 | 250...500 | 1 2 | AFS265-30-12-14 | 1SFL547082R1412 | 4.675 |
| 160 | 500 | 250 | 400 | 24...60 | 20...60 | 1 2 | AFS305-30-12-11 | 1SFL587082R1112 | 4.675 |
| | | | | 48...130 | 48...130 | 1 2 | AFS305-30-12-12 | 1SFL587082R1212 | 4.675 |
| | | | | 100...250 | 100...250 | 1 2 | AFS305-30-12-13 | 1SFL587082R1312 | 4.675 |
| | | | | 250...500 | 250...500 | 1 2 | AFS305-30-12-14 | 1SFL587082R1412 | 4.675 |
| 200 | 600 | 300 | 520 | 24...60 | 20...60 | 1 2 | AFS370-30-12-11 | 1SFL607082R1112 | 4.675 |
| | | | | 48...130 | 48...130 | 1 2 | AFS370-30-12-12 | 1SFL607082R1212 | 4.675 |
| | | | | 100...250 | 100...250 | 1 2 | AFS370-30-12-13 | 1SFL607082R1312 | 4.675 |
| | | | | 250...500 | 250...500 | 1 2 | AFS370-30-12-14 | 1SFL607082R1412 | 4.675 |




AFS190, AFS205

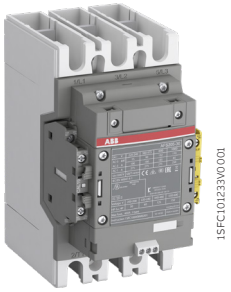



AFS265, AFS305, AFS370

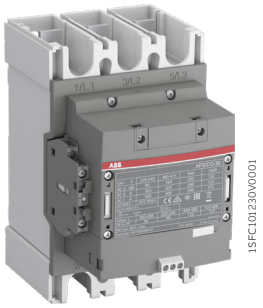
Main dimensions mm, inches

# AFS190 ... AFS370 3-pole contactors for safety applications with built-in PLC interface - 90 to 200 kW

## AC / DC operated with 1 N.O. + 2 N.C. auxiliary contacts




AFS205-30-12




AFS370-30-12

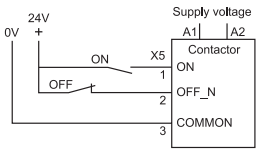
AFS190 ... AFS370 contactors are designed for machine safety applications. They are delivered with fixed 1 left (1 N.O + 1 N.C.) and 1 right ( 1 N.C.) side mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits. Mechanically linked contacts make your system safer.

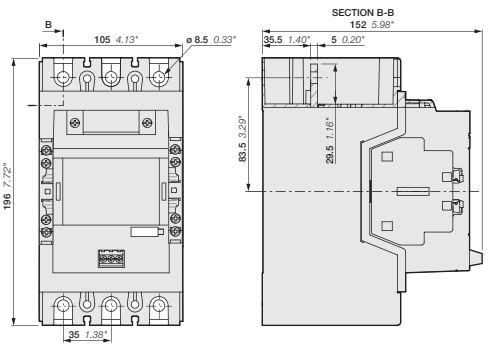
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- side-mounted auxiliary contact blocks:
  - permanently fixed
  - yellow housing for easy identification
  - minimum switching capacity 3 V / 1 mA, with a failure rate $10^{-7}$ acc. to IEC 60947-5-4
- built-in surge suppression

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50/60 Hz | V DC | | | | kg |
| 90 | 275 | 125 | 275 | 100...250 | 100...250 | 1 2 | AFS190-30-12-33 | 1SFL487082R3312 | 3.000 |
| | | | | 250...500 | 250...500 | 1 2 | AFS190-30-12-34 | 1SFL487082R3412 | 3.000 |
| 110 | 350 | 150 | 300 | 100...250 | 100...250 | 1 2 | AFS205-30-12-33 | 1SFL527082R3312 | 3.000 |
| | | | | 250...500 | 250...500 | 1 2 | AFS205-30-12-34 | 1SFL527082R3412 | 3.000 |
| 132 | 400 | 200 | 350 | 100...250 | 100...250 | 1 2 | AFS265-30-12-33 | 1SFL547082R3312 | 4.675 |
| | | | | 250...500 | 250...500 | 1 2 | AFS265-30-12-34 | 1SFL547082R3412 | 4.675 |
| 160 | 500 | 250 | 400 | 100...250 | 100...250 | 1 2 | AFS305-30-12-33 | 1SFL587082R3312 | 4.675 |
| | | | | 250...500 | 250...500 | 1 2 | AFS305-30-12-34 | 1SFL587082R3412 | 4.675 |
| 200 | 600 | 300 | 520 | 100...250 | 100...250 | 1 2 | AFS370-30-12-33 | 1SFL607082R3312 | 4.675 |
| | | | | 250...500 | 250...500 | 1 2 | AFS370-30-12-34 | 1SFL607082R3412 | 4.675 |

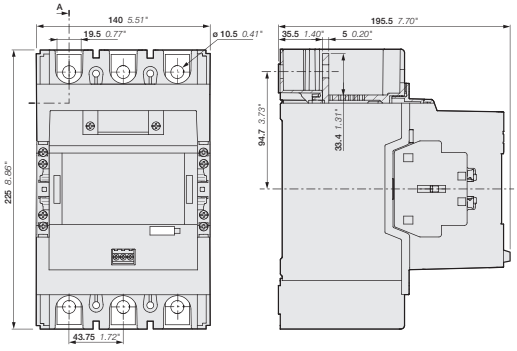
AFS190 ... AFS370 are equipped with low voltage inputs for control, for example by a PLC.

### Control inputs




AFS190, AFS205

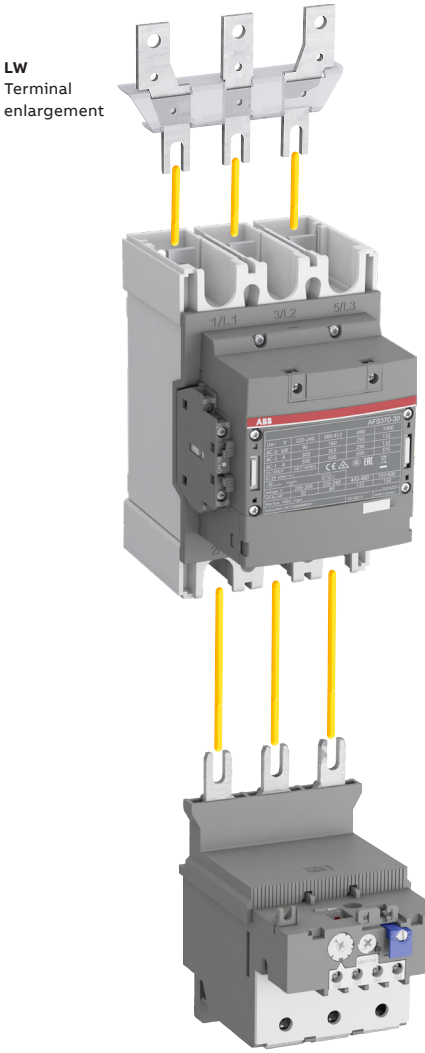



AFS265, AFS305, AFS370

Main dimensions mm, inches

# AFS116 ... AFS370 3-pole contactors for safety applications with 1 N.O. + 2 N.C. auxiliary contacts

## Contactors and main accessories




**LW**
Terminal enlargement

**AFS** contactor with built-in cable clamps

**TF/TA**
Thermal overload relay
**EF**
Electronic overload relay

**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

**Overload relays fitting details (1)**

| Contactor types | Thermal overload relays | Electronic overload relays |
|---|---|---|
| AFS116 | TF140DU (66...142 A) | EF146 (54...150 A) |
| AFS146 | – | EF146 (54...150 A) |
| AFS190, AFS205 | TA200DU (66...200 A) | EF205 (63...210 A) |
| AFS265 ... AFS370 | – | EF370 (115...380 A) |

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
(1) Direct mounting - No kit required.

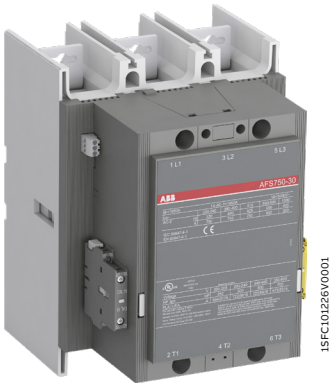
03

# AFS400 ... AFS750 3-pole contactors for safety applications 200 to 400 kW

## AC / DC operated with 1 N.O. + 2 N.C. auxiliary contacts




AFS460-30-12




AFS750-30-12

AFS400 ... AFS750 contactors are designed for machine safety applications. They are delivered with fixed 1 left (1 N.O + 1 N.C.) and 1 right (1 N.C.) side mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits.

Mechanically linked contacts make your system safer.

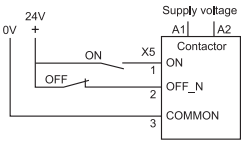
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- side-mounted auxiliary contact blocks:
  - permanently fixed
  - yellow housing for easy identification
  - minimum switching capacity 3 V / 1 mA, with a failure rate $10^{-7}$ acc. to IEC 60947-5-4
- built-in surge suppression

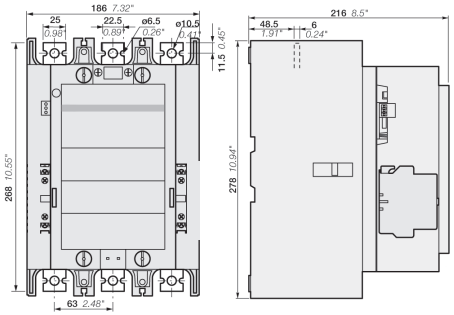
| IEC | | UL/CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C 690 V AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | V 50/60 Hz | V DC | | | | Pkg (1 pce) |
| kW | A | hp | A | | | | | | kg |
| 200 | 600 | 350 | 550 | - | 24...60 | 1 2 | AFS400-30-12-68 | 1SFL577081R6812 (1) | 12.000 |
| | | | | 48...130 | 48...130 | 1 2 | AFS400-30-12-69 | 1SFL577081R6912 | 12.000 |
| | | | | 100...250 | 100...250 | 1 2 | AFS400-30-12-70 | 1SFL577081R7012 | 12.000 |
| | | | | 250...500 | 250...500 | 1 2 | AFS400-30-12-71 | 1SFL577081R7112 | 12.000 |
| 250 | 700 | 400 | 650 | - | 24...60 | 1 2 | AFS460-30-12-68 | 1SFL597081R6812 (1) | 12.000 |
| | | | | 48...130 | 48...130 | 1 2 | AFS460-30-12-69 | 1SFL597081R6912 | 12.000 |
| | | | | 100...250 | 100...250 | 1 2 | AFS460-30-12-70 | 1SFL597081R7012 | 12.000 |
| | | | | 250...500 | 250...500 | 1 2 | AFS460-30-12-71 | 1SFL597081R7112 | 12.000 |
| 315 | 800 | 500 | 750 | - | 24...60 | 1 2 | AFS580-30-12-68 | 1SFL617081R6812 (1) | 15.000 |
| | | | | 48...130 | 48...130 | 1 2 | AFS580-30-12-69 | 1SFL617081R6912 | 15.000 |
| | | | | 100...250 | 100...250 | 1 2 | AFS580-30-12-70 | 1SFL617081R7012 | 15.000 |
| | | | | 250...500 | 250...500 | 1 2 | AFS580-30-12-71 | 1SFL617081R7112 | 15.000 |
| 400 | 1050 | 600 | 900 | - | 24...60 | 1 2 | AFS750-30-12-68 | 1SFL637081R6812 (1) | 15.000 |
| | | | | 48...130 | 48...130 | 1 2 | AFS750-30-12-69 | 1SFL637081R6912 | 15.000 |
| | | | | 100...250 | 100...250 | 1 2 | AFS750-30-12-70 | 1SFL637081R7012 | 15.000 |
| | | | | 250...500 | 250...500 | 1 2 | AFS750-30-12-71 | 1SFL637081R7112 | 15.000 |

(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
(2) Up to 850 V DC for AFS580, AFS750.

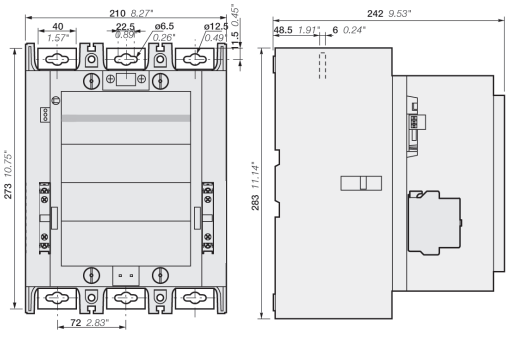
AFS400...AFS750 are equipped with low voltage inputs for control, for example by a PLC.

### Control inputs




AFS400, AFS460

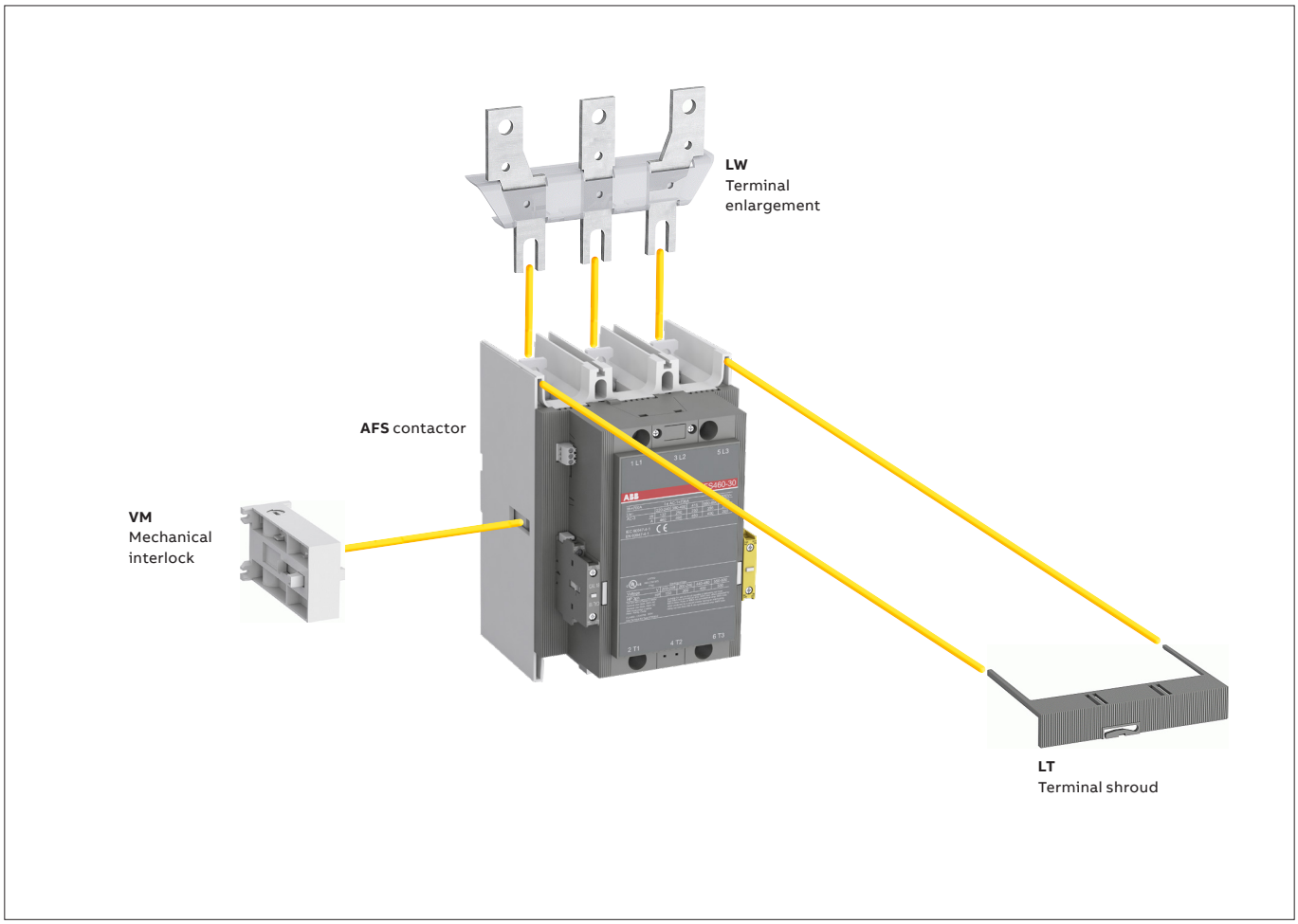



AFS580, AFS750

Main dimensions mm, inches

# AFS400 ... AFS750 3-pole contactors for safety applications with 1 N.O. + 2 N.C. auxiliary contacts

## Contactors and main accessories




**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

**Overload relays fitting details**

| Contactor types | Thermal overload relays | Electronic overload relays |
|---|---|---|
| AFS400, AFS460 | – | EF460 (150...500 A) (3) |
| AFS580, AFS750 | – | EF750 (250...800 A) (3) |

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
(3) Mounting kit required (see "Motor protection").

# AFS09 ... AFS96 3-pole contactors for safety applications

## Technical data



### Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AFS09 | AFS12 | AFS16 | AFS26 | AFS30 | AFS38 | AFS40 | AFS52 | AFS65 | AFS80 | AFS96 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1 | | | | | | | | | | |
| Rated operational voltage Ue max. | | 690 V | | | | | | | | | 1000 V | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | | | | | | |
| Conventional free-air thermal current Ith | | | | | | | | | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 35 A | 35 A | 35 A | 50 A | 50 A | 50 A | 105 A | 105 A | 105 A | 130 A | 130 A |
| With conductor cross-sectional area | | 6 mm² | 6 mm² | 6 mm² | 10 mm² | 10 mm² | 10 mm² | 35 mm² | 35 mm² | 35 mm² | 50 mm² | 50 mm² |
| AC-1 Utilization category | | | | | | | | | | | | |
| For air temperature close to contactor | | | | | | | | | | | | |
| Ie / Rated operational current AC-1 | θ ≤ 40 °C | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A | 70 A | 100 A | 105 A | 125 A | 130 A |
| Ue max. ≤ 690 V, 50/60 Hz | θ ≤ 60 °C | 25 A | 28 A | 30 A | 40 A | 42 A | 42 A | 60 A | 80 A | 90 A | 100 A | 105 A |
| | θ ≤ 70 °C | 22 A | 24 A | 26 A | 32 A | 37 A | 37 A | 50 A | 70 A | 80 A | 85 A | 90 A |
| With conductor cross-sectional area | | 4 mm² | 6 mm² | 6 mm² | 10 mm² | 10 mm² | 10 mm² | 25 mm² | 35 mm² | 35 mm² | 50 mm² | 50 mm² |
| AC-3, AC-3e Utilization category | | | | | | | | | | | | |
| For air temperature close to contactor θ ≤ 60 °C | | | | | | | | | | | | |
| Ie / Max. rated operational current AC-3, AC-3e (1) | | | | | | | | | | | | |
| AC-3e Ue ≤ 690 V | 220-230-240 V | 9 A | 12 A | 18 A | 26 A | 33 A | 40 A | 40 A | 53 A | 65 A | 80 A | 105 A |
| | 380-400 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A | 40 A | 53 A | 65 A | 80 A | 105 A |
|  3-phase motors | 415 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A | 40 A | 53 A | 65 A | 80 A | 96 A |
| | 440 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A | 40 A | 53 A | 65 A | 80 A | 96 A |
| | 500 V | 9.5 A | 12.5 A | 15 A | 23 A | 28 A | 33 A | 35 A | 45 A | 55 A | 65 A | 80 A |
| | 690 V | 7 A | 9 A | 10.5 A | 17 A | 21 A | 24 A | 25 A | 35 A | 39 A | 49 A | 57 A |
| | 1000 V | | | | | | | | | | 25 A | 30 A |
| Rated operational power AC-3, AC-3e (1) | | | | | | | | | | | | |
| AC-3e Ue ≤ 690 V | 220-230-240 V | 2.2 kW | 3 kW | 4 kW | 6.5 kW | 9 kW | 11 kW | 11 kW | 15 kW | 18.5 kW | 22 kW | 30 kW |
| | 380-400 V | 4 kW | 5.5 kW | 7.5 kW | 11 kW | 15 kW | 18.5 kW | 18.5 kW | 22 kW | 30 kW | 37 kW | 55 kW |
|  1500 r.p.m. 50 Hz<br>1800 r.p.m. 60 Hz<br>3-phase motors | 415 V | 4 kW | 5.5 kW | 9 kW | 11 kW | 15 kW | 18.5 kW | 22 kW | 30 kW | 37 kW | 45 kW | 55 kW |
| | 440 V | 4 kW | 5.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW | 22 kW | 30 kW | 37 kW | 45 kW | 55 kW |
| | 500 V | 5.5 kW | 7.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW | 22 kW | 30 kW | 37 kW | 45 kW | 55 kW |
| | 690 V | 5.5 kW | 7.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW | 22 kW | 30 kW | 37 kW | 45 kW | 55 kW |
| | 1000 V | | | | | | | | | | 35 kW | 40 kW |
| Rated making capacity AC-3, AC-3e | | 10 x Ie AC-3, 12 x Ie AC-3e acc. to IEC 60947-4-1 | | | | | | | | | | |
| Rated breaking capacity AC-3, AC-3e | | 8 x Ie AC-3, 8.5 x Ie AC-3e acc. to IEC 60947-4-1 | | | | | | | | | | |
| AC-8a Utilization category | | | | | | | | | | | | |
| (without thermal overload relay | | | | | | | | | | | | |
| Ue 400 V 50/60 Hz - θ ≤ 40 °C) | | | | | | | | | | | | |
| Ie / Rated operational current AC-8a | | 12 A | 16 A | 22 A | 30 A | 40 A | 50 A | 53 A | 70 A | 85 A | 105 A | 120 A |
| Rated operational power AC-8a | | 5.5 kW | 7.5 kW | 11 kW | 15 kW | 20 kW | 25 kW | 25 kW | 37 kW | 45 kW | 55 kW | 65 kW |
| Short-circuit protection device for contactors | | | | | | | | | | | | |
| without thermal overload relay | | | | | | | | | | | | |
| Motor protection excluded (2) | | | | | | | | | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 25 A | 32 A | 32 A | 50 A | 63 A | 63 A | 100 A | 125 A | 160 A | 160 A | 200 A |
| Rated short-time withstand current Icw | 1 s | 300 A | 300 A | 300 A | 700 A | 700 A | 700 A | 1000 A | 1000 A | 1000 A | 1200 A | 1200 A |
| at 40 °C ambient temperature, | 10 s | 150 A | 150 A | 150 A | 350 A | 350 A | 350 A | 600 A | 600 A | 600 A | 780 A | 780 A |
| in free air from a cold state | 30 s | 80 A | 80 A | 80 A | 225 A | 225 A | 225 A | 350 A | 350 A | 350 A | 450 A | 450 A |
| | 1 min | 60 A | 60 A | 60 A | 150 A | 150 A | 150 A | 250 A | 250 A | 250 A | 300 A | 300 A |
| | 15 min | 35 A | 35 A | 35 A | 50 A | 50 A | 50 A | 110 A | 110 A | 110 A | 140 A | 140 A |
| Maximum breaking capacity | | | | | | | | | | | | |
| cos ϕ = 0.45 | at 440 V | 250 A | 250 A | 250 A | 500 A | 500 A | 500 A | 950 A | 950 A | 950 A | 1150 A | 1150 A |
| | at 690 V | 106 A | 106 A | 106 A | 200 A | 200 A | 200 A | 600 A | 600 A | 600 A | 750 A | 750 A |
| Power dissipation per pole | Ie / AC-1 | 0.8 W | 1 W | 1.2 W | 1.8 W | 2.4 W | 2.4 W | 3 W | 6.3 W | 7 W | 7.6 W | 8.2 W |
| | Ie / AC-3, AC-3e | 0.1 W | 0.2 W | 0.35 W | 0.6 W | 0.9 W | 1.3 W | 1 W | 1.7 W | 2.7 W | 3 W | 4.5 W |
| Max. electrical switching frequency | AC-1 | 600 cycles/h | | | | | | | | | | |
| | AC-3, AC-3e | 1200 cycles/h | | | | | | | | | | |
| | AC-2, AC-4 | 300 cycles/h | | | 150 cycles/h | | | | | | | |
| B10d - Calculated for 50% of the rated current value Ie at AC-3 / 400 V | | 1.3 million operating cycles | | | | | | | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

# AFS116 ... AFS370 3-pole contactors for safety applications

## Technical data



### Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AFS116 | AFS146 | AFS190 | AFS205 | AFS265 | AFS305 | AFS370 |
|---|---|---|---|---|---|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1 | | | | | | |
| Rated operational voltage Ue max. | | 690 V | 1000 V | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | | |
| Conventional free-air thermal current Ith | | | | | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 160 A | 225 A | 275 A | 350 A | 400 A | 500 A | 600 A |
| With conductor cross-sectional area | | 70 mm² | 95 mm² | 150 mm² | 240 mm² (3) | 240 mm² | 300 mm² (4) | 2 x 185 mm² (4) |
| AC-1 Utilization category | | | | | | | | |
| For air temperature close to contactor | | | | | | | | |
| Ie / Rated operational current AC-1 | θ ≤ 40 °C | 160 A | 225 A | 275 A | 350 A | 400 A | 500 A | 600 A |
| Ue max. ≤ 690 V, 50/60 Hz | θ ≤ 60 °C | 145 A | 200 A | 250 A | 300 A | 350 A | 400 A | 500 A |
| | θ ≤ 70 °C | 130 A | 175 A | 200 A | 240 A | 290 A | 325 A | 400 A |
| Ie / Rated operational current AC-1 | θ ≤ 40 °C | – | 225 A | 250 A | 275 A | 350 A | 375 A | 400 A |
| Ue max. ≤ 1000 V, 50/60 Hz | θ ≤ 60 °C | – | 200 A | 225 A | 250 A | 300 A | 325 A | 350 A |
| | θ ≤ 70 °C | – | 175 A | 185 A | 200 A | 240 A | 260 A | 290 A |
| With conductor cross-sectional area | | 70 mm² | 95 mm² | 150 mm² | 240 mm² (3) | 240 mm² | 300 mm² (4) | 2 x 185 mm² (4) |
| AC-3, AC-3e Utilization category | | | | | | | | |
| For air temperature close to contactor θ ≤ 60 °C | | | | | | | | |
| Ie / Max. rated operational current AC-3, AC-3e (1) | | | | | | | | |
| | 220-230-240 V | 116 A | 146 A | 190 A | 205 A | 265 A | 305 A | 370 A |
| | 380-400 V | 116 A | 146 A | 190 A | 205 A | 265 A | 305 A | 370 A |
|  3-phase motors | 415 V | 116 A | 146 A | 190 A | 205 A | 265 A | 305 A | 370 A |
| | 440 V | 116 A | 146 A | 190 A | 205 A | 265 A | 305 A | 370 A |
| | 500 V | 110 A | 130 A | 135 A | 165 A | 250 A | 290 A | 315 A |
| | 690 V | 65 A | 93 A | 135 A | 165 A | 250 A | 290 A | 315 A |
| | 1000 V | – | 60 A / 54 A | 85 A | 100 A | 113 A | 131 A | 141 A |
| Rated operational power AC-3, AC-3e (1) | | | | | | | | |
| | 220-230-240 V | 30 kW | 45 kW | 55 kW | 55 kW | 75 kW | 90 kW | 110 kW |
| | 380-400 V | 55 kW | 75 kW | 90 kW | 110 kW | 132 kW | 160 kW | 200 kW |
|  1500 r.p.m. 50 Hz<br>1800 r.p.m. 60 Hz<br>3-phase motors | 415 V | 55 kW | 75 kW | 90 kW | 110 kW | 132 kW | 160 kW | 200 kW |
| | 440 V | 75 kW | 90 kW | 110 kW | 132 kW | 160 kW | 160 kW | 200 kW |
| | 500 V | 75 kW | 90 kW | 90 kW | 110 kW | 200 kW | 200 kW | 250 kW |
| | 690 V | 55 kW | 90 kW | 132 kW | 160 kW | 200 kW | 250 kW | 315 kW |
| | 1000 V | – | 75 kW | 110 kW | 132 kW | 160 kW | 185 kW | 200 kW |
| Rated making capacity AC-3, AC-3e | | 10 x Ie AC-3, 12 x Ie AC-3e acc. to IEC 60947-4-1 | | | | | | |
| Rated breaking capacity AC-3, AC-3e | | 8 x Ie AC-3, 8.5 x Ie AC-3e acc. to IEC 60947-4-1 | | | | | | |
| Short-circuit protection device for contactors without thermal overload relay Motor protection excluded (2) | | | | | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 250 A | 315 A | 355 A | 400 A | 500 A | 500 A | 630 A |
| Rated short-time withstand current Icw | 1 s | 1300 A | 1460 A | 1900 A | 2050 A | 2650 A | 3050 A | 3700 A |
| at 40 °C ambient temperature, | 10 s | 928 A | 1168 A | 1520 A | 1640 A | 2120 A | 2440 A | 2960 A |
| in free air from a cold state | 30 s | 536 A | 674 A | 878 A | 947 A | 1224 A | 1409 A | 1709 A |
| | 1 min | 379 A | 477 A | 621 A | 670 A | 865 A | 996 A | 1208 A |
| | 15 min | 160 A | 225 A | 275 A | 350 A | 400 A | 500 A | 600 A |
| Maximum breaking capacity | | | | | | | | |
| cos ϕ = 0.45 | at 440 V | 2000 A | 3000 A | 3300 A | 3500 A | 3800 A | 4600 A | 5000 A |
| (cos ϕ = 0.35 for Ie > 100 A) | at 690 V | 1000 A | 1500 A | 2200 A | 2500 A | 3300 A | 3800 A | 4000 A |
| Power dissipation per pole | Ie / AC-1 | 12 W | 23 W | 15 W | 25 W | 32 W | 50 W | 72 W |
| | Ie / AC-3 | 6 W | 10 W | 7 W | 8 W | 14 W | 19 W | 27 W |
| Maximum electrical switching frequency | AC-1 | 300 cycles/h | | | | | | |
| | AC-3 | 300 cycles/h | | | | | | |
| | AC-2, AC-4 | 150 cycles/h | | | | | | |
| B10d - Calculated for 50% of the rated current value Ie at AC-3 / 400 V | | 1.3 million operating cycles | | | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
For AC-3e utilization category, please consult your ABB local sales organization AC-3e is valid up to AFS190.
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".
(3) For currents above 275 A use terminal enlargements or terminal extensions.
(4) For currents above 450 A use terminal enlargements or terminal extensions.

# AFS400 ... AFS750 3-pole contactors for safety applications

## Technical data



### Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AFS400 | AFS460 | AFS580 | AFS750 |
|---|---|---|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1 | | | |
| Rated operational voltage Ue max. | | 1000 V | | | |
| Rated frequency (without derating) | | 50/60 Hz | | | |
| Conventional free-air thermal current Ith | | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 600 A | 700 A | 800 A | 1050 A |
| With conductor cross-sectional area (3) | | 2x185 mm² | 2x240 mm² | 2x240 mm² | 800 mm² (4) |
| AC-1 Utilization category | | | | | |
| For air temperature close to contactor | | | | | |
| Ie / Rated operational current AC-1 | θ ≤ 40 °C | 600 A | 700 A | 800 A | 1050 A |
| Ue max. ≤ 690 V, 50/60 Hz | θ ≤ 55 °C | 500 A | 600 A | 700 A | 875 A |
| | θ ≤ 70 °C | 400 A | 480 A | 580 A | 720 A |
| Ie / Rated operational current AC-1 | θ ≤ 40 °C | 600 A | 700 A | 800 A | 1000 A |
| Ue max. ≤ 1000 V, 50/60 Hz | θ ≤ 55 °C | 500 A | 600 A | 700 A | 875 A |
| | θ ≤ 70 °C | 400 A | 480 A | 580 A | 720 A |
| With conductor cross-sectional area | | 2x185 mm² | 2x240 mm² | 2x240 mm² | 800 mm² (4) |
| AC-3 Utilization category | | | | | |
| For air temperature close to contactor θ ≤ 55 °C | | | | | |
| Ie / Max. rated operational current AC-3 (1) | | | | | |
| | 220-230-240 V | 400 A | 460 A | 580 A | 750 A |
| | 380-400 V | 400 A | 460 A | 580 A | 750 A |
|  3-phase motors | 415 V | 400 A | 460 A | 580 A | 750 A |
| | 440 V | 400 A | 460 A | 580 A | 750 A |
| | 500 V | 400 A | 460 A | 580 A | 750 A |
| | 690 V | 350 A | 400 A | 500 A | 650 A |
| | 1000 V | 155 A | 200 A | 250 A | 300 A |
| Rated operational power AC-3 (1) | | | | | |
| | 220-230-240 V | 110 kW | 132 kW | 160 kW | 220 kW |
| | 380-400 V | 200 kW | 250 kW | 315 kW | 400 kW |
|  1500 r.p.m. 50 Hz, 1800 r.p.m. 60 Hz 3-phase motors | 415 V | 220 kW | 250 kW | 355 kW | 425 kW |
| | 440 V | 220 kW | 250 kW | 355 kW | 450 kW |
| | 500 V | 250 kW | 315 kW | 400 kW | 520 kW |
| | 690 V | 315 kW | 355 kW | 500 kW | 600 kW |
| | 1000 V | 220 kW | 280 kW | 355 kW | 400 kW |
| Rated making capacity AC-3 | | 10 x Ie AC-3 acc. to IEC 60947-4-1 | | | |
| Rated breaking capacity AC-3 | | 8 x Ie AC-3 acc. to IEC 60947-4-1 | | | |
| Short-circuit protection device for contactors without thermal overload relay Motor protection excluded (2) | | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 630 A | 800 A | 1000 A | 1000 A |
| Rated short-time withstand current Icw | 1 s | 4600 A | 4600 A | 7000 A | 7000 A |
| at 40 °C ambient temperature, | 10 s | 4400 A | 4400 A | 6400 A | 6400 A |
| in free air from a cold state | 30 s | 3100 A | 3100 A | 4500 A | 4500 A |
| | 1 min | 2500 A | 2500 A | 3500 A | 3500 A |
| | 15 min | 840 A | 840 A | 1300 A | 1300 A |
| Maximum breaking capacity | | | | | |
| cos ϕ = 0.45 | at 440 V | 4000 A | 5000 A | 6000 A | 7500 A |
| (cos ϕ = 0.35 for Ie > 100 A) | at 690 V | 3500 A | 4500 A | 5000 A | 7000 A |
| Power dissipation per pole | Ie / AC-1 | 30 W | 42 W | 32 W | 50 W |
| | Ie / AC-3 | 16 W | 21 W | 17 W | 28 W |
| Max. electrical switching frequency | AC-1 | 300 cycles/h | | 300 cycles/h | |
| | AC-3 | 300 cycles/h | | 300 cycles/h | |
| | AC-2, AC-4 | 60 cycles/h | | 60 cycles/h | |
| B10d - Calculated for 50% of the rated current value Ie at AC-3 / 400 V | | 0.68 million operating cycles | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".
(3) Conductors with preparation.
(4) Max. connection bar width 50 mm.

# AFS09 ... AFS96 3-pole contactors for safety applications

## Technical data



### Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC / DC operated | AFS09 | AFS12 | AFS16 | AFS26 | AFS30 | AFS38 | AFS40 | AFS52 | AFS65 | AFS80 | AFS96 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Standards | | UL 60947-4-1, CSA-C22.2 No. 60947-4-1 | | | | | | UL 60947-1, UL 60947-4-1<br>CSA C22.2 No. 60947-1:22, CSA C22.2 No. 60947-4-1:22 | | | | |
| Maximum operational voltage | | 600 V | | | | | | | | | | |
| NEMA size | | 00 | 0 | - | 1 | - | - | 2 | - | - | 3 | - |
| NEMA continuous amp rating | Thermal current | 9 A | 18 A | - | 27 A | - | - | 45 A | - | - | 90 A | - |
| NEMA maximum horse power ratings 1-phase, 60 Hz | 115 V AC | 1/3 hp | 1 hp | - | 2 hp | - | - | 3 hp | - | - | - | - |
| | 230 V AC | 1 hp | 2 hp | - | 3 hp | - | - | 7.5 hp | - | - | - | - |
| NEMA maximum horse power ratings 3-phase, 60 Hz | 200 V AC | 1-1/2 hp | 3 hp | - | 7-1/2 hp | - | - | 10 hp | - | - | 25 hp | - |
| | 230 V AC | 1-1/2 hp | 3 hp | - | 7-1/2 hp | - | - | 15 hp | - | - | 30 hp | - |
| | 460 V AC | 2 hp | 5 hp | - | 10 hp | - | - | 25 hp | - | - | 50 hp | - |
| | 575 V AC | 2 hp | 5 hp | - | 10 hp | - | - | 25 hp | - | - | 50 hp | - |
| UL / CSA general use rating | | | | | | | | | | | | |
| 600 V AC | | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A | 60 A | 80 A | 90 A | 105 A | 115 A |
| With conductor cross-sectional area | | AWG 10 | AWG 10 | AWG 10 | AWG 8 | AWG 8 | AWG 8 | AWG 6 | AWG 4 | AWG 3 | AWG 2 | AWG 2 |
| 1 pole | 80 V DC | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A | 60 A | 80 A | 90 A | 105 A | 115 A |
| 2 poles in serie | 160 V DC | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A | 60 A | 80 A | 90 A | 105 A | 115 A |
| 3 poles in serie | 240 V DC | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A | 60 A | 80 A | 90 A | 105 A | 115 A |
| With conductor cross-sectional area | | AWG 10 | AWG 10 | AWG 10 | AWG 8 | AWG 8 | AWG 8 | AWG 6 | AWG 4 | AWG 3 | AWG 2 | AWG 2 |
| UL / CSA maximum 1-phase motor rating | | | | | | | | | | | | |
| Full load current | 120 V AC | 13.8 A | 16 A | 20 A | 24 A | 24 A | 24 A | 34 A | 34 A | 56 A | 80 A | 80 A |
| | 240 V AC | 10 A | 12 A | 17 A | 17 A | 28 A | 28 A | 40 A | 50 A | 68 A | 68 A | 88 A |
| Horse power rating | 120 V AC | 3/4 hp | 1 hp | 1-1/2 hp | 2 hp | 2 hp | 2 hp | 3 hp | 3 hp | 5 hp | 7-1/2 hp | 7-1/2 hp |
| | 240 V AC | 1-1/2 hp | 2 hp | 3 hp | 3 hp | 5 hp | 5 hp | 7-1/2 hp | 10 hp | 15 hp | 15 hp | 20 hp |
| UL / CSA maximum 3-phase motor rating | | | | | | | | | | | | |
| Full load current (1) | 200-208 V AC | 7.8 A | 11 A | 17.5 A | 25.3 A | 32.2 A | 32.2 A | 32.2 A | 48.3 A | 62.1 A | 78.2 A | 96 A |
| | 220-240 V AC | 6.8 A | 9.6 A | 15.2 A | 22 A | 28 A | 28 A | 42 A | 54 A | 68 A | 80 A | 96 A |
| | 440-480 V AC | 7.6 A | 11 A | 14 A | 21 A | 27 A | 34 A | 40 A | 52 A | 65 A | 77 A | 96 A |
| | 550-600 V AC | 9 A | 11 A | 17 A | 22 A | 27 A | 32 A | 41 A | 52 A | 62 A | 77 A | 77 A |
| Horse power rating (1) | 200-208 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp |
| | 220-240 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp | 40 hp |
| | 440-480 V AC | 5 hp | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp | 40 hp | 50 hp | 60 hp | 75 hp |
| | 550-600 V AC | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp | 40 hp | 50 hp | 60 hp | 75 hp | 75 hp |
| UL / CSA - DC motor starting - 3 poles in series | | | | | | | | | | | | |
| Full Load Amps | 125 V DC | 9.5 A | 13.2 A | 17 A | 25 A | 25 A | 25 A | 40 A | 58 A | 76 A | 76 A | 110 A |
| | 250 V DC | 8.5 A | 12.2 A | 12.2 A | 20 A | 29 A | 29 A | 38 A | 55 A | 72 A | 89 A | 106 A |
| Horse power rating | 125 V DC | 1 hp | 1-1/2 hp | 2 hp | 3 hp | 3 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp | 15 hp |
| | 250 V DC | 2 hp | 3 hp | 3 hp | 5 hp | 7-1/2 hp | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded | | | | | | | | | | | | |
| High fault current | | 100 kA | | | | | | | | | | |
| Fuse rating | | 30 A | | 60 A | | 100 A | | 150 A | | | 200 A | |
| Fuse type, 600 V | | J | | | | | | | | | | |
| Maximum electrical switching frequency | | | | | | | | | | | | |
| For general use | | 600 cycles/h | | | | | | | | | | |
| For motor use | | 1200 cycles/h | | | | | | | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

# AFS116 ... AFS370 3-pole contactors for safety applications

## Technical data



### Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC / DC operated | AFS116 | AFS146 | AFS190 | AFS205 | AFS265 | AFS305 | AFS370 |
|---|---|---|---|---|---|---|---|---|
| Standards | | UL 60947-4-1, CSA C22.2 No. 60947-4-1-14 | | | | | | |
| Maximum operational voltage | | 600 V | 1000 V | | | | | |
| NEMA size | | – | – | – | – | 5 | – | – |
| NEMA continuous amp rating | Thermal current | – | – | – | – | 270 A | – | – |
| NEMA maximum horse power ratings 1-phase, 60 Hz | 115 V AC | – | – | – | – | – | – | – |
| | 230 V AC | – | – | – | – | – | – | – |
| NEMA maximum horse power ratings 3-phase, 60 Hz | 200 V AC | – | – | – | – | 75 hp | – | – |
| | 230 V AC | – | – | – | – | 100 hp | – | – |
| | 460 V AC | – | – | – | – | 200 hp | – | – |
| | 575 V AC | – | – | – | – | 200 hp | – | – |
| UL / CSA general use rating | | | | | | | | |
| 600 V AC | | 160 A | 200 A | 275 A | 300 A | 350 A | 400 A | 520 A |
| With conductor cross-sectional area | | AWG 2/0 | AWG 3/0 | MCM 250 | MCM 350 (2) | MCM 500 | 2//AWG 3/0 | 2//MCM 300 |
| 1 000 V AC | | – | 200 A | 250 A | 275 A | 300 A | 350 A | 400 A |
| With conductor cross-sectional area | | AWG 2/0 | AWG 3/0 | MCM 250 | MCM 350 (2) | MCM 500 | 2//AWG 3/0 | 2//MCM 300 |
| 1 pole | 90 V DC | 160 A | 200 A | – | – | – | – | – |
| | 100 V DC | – | – | 250 A | 350 A | – | – | – |
| | 110 V DC | – | – | – | – | 400 A | 500 A | 520 A |
| 2 poles in serie | 175 V DC | 160 A | 200 A | – | – | – | – | – |
| | 200 V DC | – | – | 250 A | 350 A | – | – | – |
| | 225 V DC | – | – | – | – | 400 A | 500 A | 520 A |
| 3 poles in serie | 260 V DC | 160 A | 200 A | – | – | – | – | – |
| | 300 V DC | – | – | 250 A | 350 A | – | – | – |
| | 340 V DC | – | – | – | – | 400 A | 500 A | 520 A |
| With conductor cross-sectional area | | AWG 2/0 | AWG 3/0 | MCM 250 | MCM 350 (2) | MCM 500 | 2//AWG 3/0 | 2//MCM 300 |
| UL / CSA maximum 1-phase motor rating | | | | | | | | |
| Full load current | 120 V AC | – | – | – | – | – | – | – |
| | 240 V AC | – | – | – | – | – | – | – |
| Horse power rating | 120 V AC | – | – | – | – | – | – | – |
| | 240 V AC | – | – | – | – | – | – | – |
| UL / CSA maximum 3-phase motor rating | | | | | | | | |
| Full load current (1) | 200-208 V AC | 92 A | 120 A | 150 A | 177 A | 221 A | 285 A | 359 A |
| | 220-240 V AC | 104 A | 130 A | 154 A | 192 A | 248 A | 312 A | 360 A |
| | 440-480 V AC | 96 A | 124 A | 156 A | 180 A | 240 A | 302 A | 361 A |
| | 550-600 V AC | 99 A | 125 A | 144 A | 192 A | 242 A | 289 A | 336 A |
| Horse power rating (1) | 200-208 V AC | 30 hp | 40 hp | 50 hp | 60 hp | 75 hp | 100 hp | 125 hp |
| | 220-240 V AC | 40 hp | 50 hp | 60 hp | 75 hp | 100 hp | 125 hp | 150 hp |
| | 440-480 V AC | 75 hp | 100 hp | 125 hp | 150 hp | 200 hp | 250 hp | 300 hp |
| | 550-600 V AC | 100 hp | 125 hp | 150 hp | 200 hp | 250 hp | 300 hp | 350 hp |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded | | | | | | | | |
| High fault current | | 100 kA | | | | | | |
| Fuse rating | | 225 A | 250 A | 350 A | 400 A | 500 A | 600 A | 600 A |
| Fuse type, 600 V | | J | | | | | | |
| Maximum electrical switching frequency | | | | | | | | |
| For general use | | 300 cycles/h | | | | | | |
| For motor use | | 300 cycles/h | | | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For conductor cross-sectional area above MCM 300 use terminal enlargements LW205.

# AFS400 ... AFS750 3-pole contactors for safety applications

## Technical data



### Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC / DC operated | AFS400 | AFS460 | AFS580 | AFS750 |
|---|---|---|---|---|---|
| Standards | | UL 60947-4-1, CSA C22.2 No. 60947-4-1-14 | | | |
| Maximum operational voltage | | 1000 V | | | |
| NEMA size | | – | 6 | – | 7 |
| NEMA maximum horse power ratings | | | | | |
| 1-phase, 60 Hz | 115 V AC | – | | | |
| | 230 V AC | – | | | |
| NEMA maximum horse power ratings | | | | | |
| 3-phase, 60 Hz | 200 V AC | – | 150 hp | – | – |
| | 230 V AC | – | 200 hp | – | 300 hp |
| | 460 V AC | – | 400 hp | – | 600 hp |
| | 575 V AC | – | 400 hp | – | 600 hp |
| UL / CSA general use rating | | | | | |
| 1000 V AC | | 550 A | 650 A | 750 A | 900 A |
| 3 poles in serie | 600 V DC | 550 A | 650 A | 750 A | 900 A |
| UL / CSA maximum 1-phase motor rating | | | | | |
| Full load current | 120 V AC | – | – | – | – |
| | 240 V AC | – | – | – | – |
| Horse power rating | 120 V AC | – | – | – | – |
| | 240 V AC | – | – | – | – |
| UL / CSA maximum 3-phase motor rating | | | | | |
| Full load current (1) | 200-208 V AC | 358.8 A | 414 A | 552 A | 692.3 A |
| | 220-240 V AC | 360 A | 480 A | 604 A | 722 A |
| | 440-480 V AC | 414 A | 477 A | 590 A | 722 A |
| | 550-600 V AC | 382 A | 472 A | 578 A | 672 A |
| Horse power rating (1) | 200-208 V AC | 125 hp | 150 hp | 200 hp | 250 hp |
| | 220-240 V AC | 150 hp | 200 hp | 250 hp | 300 hp |
| | 440-480 V AC | 350 hp | 400 hp | 500 hp | 600 hp |
| | 550-600 V AC | 400 hp | 500 hp | 600 hp | 700 hp |
| Short-circuit protection device for contactors | | | | | |
| without thermal overload relay - Motor protection excluded | | | | | |
| Fuse rating | | 1000 A | | 1200 A | |
| Fuse type, 600 V | | L | | | |
| Maximum electrical switching frequency | | | | | |
| For general use | | 300 cycles/h | | | |
| For motor use | | 300 cycles/h | | | |

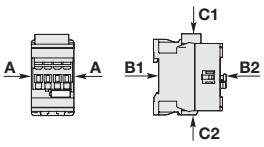
(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see “Motor rated operational powers and currents”.

# AFS09 ... AFS96 3-pole contactors for safety applications

## Technical data

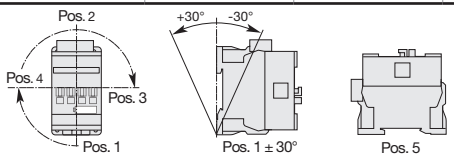


### General technical data

| Contactor types | AC / DC operated | AFS09 | AFS12 | AFS16 | AFS26 | AFS30 | AFS38 |
|---|---|---|---|---|---|---|---|
| Rated insulation voltage Ui | | | | | | | |
| acc. to IEC 60947-4-1 | | 690 V | | | | | |
| acc. to UL / CSA | | 600 V | | | | | |
| Rated impulse withstand voltage Uimp. | | 6 kV | | | | | |
| Electromagnetic compatibility | | Devices complying with IEC/EN 60947-1 - Environments A and B | | | | | |
| Pollution degree | | 3 | | | | | |
| Ambient air temperature close to contactor | | | | | | | |
| Operation Fitted with thermal overload relay | | -25 ... +60 °C | | | | | |
| Without thermal overload relay | | -40 ... +70 °C | | | | | |
| Storage | | -60 ... +80 °C | | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | | |
| Mechanical durability | | | | | | | |
| Number of operating cycles | | 10 million operating cycles | | | | | |
| Maximum switching frequency | | 3600 cycles/h | | | | | |
| Shock withstand | | | | | | | |
| acc. to IEC/EN 60068-2-27 | | | | | | | |
| Mounting position 1 | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | | | | |
|  | A | 30 g | | | | | |
| | B1 | 25 g closed position / 5 g open position | | | | | |
| | B2 | 15 g | | | | | |
| | C1 | 25 g | | | | | |
| | C2 | 25 g | | | | | |
| Vibration withstand | | 5 ... 300 Hz | | | | | |
| acc. to IEC 60068-2-6 | | 4 g Closed position / 2 g Open position | | | | | |



### Mounting characteristics and conditions for use

| Contactor types | AC / DC operated | AFS09 | AFS12 | AFS16 | AFS26 | AFS30 | AFS38 |
|---|---|---|---|---|---|---|---|
| Mounting positions | |  | | | | | |
| Mounting distances | | The contactors can be assembled side by side | | | | | |
| Fixing | | | | | | | |
| On rail according to IEC/EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | | | | | |
| By screws (not supplied) | | 2 x M4 screws placed diagonally | | | | | |

# AFS09 ... AFS38 3-pole contactors for safety applications

## Technical data

### Magnet system characteristics for AFS09 ... AFS38 contactors - AC / DC operated

| Contactor types | AC / DC operated | AFS09 | AFS12 | AFS16 | AFS26 | AFS30 | AFS38 |
|---|---|---|---|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max.<br>At θ ≤ 70 °C 0.85 x Uc min...Uc max. | | | | | |
| | DC supply | At θ ≤ 60 °C 0.85 x Uc min ... 1.1 x Uc max<br>At θ ≤ 70 °C 0.85 x Uc min ... Uc max | | | | | |
| AC control voltage 50/60 Hz | | | | | | | |
| Rated control circuit voltage Uc | | 24 ... 250 V AC | | | | | |
| Coil consumption | Average pull-in value | 50 VA | | | | | |
| | Average holding value | 2.2 VA / 2 W | | | | | |
| DC control voltage | | | | | | | |
| Rated control circuit voltage Uc | | 20 ... 250 V DC | | | | | |
| Coil consumption | Average pull-in value | 50 W | | | | | |
| | Average holding value | 2 W | | | | | |
| PLC-output control | | AFS..-30-22-11 not suitable for direct control by PLC-output. | | | | | |
| Drop-out voltage | | ≤ 60 % Uc min. | | | | | |
| Operating time | | | | | | | |
| Between coil energization and: | N.O. contact closing | 40 ... 95 ms | | | | | |
| | N.C. contact opening | 38 ... 90 ms | | | | | |
| Between coil de-energization and: | N.O. contact opening | 11 ... 95 ms (1) | | | | | |
| | N.C. contact closing | 13 ... 98 ms | | | | | |

(1) AFS09 ... AFS38 ≤ 35 ms for 20 °C ≤ θ ≤ 70 °C

### Magnet System Characteristics for AFS09Z ... AFS38Z contactors 24V DC operated - designed for PLC - coil 30

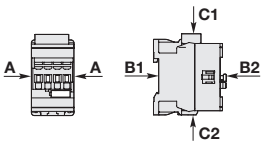
| Contactor types | DC operated | AFS09Z | AFS12Z | AFS16Z | AFS26Z | AFS30Z | AFS38Z |
|---|---|---|---|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | DC supply | At θ ≤ 60 °C 0.85 ... 1.1 x Uc<br>At θ ≤ 70 °C Uc | | | | | |
| DC control voltage | | | | | | | |
| Rated control circuit voltage Uc | | 24 V DC | | | | | |
| Coil consumption | Average pull-in value | 6 W | | | | | |
| | Average holding value | 1.7 W | | | | | |
| PLC-output control | | ≥ 250 mA 24 V DC for PLCs and safety PLCs using broken wire detection | | | | | |
| Drop-out voltage | | ≤ 60 % Uc min. | | | | | |
| Operating time | | | | | | | |
| Between coil energization and: | N.O. contact closing | 27 ... 53 ms | | | | | |
| | N.C. contact opening | 20 ... 35 ms | | | | | |
| Between coil de-energization and: | N.O. contact opening | 17 ... 29 ms | | | | | |
| | N.C. contact closing | 22 ... 57 ms | | | | | |

# AFS40 ... AFS96 3-pole contactors for safety applications

Technical data



## General technical data

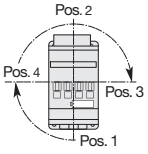
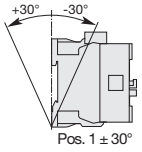
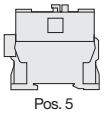
| Contactor types | AC / DC operated | AFS40 | AFS52 | AFS65 | AFS80 | AFS96 |
|---|---|---|---|---|---|---|
| Rated insulation voltage Ui | | | | | | |
| acc. to IEC 60947-4-1 | | 690 V | | | 1000 V | |
| acc. to UL / CSA | | 600 V | | | | |
| Rated impulse withstand voltage Uimp. | | 6 kV | | | 8 kV | |
| Electromagnetic compatibility | | Devices complying with IEC/EN 60947-1 - Environments A and B | | | | |
| Pollution degree | | 3 | | | | |
| Ambient air temperature close to contactor | | | | | | |
| Operation Fitted with thermal overload relay | | -40 ... +70 °C | | | | |
| Without thermal overload relay | | -40 ... +70 °C | | | | |
| Storage | | -60 ... +80 °C | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | |
| Mechanical durability | | | | | | |
| Number of operating cycles | | 10 million operating cycles | | | | |
| Maximum switching frequency | | 3600 cycles/h | | | | |
| Shock withstand | | | | | | |
| acc. to IEC/EN 60068-2-27 | | | | | | |
| Mounting position 1 | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | | | |
|  | A | 25 g | | | | |
| | B1 | 25 g closed position / 5 g open position | | | | |
| | B2 | 15 g | | | | |
| | C1 | 25 g | | | | |
| | C2 | 25 g | | | | |
| Vibration withstand | | 5 ... 300 Hz | | | | |
| acc. to IEC 60068-2-6 | | 3 g Closed position / 3 g Open position | | | | |



## Magnet system characteristics for AFS40 ... AFS96 contactors - AC / DC operated

| Contactor types | AC / DC operated | AFS40 | AFS52 | AFS65 | AFS80 | AFS96 |
|---|---|---|---|---|---|---|
| Coil operating limits | AC supply | At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max. | | | | |
| acc. to IEC 60947-4-1 | DC supply | At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max | | | | |
| AC control voltage 50/60 Hz | | | | | | |
| Rated control circuit voltage Uc | | 24 ... 250 V AC | | | | |
| Coil consumption | Average pull-in value | 25 VA | | | 40 VA | |
| | Average holding value | 4 VA / 2 W | | | | |
| DC control voltage | | | | | | |
| Rated control circuit voltage Uc | | 20 ... 250 V DC | | | | |
| Coil consumption | Average pull-in value | 25 W | | | 40 W | |
| | Average holding value | 2 W | | | | |
| PLC-output control | | AFS..-30-22-11 not suitable for direct control by PLC-output. | | | | |
| Drop-out voltage | | ≤ 60 % Uc min. | | | | |
| Operating time | | | | | | |
| Between coil energization and: | N.O. contact closing | 42 ... 100 ms | | | | |
| | N.C. contact opening | 38 ... 95 ms | | | | |
| Between coil de-energization and: | N.O. contact opening | 17 ... 100 ms | | | | |
| | N.C. contact closing | 19 ... 105 ms | | | | |

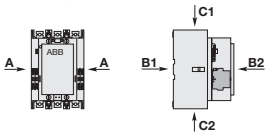
## Mounting characteristics and conditions for use

| Contactor types | AC / DC operated | AFS40 | AFS52 | AFS65 | AFS80 | AFS96 |
|---|---|---|---|---|---|---|
| Mounting positions | |  |  |  | | |
| Mounting distances | | The contactors can be assembled side by side | | | | |
| Fixing | | | | | | |
| On rail according to IEC/EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | | | 35 x 15 mm | |
| By screws (not supplied) | | 2 x M4 or 2 x M6 screws placed diagonally | | | | |

# AFS116 ... AFS370 3-pole contactors for safety applications

## Technical data

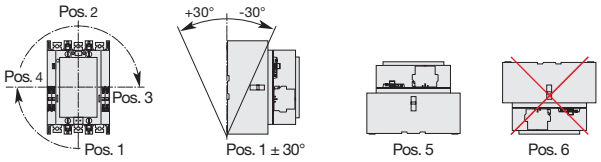
### General technical data

| Contactor types | AC / DC operated | AFS116 | AFS146 | AFS190 | AFS205 | AFS265 | AFS305 | AFS370 |
|---|---|---|---|---|---|---|---|---|
| Rated insulation voltage Ui | | | | | | | | |
| acc. to IEC 60947-4-1 | | 1000 V | | | | | | |
| acc. to UL / CSA | | 600 V | | | | | | |
| Rated impulse withstand voltage Uimp. | | 8 kV | | | | | | |
| Electromagnetic compatibility | | AFS contactors comply with IEC 60947-1 / EN 60947-1 - Environment A | | | | | | |
| Ambient air temperature close to contactor | | | | | | | | |
| Operation Fitted with thermal overload relay | | -25 ... +55 °C | | | | | | |
| Without thermal overload relay | | -40 ... +70 °C | | | | | | |
| Storage | | -40 ... +70 °C | | | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | | | |
| Mechanical durability | | | | | | | | |
| Number of operating cycles | | 5 million operating cycles | | | | | | |
| Maximum switching frequency | | 300 cycles/h | | | | | | |
| Shock withstand | | | | | | | | |
| acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | | | | |
| Mounting position 1 | | No change in contact position, closed or open position | | | | | | |
|  | Shock direction | 1/2 sinusoidal shock for 11 ms | | | 1/2 sinusoidal shock for 30 ms | | | |
| | A | 20 g | | | 20 g | | | |
| | B1 | 15 g closed position / 3 g open position | | | 15 g closed position / 3 g open position | | | |
| | B2 | 15 g closed position / 3 g open position | | | 15 g closed position / 3 g open position | | | |
| | C1 | 20 g | | | 20 g | | | |
| | C2 | 20 g | | | 20 g | | | |
| Vibration withstand | | | | | | | | |
| acc to IEC 60068-2-6 | | 0.7 g closed position / 0.7 g open position 13.2...100 Hz | | | | | | |

### Magnet system characteristics

| Contactor types | AC / DC operated | AFS116 | AFS146 | AFS190 | AFS205 | AFS265 | AFS305 | AFS370 |
|---|---|---|---|---|---|---|---|---|
| Coil operating limits | AC supply | At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max | | | | | | |
| acc. to IEC 60947-4-1 | DC supply | At θ ≤ 70 °C 0.80 x Uc min ... 1.1 x Uc max | | | | | | |
| Rated control circuit voltage Uc | | | | | | | | |
| Coil consumption | | 24...500 V AC | | | | | | |
| AC control voltage 50/60 Hz | | | | | | | | |
| 24...60 V AC | Average pull-in value | 225 VA | | 165 VA | | 475 VA | | |
| | Average holding value | 5.5 VA / 2.5 W | | 5 VA / 3 W | | 9 VA / 3 W | | |
| 48...130 V AC | Average pull-in value | 180 VA | | 180 VA | | 340 VA | | |
| | Average holding value | 6 VA / 2 W | | 6 VA / 2 W | | 17 VA / 3 W | | |
| 100...250 V AC | Average pull-in value | 130 VA | | 220 VA | | 385 VA | | |
| | Average holding value | 8 VA / 2.5 W | | 8 VA / 2.5 W | | 20 VA / 4.5 W | | |
| 250...500 V AC | Average pull-in value | 260 VA | | 260 VA | | 550 VA | | |
| | Average holding value | 18 VA / 4 W | | 18 VA / 4 W | | 27 VA / 4.5 W | | |
| DC control voltage | | | | | | | | |
| 20...60 V DC | Average pull-in value | 210 W | | 210 W | | 210 W | | |
| | Average holding value | 2.5 W | | 2.5 W | | 2.5 W | | |
| 48...130 V DC | Average pull-in value | 150 W | | 150 W | | 360 W | | |
| | Average holding value | 2.5 W | | 2.5 W | | 2.5 W | | |
| 100...250 V DC | Average pull-in value | 135 W | | 190 W | | 410 W | | |
| | Average holding value | 3 W | | 2.5 W | | 4.5 W | | |
| 250...500 V DC | Average pull-in value | 230 W | | 230 W | | 650 W | | |
| | Average holding value | 4 W | | 4 W | | 4.7 W | | |
| Drop-out voltage | | 55 % of Uc min | | | | | | |
| Voltage sag immunity | | Conditions of use on request | | | | | | |
| acc. to SEMI F47 | | | | | | | | |
| Dips withstand | | ≥ 20 ms | | | | | | |
| Operating time | | | | | | | | |
| Coil supply between A1 - A2 | | | | | | | | |
| Between coil energization and: | N.O. contact closing | 20...55 ms | | 25...60 ms | | 30...60 ms | | |
| Between coil de-energization and: | N.O. contact opening | 40..70 ms | | 45...80 ms | | 45...80 ms | | |

### Mounting characteristics and conditions for use

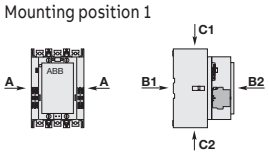
| Contactor types | AC / DC operated | AFS116 | AFS146 | AFS190 | AFS205 | AFS265 | AFS305 | AFS370 |
|---|---|---|---|---|---|---|---|---|
| Mounting positions | |   | | | | | | |
| Mounting distances | | The contactors can be assembled side by side | | | | | | |
| Fixing | | | | | | | | |
| On rail acc. to IEC 60715, EN 60715 | | – | | | | | | |
| By screws | | 4 x M4 | | 4 x M5 | | | | |

# AFS400 ... AFS750 3-pole contactors for safety applications

## Technical data



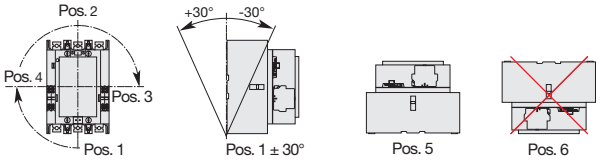
### General technical data

| Contactor types | AC / DC operated | AFS400 | AFS460 | AFS580 | AFS750 |
|---|---|---|---|---|---|
| Rated insulation voltage Ui | | | | | |
| acc. to IEC 60947-4-1 | | 1000 V | | | |
| acc. to UL / CSA | | 600 V | | | |
| Rated impulse withstand voltage Uimp. | | 8 kV | | | |
| Electromagnetic compatibility | | AFS contactors complying with IEC/EN 60947-1 - Environment A | | | |
| Pollution degree | | 3 | | | |
| Ambient air temperature close to contactor | | | | | |
| Operation | Fitted with electronic overload relay | -25 ... +70 °C | | | |
| | Without electronic overload relay | -40 ... +70 °C | | | |
| Storage | | -40 ... +70 °C | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | |
| Mechanical durability | | | | | |
| Number of operating cycles | | 3 millions operating cycles | | | |
| Max. switching frequency | | 300 cycles/h | | | |
| Shock withstand | | | | | |
| acc. to IEC/EN 60068-2-27 | | | | | |
| Mounting position 1 | | | | | |
|  | Shock direction | 1/2 sinusoidal shock for 30 ms: no change in contact position, closed or open position | | | |
| | A | 5 g | | | |
| | B1 | 5 g | | | |
| | B2 | 5 g | | | |
| | C1 | 5 g | | | |
| | C2 | 5 g | | | |
| Vibration withstand | | | | | |
| acc to IEC 60068-2-6 | | 0.7 g closed position / 0.7 g open position 13.2...100 Hz | | | |

### Magnet system characteristics

| Contactor types | AC / DC operated | AFS400 | AFS460 | AFS580 | AFS750 |
|---|---|---|---|---|---|
| Coil operating limits | AC supply | At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max | | | |
| acc. to IEC 60947-4-1 | DC supply | At θ ≤ 70 °C 0.80 x Uc min ... 1.1 x Uc max | | | |
| Rated control circuit voltage Uc | | | | | |
| Coil consumption | | 48...500 V AC, 24...500 V DC | | | |
| AC control voltage 50/60 Hz | | | | | |
| 48...130 V AC | Average pull-in value | 1215 VA | | 1100 VA | |
| | Average holding value | 12 VA | | 12 VA | |
| 100...250 V AC | Average pull-in value | 955 VA | | 880 VA | |
| | Average holding value | 12 VA | | 12 VA | |
| 250 ... 500 V AC | Average pull-in value | 950 VA | | 985 VA | |
| | Average holding value | 12 VA | | 12 VA | |
| DC control voltage | | | | | |
| 24...60 V DC | Average pull-in value | 900 W | | 785 W | |
| | Average holding value | 5 W | | 5.5 W | |
| 48...130 V DC | Average pull-in value | 1150 W | | 1020 W | |
| | Average holding value | 5 W | | 5 W | |
| 100...250 V DC | Average pull-in value | 895 W | | 880 W | |
| | Average holding value | 5 W | | 5 W | |
| 250 ... 500 V DC | Average pull-in value | 885 W | | 910 W | |
| | Average holding value | 7.5 W | | 7.5 W | |
| Drop-out voltage | | 55 % of Uc min. | | | |
| Voltage sag immunity | | Conditions of use on request | | | |
| acc. to SEMI F47 | | | | | |
| Dips withstand | | ≥ 20 ms | | | |
| Operating time | | | | | |
| Coil supply between A1 - A2 | | | | | |
| Between coil energization and: | Main contact closing | 50...120 ms | | | |
| Between coil de-energization and: | Main contact opening | 33...70 ms | | | |
| Control input for PLC's | | | | | |
| Between coil energization and: | Main contact closing | 40...60 ms | | 40...90 ms | |
| Between coil de-energization and: | Main contact opening | 10...30 ms | | | |

### Mounting characteristics and conditions for use

| Contactor types | AC / DC operated | AFS400 | AFS460 | AFS580 | AFS750 |
|---|---|---|---|---|---|
| Mounting positions | |  | | | |
| Mounting distances | | The contactors can be assembled side by side | | | |
| Fixing | | | | | |
| On rail according to IEC/EN 60715 | | – | | | |
| By screws | | 4 x M5 | | 4 x M6 | |

# AFS09 ... AFS96 3-pole contactors for safety applications

## Technical data



### Connecting characteristics

| Contactor types | AC / DC operated | AFS09 | AFS12 | AFS16 | AFS26 | AFS30 | AFS38 | AFS40 | AFS52 | AFS65 | AFS80 | AFS96 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Main terminals | |  Screw terminals with cable clamp | | | | | |  Screw terminals with double connector 2 x (9.3 width x 7.9/10.3 depth) | | |  Screw terminals with double connector 2 x (12.4 width x 9.3/11.1 depth) | |
| Connection capacity (min. ... max.) | | | | | | | | | | | | |
| Main conductors (poles) | | | | | | | | | | | | |
| Rigid Solid (≤ 4 mm²) | 1 x | 1 ... 6 mm² | | | 2.5 ... 10 mm² | | | 6 ... 35 mm² | | | 6 ... 70 mm² | |
| Rigid Stranded (≥ 1 mm²) | 2 x | 1 ... 6 mm² | | | 2.5 ... 10 mm² | | | 6 ... 35 mm² | | | 6 ... 50 mm² | |
| Flexible with non insulated ferrule | 1 x | 0.75 ... 6 mm² | | | 1.5 ... 10 mm² | | | 4 ... 35 mm² | | | 6 ... 50 mm² | |
| | 2 x | 0.75 ... 6 mm² | | | 1.5 ... 10 mm² | | | 4 ... 35 mm² | | | 6 ... 50 mm² | |
| Flexible with insulated ferrule | 1 x | 0.75 ... 4 mm² | | | 1.5 ... 10 mm² | | | 4 ... 35 mm² | | | 6 ... 50 mm² | |
| | 2 x | 0.75 ... 2.5 mm² | | | 1.5 ... 4 mm² | | | 4 ... 35 mm² | | | 6 ... 50 mm² | |
| Bars or lugs | L < | 9.6 mm | | | 12.5 mm | | | 9.2 mm | | | 12.2 mm | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 16 ... 10 | | | AWG 14 ... 8 | | | AWG 10 ... 2 | | | AWG 6 ... 1 | |
| Stripping length | | 10 mm | | | 14 mm | | | 16 mm | | | 17 mm | |
| Tightening torque | | 1.5 Nm / 13 lb.in | | | 2.5 Nm / 22 lb.in | | | 4 Nm / 35 lb.in | | | 6 Nm / 53 lb.in | |
| Auxiliary conductors (built-in auxiliary terminals + coil terminals) | | | | | | | | | | | | |
| Rigid Solid/Stranded | 1 x | 1 ... 2.5 mm² | | | | | | | | | | |
| | 2 x | 1 ... 2.5 mm² | | | | | | | | | | |
| Flexible with non insulated ferrule | 1 x | 0.75 ... 2.5 mm² | | | | | | | | | | |
| | 2 x | 0.75 ... 2.5 mm² | | | | | | | | | | |
| Flexible with insulated ferrule | 1 x | 0.75 ... 2.5 mm² | | | | | | | | | | |
| | 2 x | 0.75 ... 1.5 mm² | | | | | | | | | | |
| Bars or lugs | L < | 8 mm | | | | | | | | | | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 18 ... 14 | | | | | | | | | | |
| Stripping length | | 10 mm | | | | | | | | | | |
| Tightening torque | | | | | | | | | | | | |
| Coil terminals | | 1.2 Nm / 11 lb.in | | | | | | | | | | |
| Built-in auxiliary terminals | | 1.2 Nm / 11 lb.in | | | | | | | | | | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | | | | | | | | | |
| Main terminals | | IP20 | | | | | | IP10* | | | | |
| Coil terminals | | IP20 | | | | | | | | | | |
| Built-in auxiliary terminals | | IP20 | | | | | | | | | | |
| Screw terminals | | Delivered in open position, screws of unused terminals must be tightened | | | | | | | | | | |
| Main terminals | | M3.5 | | | M4 | | | M6 | | | M8 | |
| | Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | | | Flat Ø 6.5 / Pozidriv 2 | | | | | | hexagon socket (s = 4 mm) | |
| Coil terminals | | M3.5 | | | | | | | | | | |
| | Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | | | | | | | | | | |
| Built-in auxiliary terminals | | M3.5 | | | | | | | | | | |
| | Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | | | | | | | | | | |

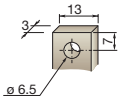
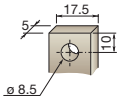
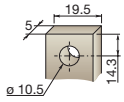
* For IP20 degree of protection, use LT terminal shroud accessory.

# AFS116 ... AFS370 3-pole contactors for safety applications

## Technical data



### Connecting characteristics

| Contactor types | AC / DC operated | AFS116 | AFS146 | AFS190 | AFS205 | AFS265 | AFS305 | AFS370 |
|---|---|---|---|---|---|---|---|---|
| Main terminals<br>Flat type | |  | |  | |  | | |
| Connection capacity (min. ... max.) | | | | | | | | |
| Main conductors (poles) | | | | | | | | |
| Cu cable - Stranded | 1 x | 10...95 mm² | | 6...150 mm² | | 16...300 mm² | | |
| Clamp type | | LD... included (1) | | 1SDA066917R1 | | 1SDA055016R1 | | |
| Tightening torque | | 8 Nm | | 14 Nm | | 25 Nm | | |
| Cu cable - Stranded | 2 x | 10...95 mm² | | 50...120 mm² | | 70...185 mm² | | |
| Clamp type | | LD... included (1) | | 1SFN074709R1000,<br>LZ185-2C/120 | | 1SCA022194R0890,<br>OZXB4 | | |
| Tightening torque | | 8 Nm | | 16 Nm | | 22 Nm | | |
| Al cable - Stranded | 1 x | – | | 95...185 mm² | | 185...240 mm² | | |
| Clamp type | | – | | 1SDA054988R1 | | 1SDA055020R1 | | |
| Tightening torque | | – | | 31 Nm | | 43 Nm | | |
| Cu cable - Flexible | 1 x | 10...70 mm² | | 6...120 mm² | | 16...240 mm² | | |
| Clamp type | | LD... included (1) | | 1SDA066917R1 | | 1SDA055016R1 | | |
| Tightening torque | | 8 Nm | | 14 Nm | | 25 Nm | | |
| Cu cable - Flexible | 2 x | 10...70 mm² | | 50...95 mm² | | 70...185 mm² | | |
| Clamp type | | LD... included (1) | | 1SFN074709R1000,<br>LZ185-2C/120 | | 1SCA022194R0890,<br>OZXB4 | | |
| Tightening torque | | 8 Nm | | 16 Nm | | 22 Nm | | |
| Lugs | L ≤ | 22 mm (.866 in) | | 24 mm (.945 in) | | 32 mm (1.260 in) | | |
| | Ø > | 6 mm (.236 in) | | 8 mm (.315 in) | | 10 mm (.394 in) | | |
| Socket type | | LL... included | | LL... included | | LL... included | | |
| Tightening torque | | 9 Nm / 80 lb.in | | 18 Nm / 160 lb.in | | 28 Nm / 248 lb.in | | |
| Connection capacity acc. to UL / CSA | 1 x | AWG 6...3/0 | | 6...300 MCM | | 4...400 MCM | | |
| Clamp type | | LD... included (1) | | ATK185 (2) | | ATK300 (2) | | |
| Tightening torque | | 8 Nm / 71 lb.in | | 34 Nm / 301 lb.in | | 42 Nm / 372 lb.in | | |
| Connection capacity acc. to UL / CSA | 2 x | AWG 6...3/0 | | – | | 4...500 MCM | | |
| Clamp type | | LD... included (1) | | – | | ATK300/2 (2) | | |
| Tightening torque | | 8 Nm / 71 lb.in | | – | | 42 Nm / 372 lb.in | | |
| Auxiliary conductors<br>(coil terminals) | | | | | | | | |
| Rigid Solid/Stranded | 1 x | 1...4 mm² | | | | | | |
| | 2 x | 1...4 mm² | | | | | | |
| Flexible | 1 x | 0.75...2.5 mm² | | | | | | |
| | 2 x | 0.75...2.5 mm² | | | | | | |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² | | | | | | |
| | 2 x | 0.75...2.5 mm² | | | | | | |
| Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² | | | | | | |
| | 2 x | 0.75...2.5 mm² | | | | | | |
| Lugs | L < | 8 mm | | | | | | |
| | l > | 3.5 mm | | | | | | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 | | | | | | |
| Stripping length | | 9 mm | | | | | | |
| Tightening torque | | 1.00 Nm / 9 lb.in | | | | | | |
| Degree of protection<br>acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | | | | | |
| Main terminals | | IP00 | | | | | | |
| Coil terminals | | IP20 | | | | | | |
| Screw terminals | | | | | | | | |
| Main terminals | | M6 | | M8 | | M10 | | |
| Screwdriver type | | Screws and bolts | | | | | | |
| Coil terminals (delivered in open position) | | M3.5 | | | | | | |
| Screwdriver type | | Flat Ø 5.5 mm / Pozidriv 2 | | | | | | |

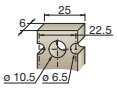
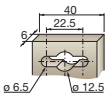
(1) LD... not included for AFS116 ... AFS146-30-..B.
(2) Available in North America only.

# AFS400 ... AFS750 3-pole contactors for safety applications

## Technical data



### Connecting characteristics

| Contactor types | AC / DC operated | AFS400 | AFS460 | AFS580 | AFS750 |
|---|---|---|---|---|---|
| Main terminals<br>Flat type | |  | |  | |
| Connection capacity (min. ... max.) | | | | | |
| Main conductors (poles) | | | | | |
| Cu cable - Stranded | 2 x | 240 mm² | | | – |
| Clamp type | | 1SDA013922R1 | | | – |
| Tightening torque | | 35 Nm | | | – |
| Cu cable - Stranded | 3 x | – | | 185 mm² | |
| Clamp type | | – | | 1SDA013956R1 | |
| Tightening torque | | 35 Nm | | 45 Nm | |
| Al cable - Stranded | 2 x | 240 mm² | | | – |
| Clamp type | | 1SDA013922R1 | | | – |
| Tightening torque | | 35 Nm | | | – |
| | 3 x | – | | 185 mm² | |
| Clamp type | | – | | 1SDA013956R1 | |
| Tightening torque | | 35 Nm | | 45 Nm | |
| Lugs | L ≤ | 47 mm | | 50 mm | |
| | Ø > | 10 mm | | 12 mm | |
| Tightening torque | | 35 Nm / 310 lb.in | | 45 Nm / 398 lb.in | |
| Connection capacity acc. to UL / CSA | 2 x | 250-500 MCM alt. 2/0 AWG-500 MCM | | – | |
| Clamp type | | K6TH alt. ATK580 | | – | |
| Tightening torque | | 275 lb.in | | – | |
| Connection capacity acc. to UL / CSA | 3 x | 2/0 AWG-400 MCM | | 2/0 AWG-500 MCM | |
| Clamp type | | K6TJ | | ATK750/3 | |
| Tightening torque | | 275 lb.in | | 375 lb.in | |
| Auxiliary conductors<br>(coil terminals) | | | | | |
| Rigid Solid/Stranded | 1 x | 1...4 mm² | | | |
| | 2 x | 1...4 mm² | | | |
| Flexible | 1 x | 0.75...2.5 mm² | | | |
| | 2 x | 0.75...2.5 mm² | | | |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² | | | |
| | 2 x | 0.75...2.5 mm² | | | |
| Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² | | | |
| | 2 x | 0.75...2.5 mm² | | | |
| Lugs | L ≤ | 8 mm | | | |
| | l > | 3.7 mm | | | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 | | | |
| Tightening torque Recommended | | 1.00 Nm / 9 lb.in | | | |
| Max. | | 1.20 Nm | | | |
| Degree of protection<br>acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | | |
| Main terminals | | IP00 | | | |
| Coil terminals | | IP20 | | | |
| Screw terminals | | | | | |
| Main terminals | | M10 | | M12 | |
| | | Screws and bolts | | | |
| Coil terminals (delivered in open position) | | M3.5 | | | |
| Screwdriver type | | Flat Ø 5.5 mm / Pozidriv 2 | | | |

# AFS09 ... AFS96 3-pole contactors for safety applications

## Technical data



### Built-in auxiliary contacts according to IEC

| Contactor types | AC / DC operated | AFS09 | AFS12 | AFS16 | AFS26 | AFS30 | AFS38 | AFS40 | AFS52 | AFS65 | AFS80 | AFS96 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational voltage Ue max. | | 690 V | | | | | | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | | | | | | |
| Conventional free air thermal current Ith - θ ≤ 40 °C | | 16 A | | | | | | | | | | |
| Ie / Rated operational current AC-15 | | | | | | | | | | | | |
| acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A | | | | | | | | | | |
| | 220-240 V 50/60 Hz | 4 A | | | | | | | | | | |
| | 400-440 V 50/60 Hz | 3 A | | | | | | | | | | |
| | 500 V 50/60 Hz | 2 A | | | | | | | | | | |
| | 690 V 50/60 Hz | 2 A | | | | | | | | | | |
| Making capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | | | | | | | | | | |
| Breaking capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | | | | | | | | | | |
| Ie / Rated operational current DC-13 | | | | | | | | | | | | |
| acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W | | | | | | | | | | |
| | 48 V DC | 2.8 A / 134 W | | | | | | | | | | |
| | 72 V DC | 1 A / 72 W | | | | | | | | | | |
| | 110 V DC | 0.55 A / 60 W | | | | | | | | | | |
| | 125 V DC | 0.55 A / 69 W | | | | | | | | | | |
| | 220 V DC | 0.27 A / 60 W | | | | | | | | | | |
| | 250 V DC | 0.27 A / 68 W | | | | | | | | | | |
| | 400 V DC | 0.15 A / 60 W | | | | | | | | | | |
| | 500 V DC | 0.13 A / 65 W | | | | | | | | | | |
| | 600 V DC | 0.1 A / 60 W | | | | | | | | | | |
| Short-circuit protection device gG type fuse | | 10 A | | | | | | | | | | |
| Rated short-time withstand current Icw | for 1.0 s | 100 A | | | | | | | | | | |
| | for 0.1 s | 140 A | | | | | | | | | | |
| Minimum switching capacity | | 12 V / 3 mA | | | | | | | | | | |
| with failure rate acc. to IEC 60947-5-4 | | $10^{-7}$ | | | | | | | | | | |
| Non-overlapping time between N.O. and N.C. contacts | | ≥ 2 ms | | | | | | | | | | |
| Power dissipation per pole at 6 A | | 0.1 w | | | | | | | | | | |
| Maximum electrical switching frequency | AC-15 | 1200 cycles/h | | | | | | | | | | |
| | DC-13 | 900 cycles/h | | | | | | | | | | |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CAL4 aux. contact blocks) are mechanically linked contacts. | | | | | | | | | | |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CAL4 aux. contact blocks) are mirror contacts. | | | | | | | | | | |

### Built-in auxiliary contacts according to UL / CSA

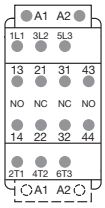
| Contactor types | AC / DC operated | AFS09 | AFS12 | AFS16 | AFS26 | AFS30 | AFS38 | AFS40 | AFS52 | AFS65 | AFS80 | AFS96 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum operational voltage | | 600 V AC, 600 V DC | | | | | | | | | | |
| Pilot duty | | A600, Q600 | | | | | | | | | | |
| AC thermal rated current | | 10 A | | | | | | | | | | |
| AC maximum volt-ampere making | | 7200 VA | | | | | | | | | | |
| AC maximum volt-ampere breaking | | 720 VA | | | | | | | | | | |
| DC thermal rated current | | 2.5 A | | | | | | | | | | |
| DC maximum volt-ampere making-breaking | | 69 VA | | | | | | | | | | |

# AFS09 ... AFS750 3-pole contactors for safety applications

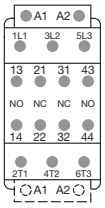
## Terminal marking and positioning

### AFS09 ... AFS96 contactors - AC / DC operated

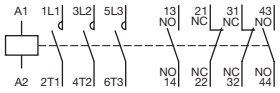
Standard devices




AFS09 ... AFS16..-30-22



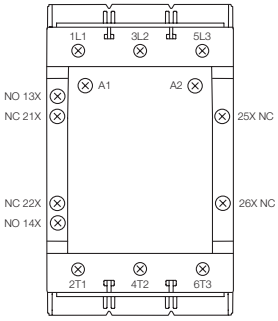

AFS26 ... AFS96..-30-22



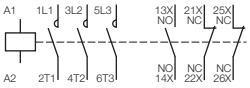

AFS09 ... AFS96..-30-22

### AFS116 ... AFS370 contactors - AC / DC operated

Standard devices with factory mounted auxiliary contacts



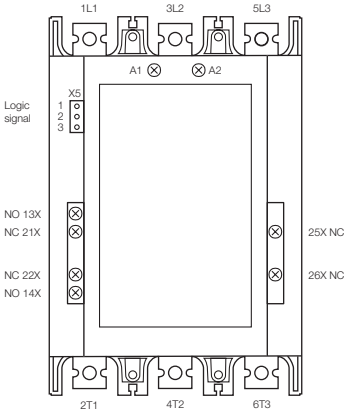

AFS116 ... AFS370-30-12




AFS116 ... AFS370-30-12

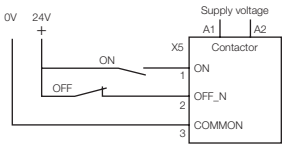
### AFS400 ... AFS750 contactors - AC / DC operated

Standard devices with factory mounted auxiliary contacts

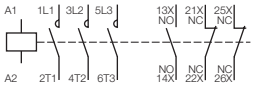



AFS400 ... AFS750-30-12

Control with logic signal




AFS400 ... AFS750-30-12




AFS400 ... AFS750-30-12

# 3-pole contactors

## Electrical durability and utilization categories



### General

Utilization categories determine the current making and breaking conditions relating to the characteristics of the loads to be controlled by the contactors. International standard IEC 60947-4-1 and European standard EN 60947-4-1 are the standards to be referred to.
If Ic is the current to be broken by the contactor and Ie the rated operational current normally drawn by the load, then:

- Categories AC-1 and AC-3 Ic = Ie
- Category AC-2 Ic = 2.5 x Ie
- Category AC-4 Ic = 6 x Ie

Generally speaking Ic = m x Ie where m is a multiple of the load operational current.

On next pages, the curves corresponding to categories AC-1, AC-3 and AC-4 represent the electrical durability variation of standard contactors in relation to the breaking current Ic. Electrical durability is expressed in millions of operating cycles.

### Curve utilization mode

Electrical durability forecast and contactor selection for categories AC-1, AC-2, AC-3 or AC-4

| Characteristics | Load to be controlled |
|---|---|
| Operational voltage | Ue |
| Current normally drawn | Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents") |
| Utilization category | AC-1, AC-2, AC-3 or AC-4 |
| Breaking current | Ic = Ie for AC-1 and for AC-3 ; Ic = 2.5 x Ie for AC-2 ; Ic = 6 x Ie for AC-4 |

- Define the number of operating cycles N required.
- On the diagram corresponding to the operational category, select the contactor with the curve immediately above the intersection point (Ic ; N).

### Electrical durability forecast and contactor selection for mixed duty motor control: AC-3 (Ic = Ie) type switching off while "motor running" and, occasionally, AC-4 (Ic = 6 x Ie) type switching off while "motor accelerating"

| Characteristics | Load to be controlled |
|---|---|
| Operational voltage | Ue |
| Current normally drawn while "motor running" | Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents") |
| Utilization category | AC-3 or AC-4 |
| Breaking current for AC-3 | Ic = Ie |
| Breaking current for AC-4 while "motor accelerating" | Ic = 6 x Ie |
| Percentage of AC-4 operating cycles | K (on the basis of the total number of operating cycles) |

- Define the total number of operating cycles N required.
- Note the smallest contactor rating compatible for AC-3 (Ue / Ie) on Main pole utilization characteristic table (see “Technical data”).
- For the selected contactor make a note of the following in relation to the voltage using diagram AC-3 in next pages:
  - The number of operating cycles A for Ic = Ie (AC-3)
  - The number of operating cycles B for Ic = 6 x Ie (AC-4)
- Calculate the estimated number of cycles N’ (N’ is always below A)

$$N' = \frac{A}{1 + 0.01\ K\ (A/B - 1)}$$

- If N' is too low in relation to the target N, calculate the estimated number of cycles for a higher contactor rating.

### Case of uninterrupted duty

For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us).
The combinated effect of environmental conditions and the proper temperature of the product may require some disposals. As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

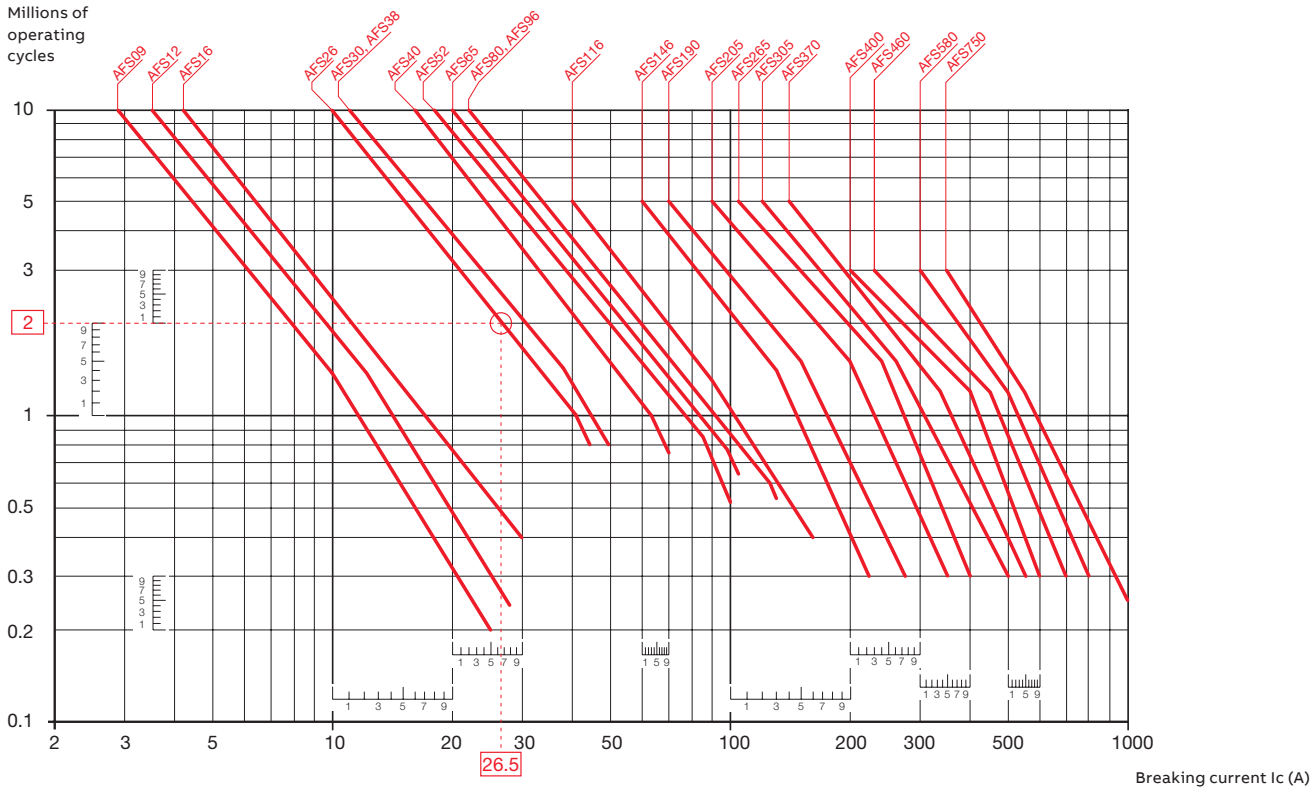
# 3-pole contactors for safety applications

## Electrical durability

**Electrical durability for AC-1 utilization category - Ue ≤ 690 V**

Switching non-inductive or slightly inductive loads. The breaking current Ic for AC-1 is equal to the rated operational current of the load.

Ambient temperature and maximum electrical switching frequency: see "Technical data".




**Example:**

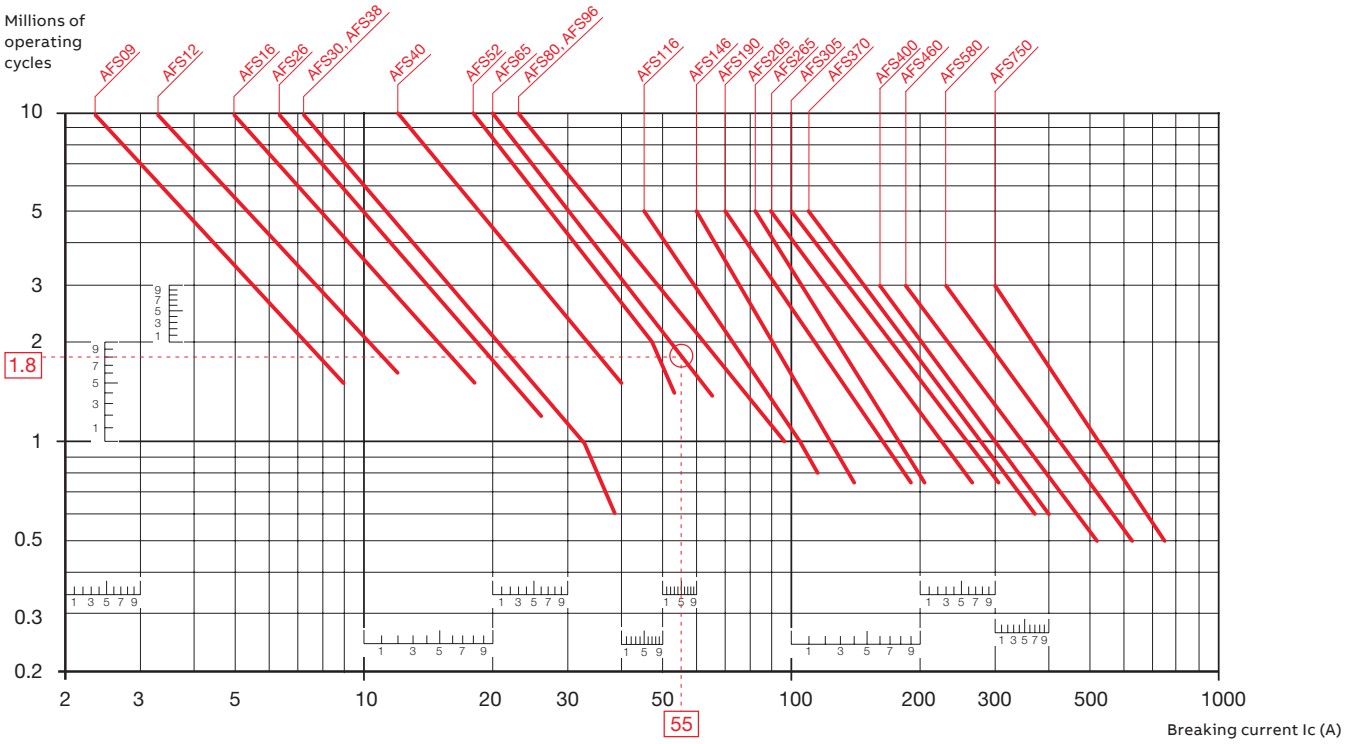
Ic / AC-1 = 26.5 A – Electrical durability required = 2 millions operating cycles.

Using the AC-1 curves above select the AFS26 contactor at intersection "○" (26.5 A / 2 millions operating cycles).

# 3-pole contactors for safety applications

## Electrical durability

**Electrical durability for AC-3 utilization category - Ue ≤ 440 V.**
Switching cage motors: starting and switching off running motors. The breaking current Ic for AC-3 is equal to the rated operational current Ie (Ie = motor full load current).
Ambient temperature and maximum electrical switching frequency: see "Technical data".

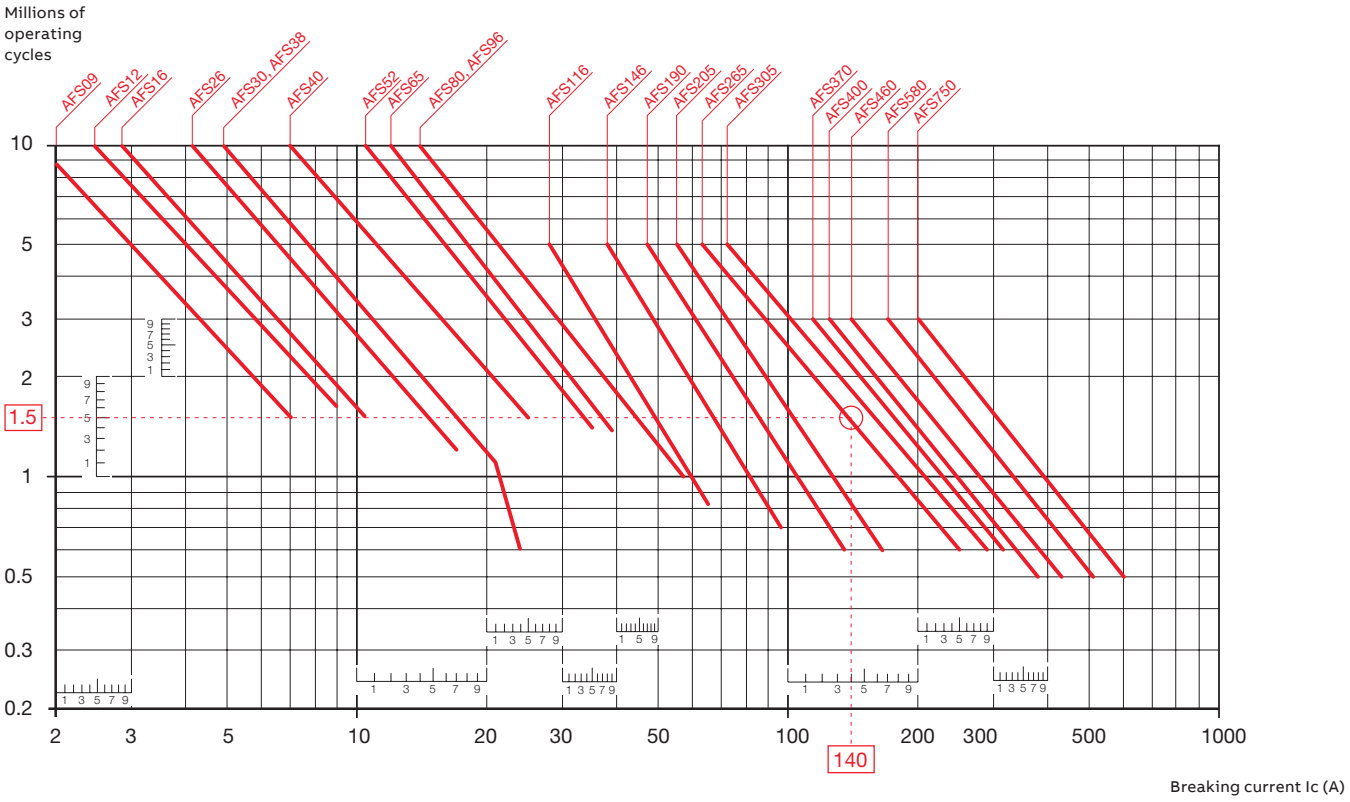



**Example:**
Motor power 30 kW for AC-3 - Ue = 400 V and Ie = 55 A utilization – Electrical durability required = 1.8 million operating cycles.
For AC-3: Ic = Ie. Select the AFS65 contactor at intersection "○" (55 A / 1.8 million operating cycles) on the curves (AC-3 - Ue ≤ 440 V).

# 3-pole contactors for safety applications

## Electrical durability

**Electrical durability for AC-3 utilization category - 440 V < Ue ≤ 690 V.**
Switching cage motors: starting and switching off running motors. The breaking current Ic for AC-3 is equal to the rated operational current Ie (Ie = motor full load current).
Ambient temperature and maximum electrical switching frequency: see "Technical data".

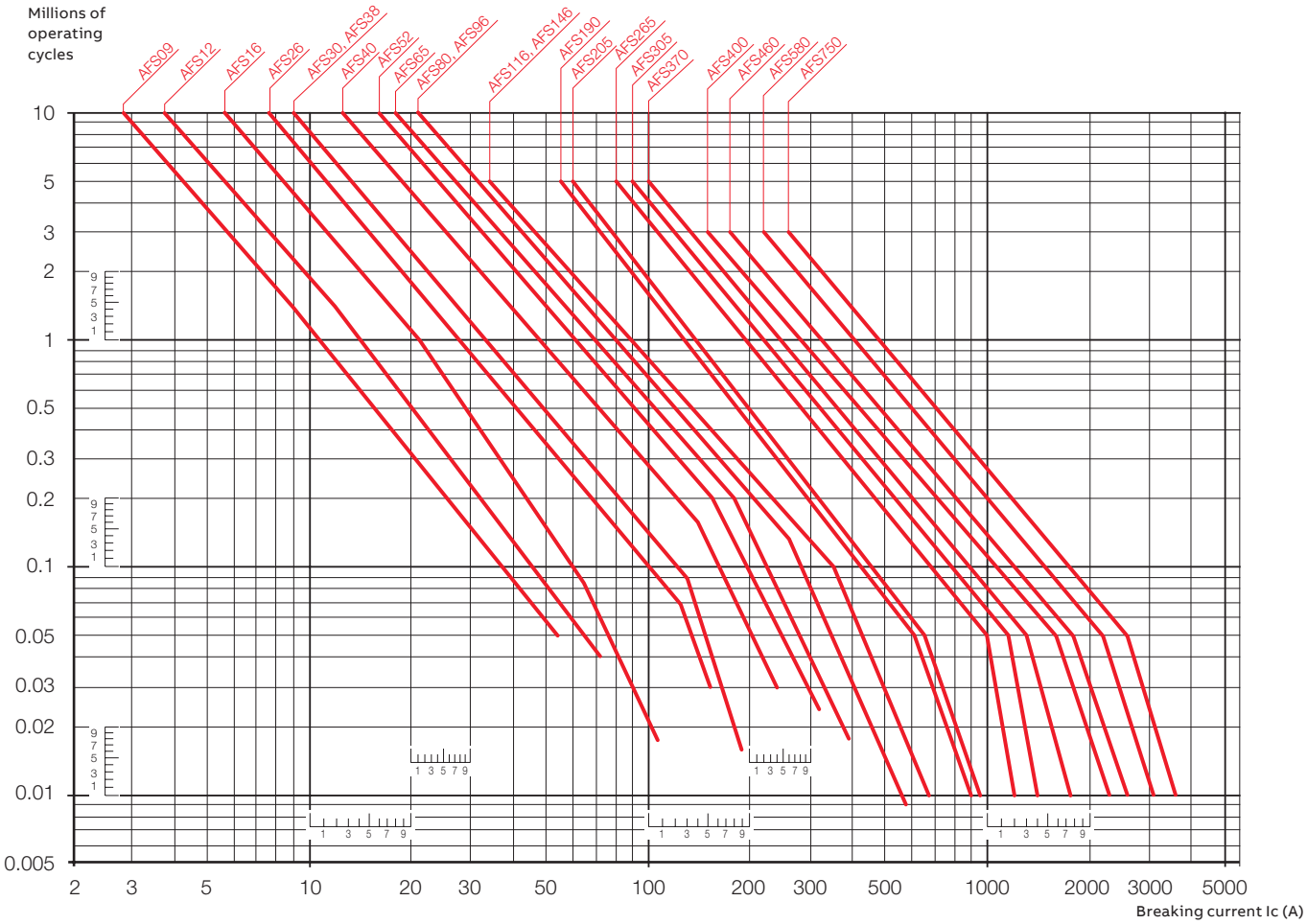


# 3-pole contactors for safety applications

## Electrical durability



**Electrical durability for AC-2 or AC-4 utilization category - Ue ≤ 440 V**
**Ambient temperature ≤ 60 °C for AFS09 ... AFS96**
Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current Ic is equal to 2.5 x Ie for AC-2 and 6 x Ie for AC-4, keeping in mind that Ie is the motor rated operational current (Ie = motor full-load current).
Maximum electrical switching frequency: see "Technical data".

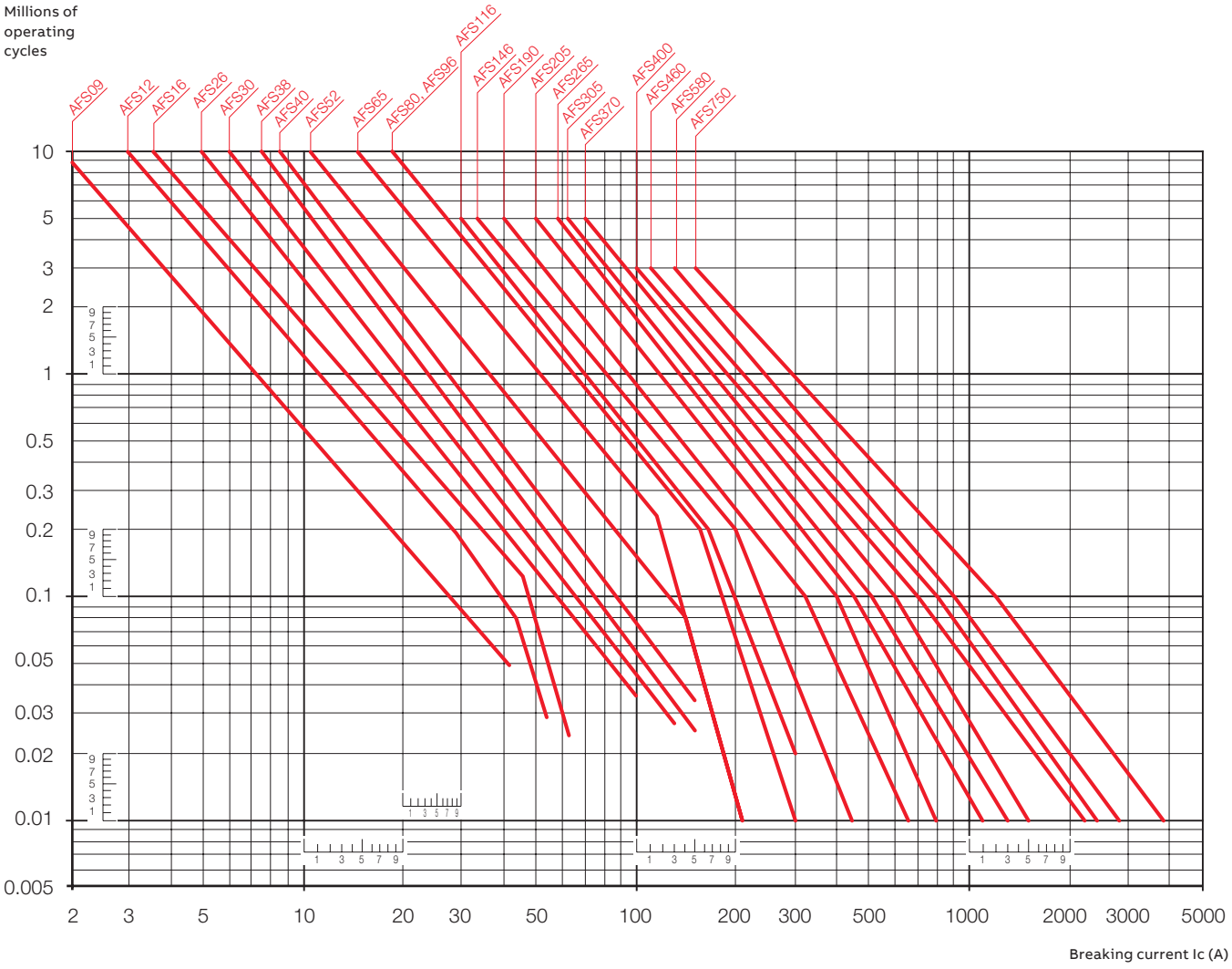


# 3-pole contactors for safety applications

## Electrical durability



**Electrical durability for AC-2 or AC-4 utilization category - 440 V < Ue ≤ 690 V**
**Ambient temperature ≤ 60 °C for AFS09 ... AFS96**
Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current Ic is equal to 2.5 x Ie for AC-2 and 6 x Ie for AC-4, keaping in mind tha Ie is the motor rated operational current (Ie = motor full load current).
Maximum electrical switching frequency: see "Technical data".





**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**1SBL137201R1300**

# AF and EK 4-pole contactors




**3/**184 **Overview**

**Ordering details**

**25 to 125 A AC-1**

**3/**186 AF09 … AF38 AC / DC operated
**3/**187 AF09Z … AF16Z 24 V DC operated designed for PLC
**3/**188 AF09Z ... AF38Z AC / DC operated for specific applications
**3/**189 AF40 … AF80 AC / DC operated
**3/**190 Contactors and main accessories

**160 to 525 A AC-1**

**3/**191 AF116 … AF140 AC / DC operated
**3/**192 AF190 … AF370 AC / DC operated
**3/**193 Contactors and main accessories
**3/**194 AF116 … AF140 AC / DC operated - with 1 N.O. + 1 N.C.
**3/**195 AF190 … AF370 AC / DC operated - with 1 N.O. + 1 N.C.
**3/**196 Contactors and main accessories
**3/**197 AF116 … AF140 AC / DC operated - with 2 N.O. + 2 N.C.
**3/**198 AF190 … AF370 AC / DC operated - with 2 N.O. + 2 N.C.
**3/**199 Contactors and main accessories

**800 to 1000 A AC-1**

**3/**200 EK550, EK1000 AC operated - with 1 N.O. + 1 N.C.
**3/**201 EK550, EK1000 DC operated - with 2 N.O. + 1 N.C.
**3/**202 EK550, EK1000 AC operated - with 2 N.O. + 2 N.C.
**3/**203 Main accessories

**3/**205 **Technical data**

**3/**217 **Electrical durability**

# 4-pole contactors

## Overview






| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| IEC | AC-1 Rated operational current | θ ≤ 40 °C, 690 V | A | 25 | 30 | 45 | 55 | 70 | 100 | 125 |
| UL/CSA | General use rating | 600 V | A | 25 | 30 | 45 | 55 | 60 | 80 | 105 |
| AC / DC Control supply | | | Type | **AF09** | **AF16** | **AF26** | **AF38** | **AF40** | **AF52** | **AF80** |
| AC Control supply | | | Type | **AF09** | **AF16** | **AF26** | **AF38** | **AF40** | **AF52** | **AF80** |
| DC Control supply | | | Type | **AF09** | **AF16** | **AF26** | **AF38** | **AF40** | **AF52** | **AF80** |
| IEC | AC-1 Rated operational current 690 V | θ ≤ 40 °C | A | 25 | 30 | 45 | 55 | 70 | 100 | 125 |
| | | θ ≤ 60 °C (1) | A | 25 | 30 | 40 | 45 | 60 | 80 | 105 |
| | | θ ≤ 70 °C | A | 22 | 26 | 32 | 37 | 50 | 70 | 90 |
| | With conductor cross sectional area | | $mm^2$ | 4 | 6 | 10 | 16 | 35 | 35 | 50 |
| | Rated operational voltage Ue max. | | V | 690 | 690 | 690 | 690 | 690 | 690 | 1000 |

(1) θ ≤ 55 °C for EK550, EK1000 contactors

### Main accessories

| | | | |
|---|---|---|---|
| Auxiliary contact blocks | Front mounting | **CA4-10** (1 x N.O.), **CA4-01** (1 x N.C.) | |
| | Side mounting | **CAL4-11** (1 x N.O. + 1 x N.C.) | |
| Timers | Electronic | **TEF4-ON**<br>**TEF4-OFF** | |
| Interlocking units | Mechanical | **VM4** | **VM96-4** |
| | Mechanical / Electrical | **VEM4** | |
| Surge suppressors | Varistor + RC (AC / DC) | Built-in surge protection | |






| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 160 | 200 | 275 | 350 | 400 | 500 | 525 | 800 | 1000 |
| | 160 | 175 | 230 | 250 | 300 | 350 | 420 | 540 | — |
| | **AF116** | **AF140** | **AF190** | **AF205** | **AF265** | **AF305** | **AF370** | **—** | **—** |
| | **AF116** | **AF140** | **AF190** | **AF205** | **AF265** | **AF305** | **AF370** | **EK550** | **EK1000** |
| | **AF116** | **AF140** | **AF190** | **AF205** | **AF265** | **AF305** | **AF370** | **EK550** | **EK1000** |
| | 160 | 200 | 275 | 350 | 400 | 500 | 525 | 800 | 1000 |
| | 145 | 175 | 250 | 300 | 350 | 400 | 425 | 650 | 800 |
| | 130 | 160 | 200 | 240 | 290 | 325 | 350 | 575 | 720 |
| | 70 | 95 | 150 | 240 | 240 | 300 | 2 x 185 | 2 x 240 | 2 x 300 |
| | 690 | 690 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |

| | | |
|---|---|---|
| | | |
| | **CAL19-11** (1 x N.O. + 1 x N.C.) | **CAL16-11** (1 x N.O. + 1 x N.C.) |
| | | |
| | **VM19** (for same size contactors) | **VH800** |
| | | |
| | | **RC-EH800** |

# AF09 ... AF38 4-pole contactors

## 25 to 55 A AC-1
## AC / DC operated




AF09-40-00



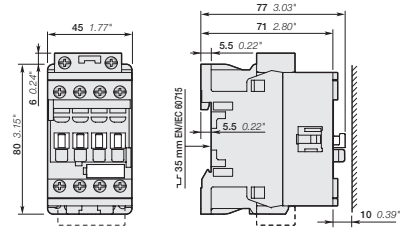

AF26-40-00

AF09 ... AF38 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

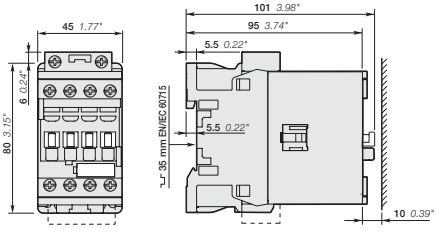
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | UL/CSA | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 40 °C AC-1 | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| A | A | V 50/60 Hz | V DC | | | | kg |
| **4 N.O. main poles** | | | | | | | |
| 25 | 25 | 24...60 | 20...60 (1) | 0 0 | AF09-40-00-11 | 1SBL137201R1100 | 0.270 |
| | | 48...130 | 48...130 | 0 0 | AF09-40-00-12 | 1SBL137201R1200 | 0.270 |
| | | 100...250 | 100...250 | 0 0 | AF09-40-00-13 | 1SBL137201R1300 | 0.270 |
| | | 250...500 | 250...500 | 0 0 | AF09-40-00-14 | 1SBL137201R1400 | 0.310 |
| 30 | 30 | 24...60 | 20...60 (1) | 0 0 | AF16-40-00-11 | 1SBL177201R1100 | 0.270 |
| | | 48...130 | 48...130 | 0 0 | AF16-40-00-12 | 1SBL177201R1200 | 0.270 |
| | | 100...250 | 100...250 | 0 0 | AF16-40-00-13 | 1SBL177201R1300 | 0.270 |
| | | 250...500 | 250...500 | 0 0 | AF16-40-00-14 | 1SBL177201R1400 | 0.310 |
| 45 | 45 | 24...60 | 20...60 (1) | 0 0 | AF26-40-00-11 | 1SBL237201R1100 | 0.360 |
| | | 48...130 | 48...130 | 0 0 | AF26-40-00-12 | 1SBL237201R1200 | 0.360 |
| | | 100...250 | 100...250 | 0 0 | AF26-40-00-13 | 1SBL237201R1300 | 0.360 |
| | | 250...500 | 250...500 | 0 0 | AF26-40-00-14 | 1SBL237201R1400 | 0.400 |
| 55 | 55 | 24...60 | 20...60 (1) | 0 0 | AF38-40-00-11 | 1SBL297201R1100 | 0.360 |
| | | 48...130 | 48...130 | 0 0 | AF38-40-00-12 | 1SBL297201R1200 | 0.360 |
| | | 100...250 | 100...250 | 0 0 | AF38-40-00-13 | 1SBL297201R1300 | 0.360 |
| | | 250...500 | 250...500 | 0 0 | AF38-40-00-14 | 1SBL297201R1400 | 0.400 |
| **2 N.O. + 2 N.C. main poles** | | | | | | | |
| 25 | 25 | 24...60 | 20...60 (1) | 0 0 | AF09-22-00-11 | 1SBL137501R1100 | 0.270 |
| | | 48...130 | 48...130 | 0 0 | AF09-22-00-12 | 1SBL137501R1200 | 0.270 |
| | | 100...250 | 100...250 | 0 0 | AF09-22-00-13 | 1SBL137501R1300 | 0.270 |
| | | 250...500 | 250...500 | 0 0 | AF09-22-00-14 | 1SBL137501R1400 | 0.310 |
| 30 | 30 | 24...60 | 20...60 (1) | 0 0 | AF16-22-00-11 | 1SBL177501R1100 | 0.270 |
| | | 48...130 | 48...130 | 0 0 | AF16-22-00-12 | 1SBL177501R1200 | 0.270 |
| | | 100...250 | 100...250 | 0 0 | AF16-22-00-13 | 1SBL177501R1300 | 0.270 |
| | | 250...500 | 250...500 | 0 0 | AF16-22-00-14 | 1SBL177501R1400 | 0.310 |
| 45 | 45 | 24...60 | 20...60 (1) | 0 0 | AF26-22-00-11 | 1SBL237501R1100 | 0.360 |
| | | 48...130 | 48...130 | 0 0 | AF26-22-00-12 | 1SBL237501R1200 | 0.360 |
| | | 100...250 | 100...250 | 0 0 | AF26-22-00-13 | 1SBL237501R1300 | 0.360 |
| | | 250...500 | 250...500 | 0 0 | AF26-22-00-14 | 1SBL237501R1400 | 0.400 |
| 55 | 55 | 24...60 | 20...60 (1) | 0 0 | AF38-22-00-11 | 1SBL297501R1100 | 0.360 |
| | | 48...130 | 48...130 | 0 0 | AF38-22-00-12 | 1SBL297501R1200 | 0.360 |
| | | 100...250 | 100...250 | 0 0 | AF38-22-00-13 | 1SBL297501R1300 | 0.360 |
| | | 250...500 | 250...500 | 0 0 | AF38-22-00-14 | 1SBL297501R1400 | 0.400 |

(1) AF..-40-..-11 and AF..-22-..-11 not suitable for direct control by PLC-output.




AF09, AF16




AF26, AF38

Main dimensions mm, inches

# AF09Z ... AF38Z 4-pole contactors

## 25 to 55 A AC-1

## 24 V DC operated designed for PLC




AF09Z-40-00



AF26Z-40-00

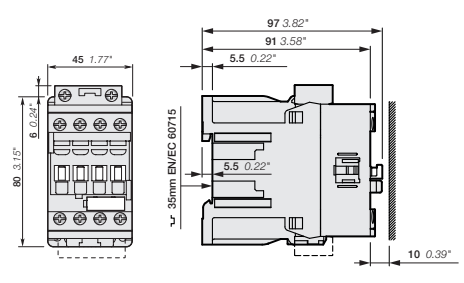
AF09Z ... AF38Z 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

- control circuit: 24 V DC operated with electronic coil interface allowing low holding consumption up to 1.7 W and reduced panel energy consumption
  - allow direct control by PLC-output ≥ 250 mA 24 V DC
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

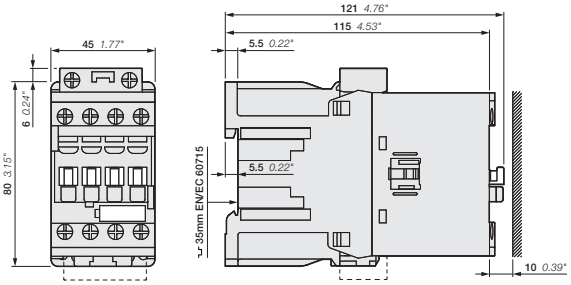
| IEC<br>Rated operational current<br>θ ≤ 40 °C<br>AC-1<br>A | UL/CSA<br>General use rating<br>600 V AC<br>A | Rated control circuit voltage<br>Uc<br>V DC | Auxiliary contacts fitted | Type | Order code | Weight<br>Pkg (1 pce)<br>kg |
|---|---|---|---|---|---|---|
| **4 N.O. main poles** | | | | | | |
| 25 | 25 | 24 | 0 0 | AF09Z-40-00-30 | 1SBL136201R3000 | 0.430 |
| 30 | 30 | 24 | 0 0 | AF16Z-40-00-30 | 1SBL176201R3000 | 0.430 |
| 45 | 45 | 24 | 0 0 | AF26Z-40-00-30 | 1SBL236201R3000 | 0.530 |
| 55 | 55 | 24 | 0 0 | AF38Z-40-00-30 | 1SBL296201R3000 | 0.530 |
| **2 N.O. + 2 N.C. main poles** | | | | | | |
| 25 | 25 | 24 | 0 0 | AF09Z-22-00-30 | 1SBL136501R3000 | 0.430 |
| 30 | 30 | 24 | 0 0 | AF16Z-22-00-30 | 1SBL176501R3000 | 0.430 |
| 45 | 45 | 24 | 0 0 | AF26Z-22-00-30 | 1SBL236501R3000 | 0.530 |
| 55 | 55 | 24 | 0 0 | AF38Z-22-00-30 | 1SBL296501R3000 | 0.530 |

Note: AF..Z contactors with 24 V DC control voltage need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

### Main dimensions mm, inches




AF09Z, AF16Z




AF26Z, AF38Z

# AF09Z ... AF38Z 4-pole contactors

## 25 to 55 A AC-1

## AC / DC operated for specific applications




AF09Z-40-00



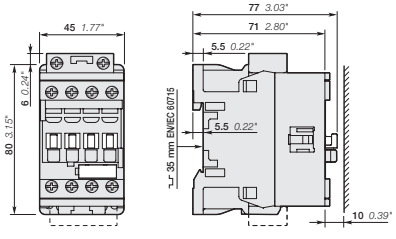

AF26Z-40-00

AF09Z ... AF38Z 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

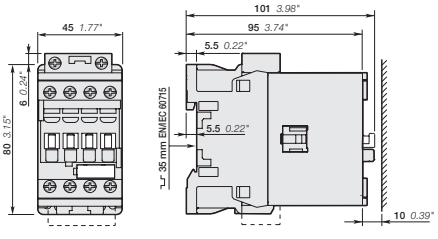
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - can manage large control voltage variations
  - allow direct control by PLC-output ≥ 24 V DC 500 mA
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC<br>Rated operational current<br>θ ≤ 40 °C<br>AC-1<br>A | UL/CSA<br>General use rating<br>600 V AC<br>A | Rated control circuit voltage<br>Uc min. ... Uc max.<br>V 50/60 Hz | <br><br>V DC | Auxiliary contacts fitted | Type | Order code | Weight<br>Pkg (1 pce)<br>kg |
|---|---|---|---|---|---|---|---|
| **4 N.O. main poles** | | | | | | | |
| 25 | 25 | - | 12...20 | 0 0 | AF09Z-40-00-20 | 1SBL136201R2000 | 0.310 |
| | | 24...60 | 20...60 | 0 0 | AF09Z-40-00-21 | 1SBL136201R2100 | 0.310 |
| | | 48...130 | 48...130 | 0 0 | AF09Z-40-00-22 | 1SBL136201R2200 | 0.310 |
| | | 100...250 | 100...250 | 0 0 | AF09Z-40-00-23 | 1SBL136201R2300 | 0.310 |
| 30 | 30 | - | 12...20 | 0 0 | AF16Z-40-00-20 | 1SBL176201R2000 | 0.310 |
| | | 24...60 | 20...60 | 0 0 | AF16Z-40-00-21 | 1SBL176201R2100 | 0.310 |
| | | 48...130 | 48...130 | 0 0 | AF16Z-40-00-22 | 1SBL176201R2200 | 0.310 |
| | | 100...250 | 100...250 | 0 0 | AF16Z-40-00-23 | 1SBL176201R2300 | 0.310 |
| 45 | 45 | - | 12...20 | 0 0 | AF26Z-40-00-20 | 1SBL236201R2000 | 0.400 |
| | | 24...60 | 20...60 | 0 0 | AF26Z-40-00-21 | 1SBL236201R2100 | 0.400 |
| | | 48...130 | 48...130 | 0 0 | AF26Z-40-00-22 | 1SBL236201R2200 | 0.400 |
| | | 100...250 | 100...250 | 0 0 | AF26Z-40-00-23 | 1SBL236201R2300 | 0.400 |
| 55 | 55 | - | 12...20 | 0 0 | AF38Z-40-00-20 | 1SBL296201R2000 | 0.400 |
| | | 24...60 | 20...60 | 0 0 | AF38Z-40-00-21 | 1SBL296201R2100 | 0.400 |
| | | 48...130 | 48...130 | 0 0 | AF38Z-40-00-22 | 1SBL296201R2200 | 0.400 |
| | | 100...250 | 100...250 | 0 0 | AF38Z-40-00-23 | 1SBL296201R2300 | 0.400 |
| **2 N.O. + 2 N.C. main poles** | | | | | | | |
| 25 | 25 | - | 12...20 | 0 0 | AF09Z-22-00-20 | 1SBL136501R2000 | 0.310 |
| | | 24...60 | 20...60 | 0 0 | AF09Z-22-00-21 | 1SBL136501R2100 | 0.310 |
| | | 48...130 | 48...130 | 0 0 | AF09Z-22-00-22 | 1SBL136501R2200 | 0.310 |
| | | 100...250 | 100...250 | 0 0 | AF09Z-22-00-23 | 1SBL136501R2300 | 0.310 |
| 30 | 30 | - | 12...20 | 0 0 | AF16Z-22-00-20 | 1SBL176501R2000 | 0.310 |
| | | 24...60 | 20...60 | 0 0 | AF16Z-22-00-21 | 1SBL176501R2100 | 0.310 |
| | | 48...130 | 48...130 | 0 0 | AF16Z-22-00-22 | 1SBL176501R2200 | 0.310 |
| | | 100...250 | 100...250 | 0 0 | AF16Z-22-00-23 | 1SBL176501R2300 | 0.310 |
| 45 | 45 | - | 12...20 | 0 0 | AF26Z-22-00-20 | 1SBL236501R2000 | 0.400 |
| | | 24...60 | 20...60 | 0 0 | AF26Z-22-00-21 | 1SBL236501R2100 | 0.400 |
| | | 48...130 | 48...130 | 0 0 | AF26Z-22-00-22 | 1SBL236501R2200 | 0.400 |
| | | 100...250 | 100...250 | 0 0 | AF26Z-22-00-23 | 1SBL236501R2300 | 0.400 |
| 55 | 55 | - | 12...20 | 0 0 | AF38Z-22-00-20 | 1SBL296501R2000 | 0.400 |
| | | 24...60 | 20...60 | 0 0 | AF38Z-22-00-21 | 1SBL296501R2100 | 0.400 |
| | | 48...130 | 48...130 | 0 0 | AF38Z-22-00-22 | 1SBL296501R2200 | 0.400 |
| | | 100...250 | 100...250 | 0 0 | AF38Z-22-00-23 | 1SBL296501R2300 | 0.400 |

Note: Only AF..Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.




AF09Z, AF16Z




AF26Z, AF38Z

Main dimensions mm, inches

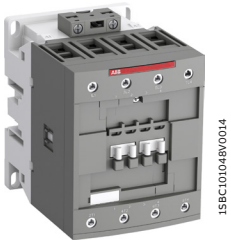
# AF40 ... AF80 4-pole contactors

70 to 125 A AC-1

AC / DC operated




AF40-40-00



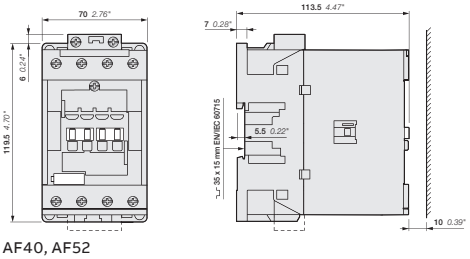

AF80-40-00

AF40 ... AF80 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC (AF40, AF52) / 1000 V AC (AF80) and 440 V DC. These contactors are of the block type design with 4 main poles.

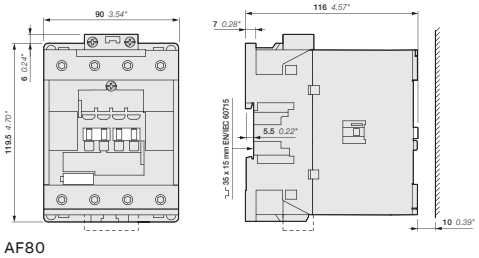
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltages ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | UL/CSA | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 40 °C AC-1 | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| A | A | V 50/60 Hz | V DC | | | | kg |
| **4 N.O. main poles** | | | | | | | |
| 70 | 60 | 24...60 | 20...60 | 0 0 | AF40-40-00-11 | 1SBL347201R1100 | 1.210 |
| | | 48...130 | 48...130 | 0 0 | AF40-40-00-12 | 1SBL347201R1200 | 1.210 |
| | | 100...250 | 100...250 | 0 0 | AF40-40-00-13 | 1SBL347201R1300 | 1.160 |
| | | 250...500 | 250...500 | 0 0 | AF40-40-00-14 | 1SBL347201R1400 | 1.160 |
| 100 | 80 | 24...60 | 20...60 | 0 0 | AF52-40-00-11 | 1SBL367201R1100 | 1.210 |
| | | 48...130 | 48...130 | 0 0 | AF52-40-00-12 | 1SBL367201R1200 | 1.210 |
| | | 100...250 | 100...250 | 0 0 | AF52-40-00-13 | 1SBL367201R1300 | 1.160 |
| | | 250...500 | 250...500 | 0 0 | AF52-40-00-14 | 1SBL367201R1400 | 1.160 |
| 125 | 105 | 24...60 | 20...60 | 0 0 | AF80-40-00-11 | 1SBL397201R1100 | 1.490 |
| | | 48...130 | 48...130 | 0 0 | AF80-40-00-12 | 1SBL397201R1200 | 1.490 |
| | | 100...250 | 100...250 | 0 0 | AF80-40-00-13 | 1SBL397201R1300 | 1.440 |
| | | 250...500 | 250...500 | 0 0 | AF80-40-00-14 | 1SBL397201R1400 | 1.440 |
| **2 N.O. + 2 N.C. main poles** | | | | | | | |
| 70 | 60 | 24...60 | 20...60 | 0 0 | AF40-22-00-11 | 1SBL347501R1100 | 1.210 |
| | | 48...130 | 48...130 | 0 0 | AF40-22-00-12 | 1SBL347501R1200 | 1.210 |
| | | 100...250 | 100...250 | 0 0 | AF40-22-00-13 | 1SBL347501R1300 | 1.160 |
| | | 250...500 | 250...500 | 0 0 | AF40-22-00-14 | 1SBL347501R1400 | 1.160 |
| 125 | 105 | 24...60 | 20...60 | 0 0 | AF80-22-00-11 | 1SBL397501R1100 | 1.490 |
| | | 48...130 | 48...130 | 0 0 | AF80-22-00-12 | 1SBL397501R1200 | 1.490 |
| | | 100...250 | 100...250 | 0 0 | AF80-22-00-13 | 1SBL397501R1300 | 1.440 |
| | | 250...500 | 250...500 | 0 0 | AF80-22-00-14 | 1SBL397501R1400 | 1.440 |

For control by PLC-output, use RA4 interface relay.




AF40, AF52



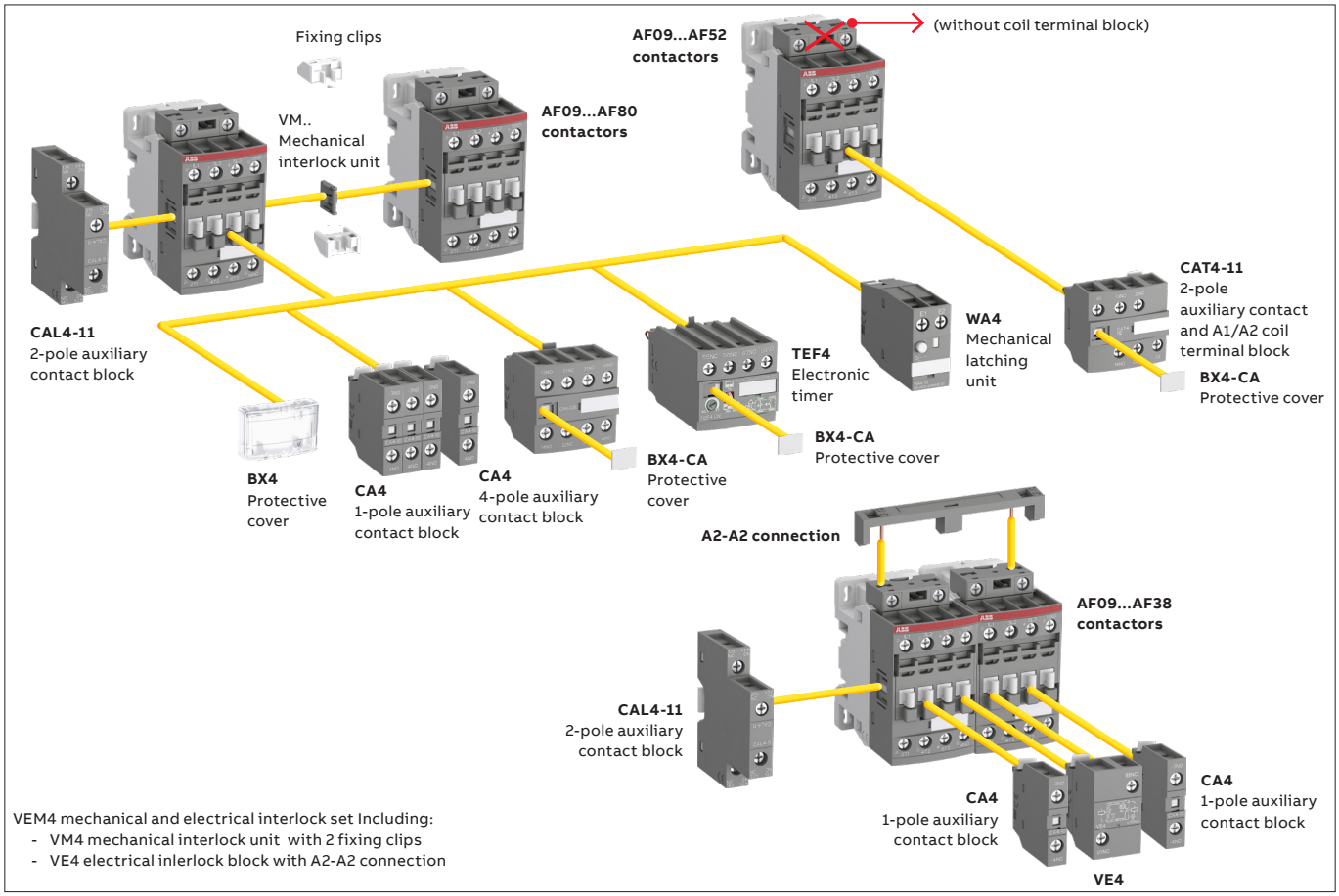

AF80

Main dimensions mm, inches

03

# AF09 ... AF80 4-pole contactors

## Contactors and main accessories




VEM4 mechanical and electrical interlock set Including:
- VM4 mechanical interlock unit with 2 fixing clips
- VE4 electrical inlerlock block with A2-A2 connection

**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories
Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories Auxiliary contact blocks | | | Electronic timer | Mechanical latching unit | Electrical and mechanical interlock set (between 2 contactors) | Side-mounted accessories Auxiliary contact blocks | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1-pole CA4 | 2-pole CAT4-11 | 4-pole CA4 | TEF4 | WA4 (4) | VEM4 | 2-pole CAL4-11 Left side | 2-pole CAL4-11 Right side |
| **AF09(Z) ... AF38(Z)** | | | | | | | | | | |
| AF09 ... AF16 | 4 0 | 0 0 (1) | 4 max. | or 1 | or 1 | or 1 | or 1 | – | + 1 | – |
| AF26 ... AF38 | 4 0 | 0 0 (2) | 2 max. | or 1 | – | or 1 | or 1 | – | + 1 | + 1 |
| | | | 3 max. | – | – | – | – | + 1 (5) | + 1 | or 1 |
| AF09 ... AF38 | 2 2 | 0 0 (2) | 4 max. | or 1 | or 1 | or 1 | or 1 | – | + 1 | – |
| | | | 2 max. | or 1 | – | or 1 | or 1 | – | + 1 | + 1 |
| **AF09Z ... AF38Z 24 V DC designed for PLC - coil 30** | | | | | | | | | | |
| AF09Z ... AF16Z | 4 0 | 0 0 (1) | 4 max. | – | or 1 | or 1 | – | – (5) | or 1 | + 1 |
| AF26Z ... AF38Z | 4 0 | 0 0 (2) | 2 max. | – | – | or 1 | – | – (5) | + 1 | or 1 |
| | | | – | – | – | 1 | – | – | + 1 | + 1 |
| AF09Z ... AF38Z | 2 2 | 0 0 (2) | 4 max. | – | or 1 | or 1 | – | – | or 1 | + 1 |
| | | | 2 max. | – | – | or 1 | – | – | + 1 | or 1 |
| | | | – | – | – | 1 | – | – | + 1 | + 1 |
| **AF40 ... AF80** | | | | | | | | | | |
| AF40 ... AF52 | 4 0 | 0 0 | 4 max. | or 1 | or 1 | or 1 | or 1 | – | + 1 | + 1 |
| AF80 | 4 0 | 0 0 | 4 max. | – | or 1 | or 1 | or 1 | – | + 1 | + 1 |
| AF40 | 2 2 | 0 0 (3) | 4 max. | or 1 | or 1 | or 1 | or 1 | – | + 1 | – |
| | | | 4 max. | – | or 1 | or 1 | or 1 | – | + 1 | + 1 |
| AF80 | 2 2 | 0 0 (3) | 4 max. | – | or 1 | or 1 | or 1 | – | + 1 | + 1 |

(1) Including add-on contacts: 4 N.C. auxiliary contacts max. on positions 1, 2, 3, 4 and 3 N.C. auxiliary contacts max. on positions 1 ±30°, 5.
(2) Including add-on contacts: 3 N.C. auxiliary contacts max. on positions 1, 2, 3, 4 and 2 N.C. auxiliary contacts max. on positions 1 ±30°, 5.
(3) Including add-on contacts: 2 N.C. auxiliary contacts max. on positions 1, 1 ±30°, 2, 3, 4, 5.
(4) Use WA4 for AF09...AF52 and WA4-96 for AF80.
Accept 1-pole CA4 auxiliary contacts (1 block on each side of the mechanical latch) in respect to the total number of built-in or additional N.C. auxiliary contacts.
For WA4 accessory use with contactors coil 30, please consult your ABB local sales organization.
(5) VEM4 not suitable for AF..Z contactors with DC control voltages 12...20 V DC (coil 20) and 24 V DC (coil 30). Use VM4 side-mounted mechanical interlock unit.

# AF116 ... AF140 4-pole contactors

160 to 200 A AC-1

AC / DC operated




AF140-40-00



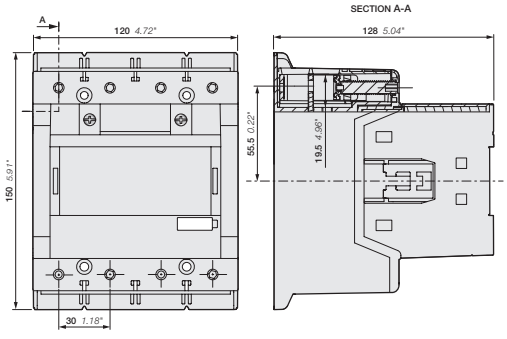

AF140-40-00B

AF116 ... AF140 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 350 V DC. These contactors are of the block type design with 4 main poles.

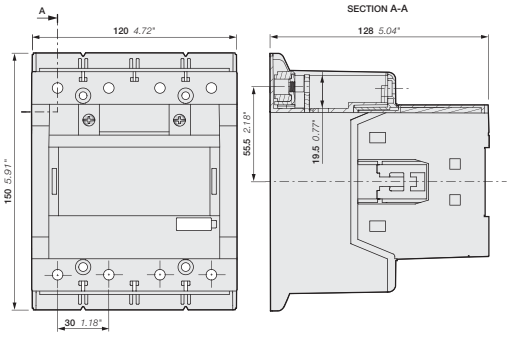
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 40 °C AC-1 | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| A | A | V 50/60 Hz | V DC | | | | kg |
| **4 N.O. main poles** | | | | | | | |
| **For connection with built-in cable clamps** | | | | | | | |
| 160 | 160 | 24...60 | 20...60 | 0 0 | AF116-40-00-11 | 1SFL427101R1100 | 2.250 |
| | | 48...130 | 48...130 | 0 0 | AF116-40-00-12 | 1SFL427101R1200 | 2.250 |
| | | 100...250 | 100...250 | 0 0 | AF116-40-00-13 | 1SFL427101R1300 | 2.250 |
| | | 250...500 | 250...500 | 0 0 | AF116-40-00-14 | 1SFL427101R1400 | 2.250 |
| 200 | 175 | 24...60 | 20...60 | 0 0 | AF140-40-00-11 | 1SFL447101R1100 | 2.250 |
| | | 48...130 | 48...130 | 0 0 | AF140-40-00-12 | 1SFL447101R1200 | 2.250 |
| | | 100...250 | 100...250 | 0 0 | AF140-40-00-13 | 1SFL447101R1300 | 2.250 |
| | | 250...500 | 250...500 | 0 0 | AF140-40-00-14 | 1SFL447101R1400 | 2.250 |
| **With bar connections** | | | | | | | |
| 160 | 160 | 24...60 | 20...60 | 0 0 | AF116-40-00B-11 | 1SFL427102R1100 | 2.150 |
| | | 48...130 | 48...130 | 0 0 | AF116-40-00B-12 | 1SFL427102R1200 | 2.150 |
| | | 100...250 | 100...250 | 0 0 | AF116-40-00B-13 | 1SFL427102R1300 | 2.150 |
| | | 250...500 | 250...500 | 0 0 | AF116-40-00B-14 | 1SFL427102R1400 | 2.150 |
| 200 | 175 | 24...60 | 20...60 | 0 0 | AF140-40-00B-11 | 1SFL447102R1100 | 2.150 |
| | | 48...130 | 48...130 | 0 0 | AF140-40-00B-12 | 1SFL447102R1200 | 2.150 |
| | | 100...250 | 100...250 | 0 0 | AF140-40-00B-13 | 1SFL447102R1300 | 2.150 |
| | | 250...500 | 250...500 | 0 0 | AF140-40-00B-14 | 1SFL447102R1400 | 2.150 |

(1) For other auxiliary contacts arrangements, please contact your ABB local organization.




AF116, AF140-40-00



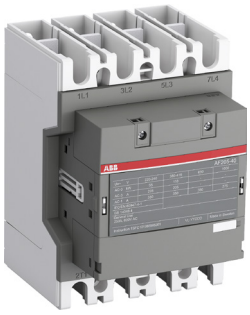

AF116, AF140-40-00B

Main dimensions mm, inches

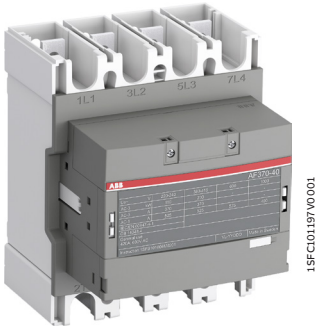
# AF190 ... AF370 4-pole contactors

## 275 to 525 A AC-1

## AC / DC operated




AF205-40-00



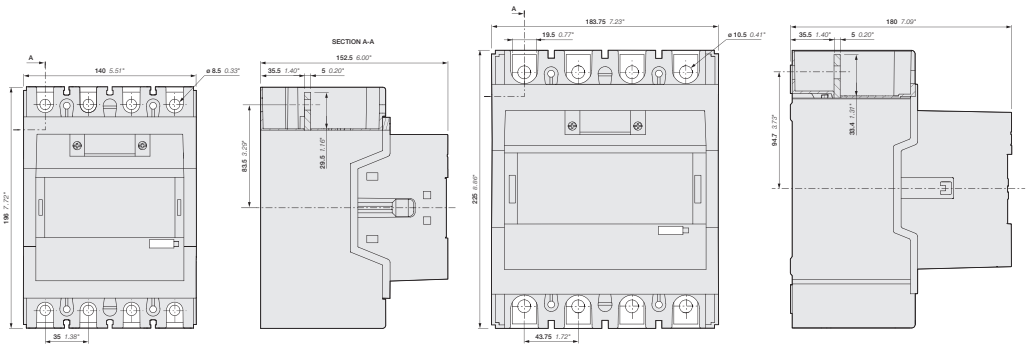

AF370-40-00

AF190 ... AF370 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 40 °C AC-1 | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| A | A | V 50/60 Hz | V DC | | | | kg |
| **4 N.O. main poles** | | | | | | | |
| 275 | 230 | 24...60 | 20...60 | 0 0 | AF190-40-00-11 | 1SFL487102R1100 | 3.900 |
| | | 48...130 | 48...130 | 0 0 | AF190-40-00-12 | 1SFL487102R1200 | 3.900 |
| | | 100...250 | 100...250 | 0 0 | AF190-40-00-13 | 1SFL487102R1300 | 3.900 |
| | | 250...500 | 250...500 | 0 0 | AF190-40-00-14 | 1SFL487102R1400 | 3.900 |
| 350 | 250 | 24...60 | 20...60 | 0 0 | AF205-40-00-11 | 1SFL527102R1100 | 3.900 |
| | | 48...130 | 48...130 | 0 0 | AF205-40-00-12 | 1SFL527102R1200 | 3.900 |
| | | 100...250 | 100...250 | 0 0 | AF205-40-00-13 | 1SFL527102R1300 | 3.900 |
| | | 250...500 | 250...500 | 0 0 | AF205-40-00-14 | 1SFL527102R1400 | 3.900 |
| 400 | 300 | 24...60 | 20...60 | 0 0 | AF265-40-00-11 | 1SFL547102R1100 | 6.360 |
| | | 48...130 | 48...130 | 0 0 | AF265-40-00-12 | 1SFL547102R1200 | 6.360 |
| | | 100...250 | 100...250 | 0 0 | AF265-40-00-13 | 1SFL547102R1300 | 6.360 |
| | | 250...500 | 250...500 | 0 0 | AF265-40-00-14 | 1SFL547102R1400 | 6.360 |
| 500 | 350 | 24...60 | 20...60 | 0 0 | AF305-40-00-11 | 1SFL587102R1100 | 6.360 |
| | | 48...130 | 48...130 | 0 0 | AF305-40-00-12 | 1SFL587102R1200 | 6.360 |
| | | 100...250 | 100...250 | 0 0 | AF305-40-00-13 | 1SFL587102R1300 | 6.360 |
| | | 250...500 | 250...500 | 0 0 | AF305-40-00-14 | 1SFL587102R1400 | 6.360 |
| 525 | 420 | 24...60 | 20...60 | 0 0 | AF370-40-00-11 | 1SFL607102R1100 | 6.360 |
| | | 48...130 | 48...130 | 0 0 | AF370-40-00-12 | 1SFL607102R1200 | 6.360 |
| | | 100...250 | 100...250 | 0 0 | AF370-40-00-13 | 1SFL607102R1300 | 6.360 |
| | | 250...500 | 250...500 | 0 0 | AF370-40-00-14 | 1SFL607102R1400 | 6.360 |

(1) For other auxiliary contacts arrangements, please contact your ABB local organization.



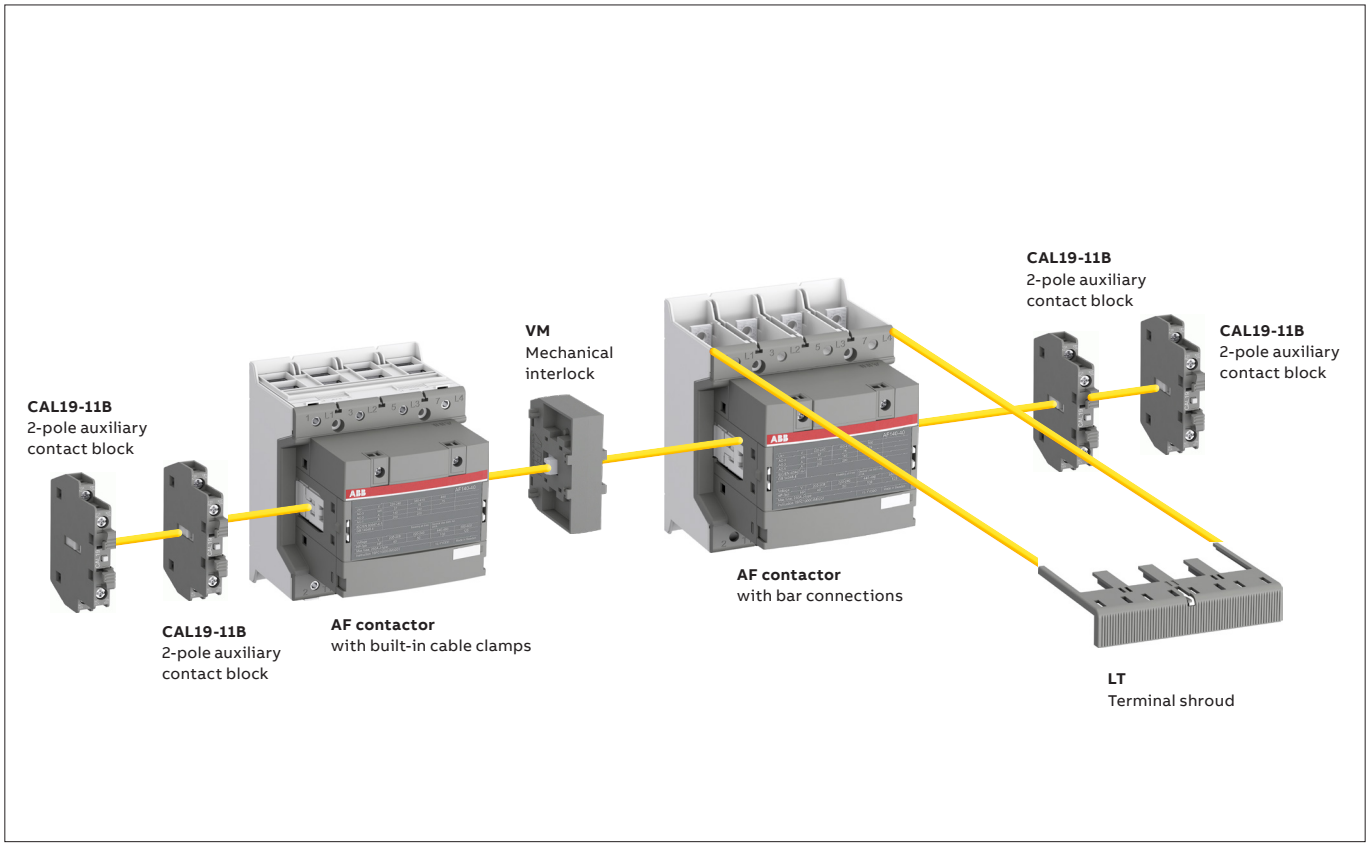

AF190, AF205

AF265, AF305, AF370

Main dimensions mm, inches

# AF116 ... AF370 4-pole contactors

## Contactors and main accessories




**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Available auxiliary contacts | Side-mounted accessories<br>Auxiliary contact blocks<br>CAL19-11 (3) | CAL19-11B (3) | Mechanical interlock units<br>(between two contactors) |
|---|---|---|---|---|---|
| AF116 ... AF370 | 4 0 | 0 0 | 2 x CAL19-11 | + 2 x CAL19-11B | – |
| AF116 ... AF370 | 4 0 | 0 0 | 2 x CAL19-11 (1) | + 2 x CAL19-11B (1) | + VM... (2) |

(1) Total number of auxiliary contact blocks for the two contactors.
(2) Interlock type, according to the contactor ratings (see "Accessories").
(3) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

# AF116 ... AF140 4-pole contactors

## 160 to 200 A AC-1

## AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts



1SFC101154V0001

AF140-40-11



1SFC101192V0001

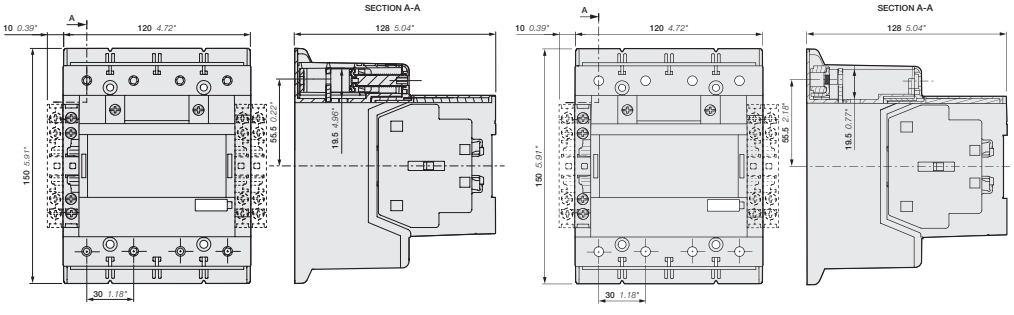
AF140-40-11B

AF116 ... AF140 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 350 V DC. These contactors are of the block type design with 4 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 40 °C AC-1 | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| A | A | V 50/60 Hz | V DC | | | | kg |
| **4 N.O. main poles** | | | | | | | |
| **For connection with built-in cable clamps** | | | | | | | |
| 160 | 160 | 24...60 | 20...60 | 1 1 | AF116-40-11-11 | 1SFL427101R1111 | 2.270 |
| | | 48...130 | 48...130 | 1 1 | AF116-40-11-12 | 1SFL427101R1211 | 2.270 |
| | | 100...250 | 100...250 | 1 1 | AF116-40-11-13 | 1SFL427101R1311 | 2.270 |
| | | 250...500 | 250...500 | 1 1 | AF116-40-11-14 | 1SFL427101R1411 | 2.270 |
| 200 | 175 | 24...60 | 20...60 | 1 1 | AF140-40-11-11 | 1SFL447101R1111 | 2.270 |
| | | 48...130 | 48...130 | 1 1 | AF140-40-11-12 | 1SFL447101R1211 | 2.270 |
| | | 100...250 | 100...250 | 1 1 | AF140-40-11-13 | 1SFL447101R1311 | 2.270 |
| | | 250...500 | 250...500 | 1 1 | AF140-40-11-14 | 1SFL447101R1411 | 2.270 |
| **With bar connections** | | | | | | | |
| 160 | 160 | 24...60 | 20...60 | 1 1 | AF116-40-11B-11 | 1SFL427102R1111 | 2.170 |
| | | 48...130 | 48...130 | 1 1 | AF116-40-11B-12 | 1SFL427102R1211 | 2.170 |
| | | 100...250 | 100...250 | 1 1 | AF116-40-11B-13 | 1SFL427102R1311 | 2.170 |
| | | 250...500 | 250...500 | 1 1 | AF116-40-11B-14 | 1SFL427102R1411 | 2.170 |
| 200 | 175 | 24...60 | 20...60 | 1 1 | AF140-40-11B-11 | 1SFL447102R1111 | 2.170 |
| | | 48...130 | 48...130 | 1 1 | AF140-40-11B-12 | 1SFL447102R1211 | 2.170 |
| | | 100...250 | 100...250 | 1 1 | AF140-40-11B-13 | 1SFL447102R1311 | 2.170 |
| | | 250...500 | 250...500 | 1 1 | AF140-40-11B-14 | 1SFL447102R1411 | 2.170 |

(1) For other auxiliary contacts arrangements, please contact your ABB local organization.




AF116, AF140-40-11

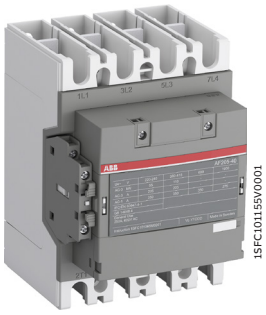
AF116, AF140-40-11B

Main dimensions mm, inches

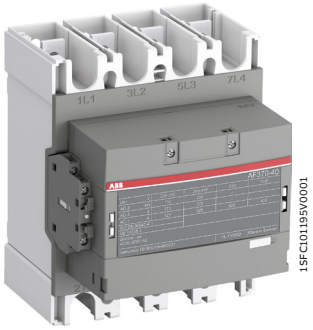
# AF190 ... AF370 4-pole contactors

## 275 to 525 A AC-1

## AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts




AF205-40-11



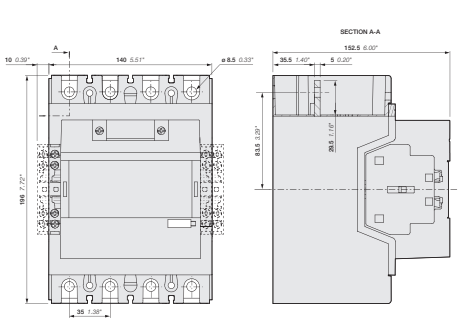

AF370-40-11

AF190 ... AF370 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

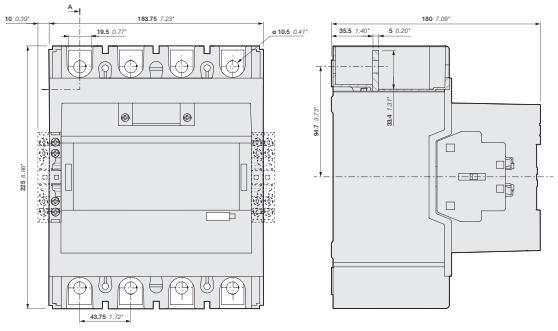
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC<br>Rated operational current<br>θ ≤ 40 °C<br>AC-1<br>A | UL / CSA<br>General use rating<br>600 V AC<br>A | Rated control circuit voltage<br>Uc min. ... Uc max.<br>V 50/60 Hz | <br><br>V DC | Auxiliary contacts fitted | Type (1) | Order code | Weight<br>Pkg (1 pce)<br>kg |
|---|---|---|---|---|---|---|---|
| **4 N.O. main poles** | | | | | | | |
| 275 | 230 | 24...60 | 20...60 | 1 1 | AF190-40-11-11 | 1SFL487102R1111 | 3.920 |
| | | 48...130 | 48...130 | 1 1 | AF190-40-11-12 | 1SFL487102R1211 | 3.920 |
| | | 100...250 | 100...250 | 1 1 | AF190-40-11-13 | 1SFL487102R1311 | 3.920 |
| | | 250...500 | 250...500 | 1 1 | AF190-40-11-14 | 1SFL487102R1411 | 3.920 |
| 350 | 250 | 24...60 | 20...60 | 1 1 | AF205-40-11-11 | 1SFL527102R1111 | 3.920 |
| | | 48...130 | 48...130 | 1 1 | AF205-40-11-12 | 1SFL527102R1211 | 3.920 |
| | | 100...250 | 100...250 | 1 1 | AF205-40-11-13 | 1SFL527102R1311 | 3.920 |
| | | 250...500 | 250...500 | 1 1 | AF205-40-11-14 | 1SFL527102R1411 | 3.920 |
| 400 | 300 | 24...60 | 20...60 | 1 1 | AF265-40-11-11 | 1SFL547102R1111 | 6.380 |
| | | 48...130 | 48...130 | 1 1 | AF265-40-11-12 | 1SFL547102R1211 | 6.380 |
| | | 100...250 | 100...250 | 1 1 | AF265-40-11-13 | 1SFL547102R1311 | 6.380 |
| | | 250...500 | 250...500 | 1 1 | AF265-40-11-14 | 1SFL547102R1411 | 6.380 |
| 500 | 350 | 24...60 | 20...60 | 1 1 | AF305-40-11-11 | 1SFL587102R1111 | 6.380 |
| | | 48...130 | 48...130 | 1 1 | AF305-40-11-12 | 1SFL587102R1211 | 6.380 |
| | | 100...250 | 100...250 | 1 1 | AF305-40-11-13 | 1SFL587102R1311 | 6.380 |
| | | 250...500 | 250...500 | 1 1 | AF305-40-11-14 | 1SFL587102R1411 | 6.380 |
| 525 | 420 | 24...60 | 20...60 | 1 1 | AF370-40-11-11 | 1SFL607102R1111 | 6.380 |
| | | 48...130 | 48...130 | 1 1 | AF370-40-11-12 | 1SFL607102R1211 | 6.380 |
| | | 100...250 | 100...250 | 1 1 | AF370-40-11-13 | 1SFL607102R1311 | 6.380 |
| | | 250...500 | 250...500 | 1 1 | AF370-40-11-14 | 1SFL607102R1411 | 6.380 |

(1) For other auxiliary contacts arrangements, please contact your ABB local organization.



AF190, AF205



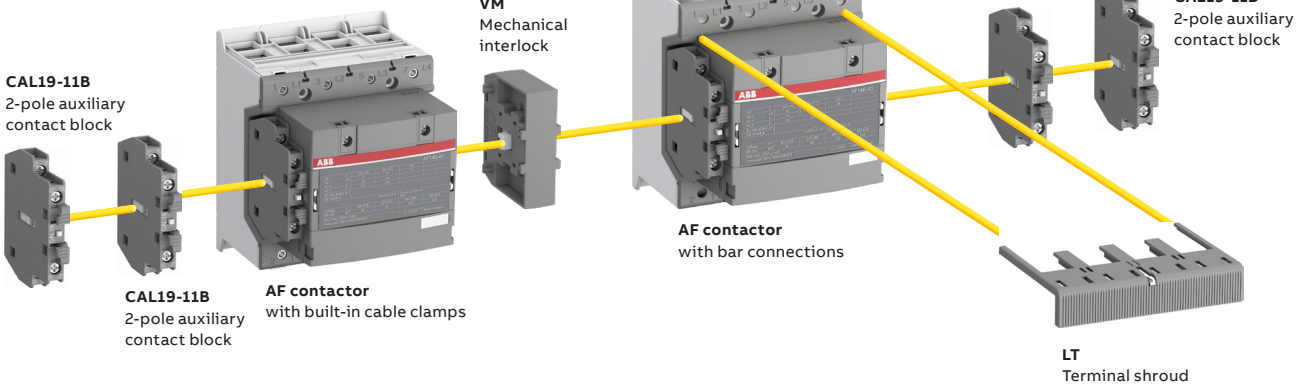
AF265, AF305, AF370

Main dimensions mm, inches

# AF116 ... AF370 4-pole contactors with 1 N.O. + 1 N.C. auxiliary contacts

## Contactors and main accessories






**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Available auxiliary contacts | Side-mounted accessories<br>Auxiliary contact blocks | | |
|---|---|---|---|---|---|
| | | | **CAL19-11** | **CAL19-11B** | Mechanical interlock units (between two contactors) |
| AF116 ... AF370 | 4 0 | 1 1 | 1 x CAL19-11 | + 2 x CAL19-11B | – |
| AF116 ... AF370 | 4 0 | 1 1 | – | + 2 x CAL19-11B (1) | + VM... (2) |

(1) Total number of auxiliary contact blocks for the two contactors.
(2) Interlock type, according to the contactor ratings (see "Accessories").

# AF116 ... AF140 4-pole contactors

160 to 200 A AC-1

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts



AF140-40-22



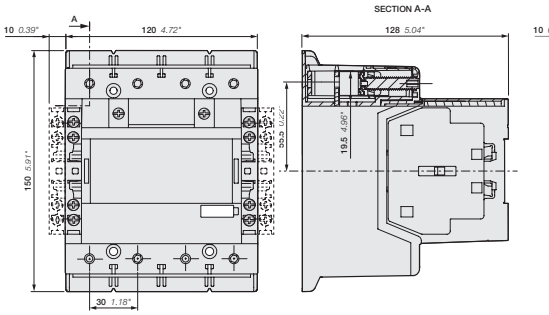
AF140-40-22B

AF116 ... AF140 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 350 V DC. These contactors are of the block type design with 4 main poles.

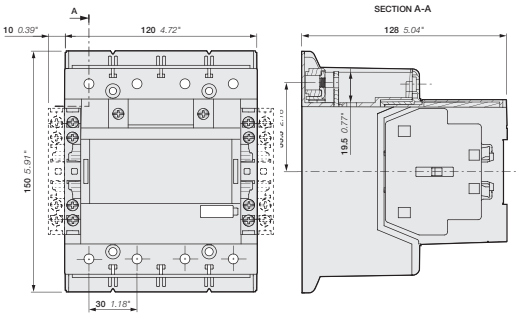
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 40 °C AC-1 | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| A | A | V 50/60 Hz | V DC | | | | kg |
| **4 N.O. main poles** | | | | | | | |
| **For connection with built-in cable clamps** | | | | | | | |
| 160 | 160 | 24...60 | 20...60 | 2 2 | AF116-40-22-11 | 1SFL427101R1122 | 2.290 |
| | | 48...130 | 48...130 | 2 2 | AF116-40-22-12 | 1SFL427101R1222 | 2.290 |
| | | 100...250 | 100...250 | 2 2 | AF116-40-22-13 | 1SFL427101R1322 | 2.290 |
| | | 250...500 | 250...500 | 2 2 | AF116-40-22-14 | 1SFL427101R1422 | 2.290 |
| 200 | 175 | 24...60 | 20...60 | 2 2 | AF140-40-22-11 | 1SFL447101R1122 | 2.290 |
| | | 48...130 | 48...130 | 2 2 | AF140-40-22-12 | 1SFL447101R1222 | 2.290 |
| | | 100...250 | 100...250 | 2 2 | AF140-40-22-13 | 1SFL447101R1322 | 2.290 |
| | | 250...500 | 250...500 | 2 2 | AF140-40-22-14 | 1SFL447101R1422 | 2.290 |
| **With bar connections** | | | | | | | |
| 160 | 160 | 24...60 | 20...60 | 2 2 | AF116-40-22B-11 | 1SFL427102R1122 | 2.190 |
| | | 48...130 | 48...130 | 2 2 | AF116-40-22B-12 | 1SFL427102R1222 | 2.190 |
| | | 100...250 | 100...250 | 2 2 | AF116-40-22B-13 | 1SFL427102R1322 | 2.190 |
| | | 250...500 | 250...500 | 2 2 | AF116-40-22B-14 | 1SFL427102R1422 | 2.190 |
| 200 | 175 | 24...60 | 20...60 | 2 2 | AF140-40-22B-11 | 1SFL447102R1122 | 2.190 |
| | | 48...130 | 48...130 | 2 2 | AF140-40-22B-12 | 1SFL447102R1222 | 2.190 |
| | | 100...250 | 100...250 | 2 2 | AF140-40-22B-13 | 1SFL447102R1322 | 2.190 |
| | | 250...500 | 250...500 | 2 2 | AF140-40-22B-14 | 1SFL447102R1422 | 2.190 |

(1) For other auxiliary contacts arrangements, please contact your ABB local organization.




AF116, AF140-40-11



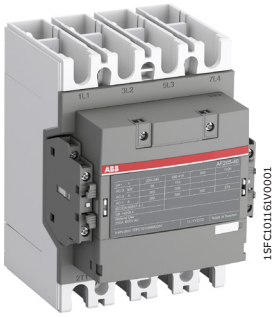

AF116, AF140-40-11B

Main dimensions mm, inches

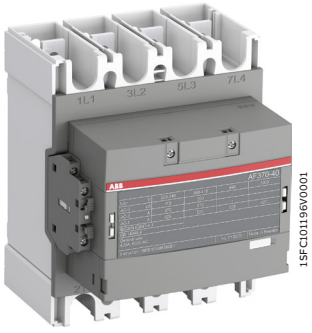
# AF190 ... AF370 4-pole contactors

## 275 to 525 A AC-1

## AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts




AF205-40-22



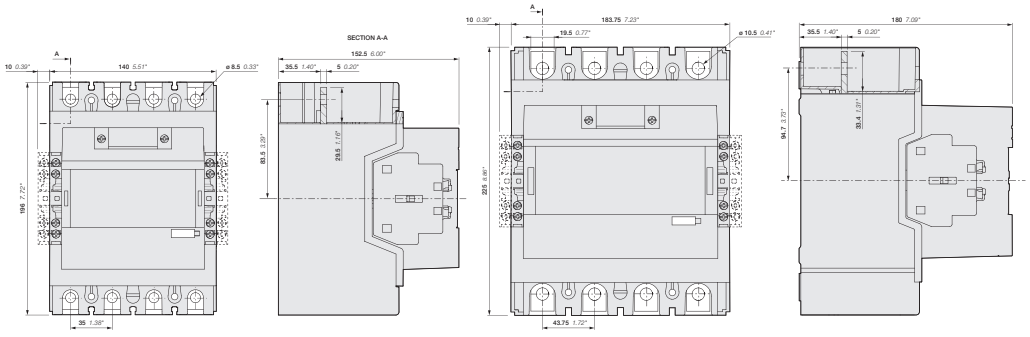

AF370-40-22

AF190 ... AF370 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 40 °C AC-1 | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| A | A | V 50/60 Hz | V DC | | | | kg |
| **4 N.O. main poles** | | | | | | | |
| 275 | 230 | 24...60 | 20...60 | 2 2 | AF190-40-22-11 | 1SFL487102R1122 | 3.940 |
| | | 48...130 | 48...130 | 2 2 | AF190-40-22-12 | 1SFL487102R1222 | 3.940 |
| | | 100...250 | 100...250 | 2 2 | AF190-40-22-13 | 1SFL487102R1322 | 3.940 |
| | | 250...500 | 250...500 | 2 2 | AF190-40-22-14 | 1SFL487102R1422 | 3.940 |
| 350 | 250 | 24...60 | 20...60 | 2 2 | AF205-40-22-11 | 1SFL527102R1122 | 3.940 |
| | | 48...130 | 48...130 | 2 2 | AF205-40-22-12 | 1SFL527102R1222 | 3.940 |
| | | 100...250 | 100...250 | 2 2 | AF205-40-22-13 | 1SFL527102R1322 | 3.940 |
| | | 250...500 | 250...500 | 2 2 | AF205-40-22-14 | 1SFL527102R1422 | 3.940 |
| 400 | 300 | 24...60 | 20...60 | 2 2 | AF265-40-22-11 | 1SFL547102R1122 | 6.400 |
| | | 48...130 | 48...130 | 2 2 | AF265-40-22-12 | 1SFL547102R1222 | 6.400 |
| | | 100...250 | 100...250 | 2 2 | AF265-40-22-13 | 1SFL547102R1322 | 6.400 |
| | | 250...500 | 250...500 | 2 2 | AF265-40-22-14 | 1SFL547102R1422 | 6.400 |
| 500 | 350 | 24...60 | 20...60 | 2 2 | AF305-40-22-11 | 1SFL587102R1122 | 6.400 |
| | | 48...130 | 48...130 | 2 2 | AF305-40-22-12 | 1SFL587102R1222 | 6.400 |
| | | 100...250 | 100...250 | 2 2 | AF305-40-22-13 | 1SFL587102R1322 | 6.400 |
| | | 250...500 | 250...500 | 2 2 | AF305-40-22-14 | 1SFL587102R1422 | 6.400 |
| 525 | 420 | 24...60 | 20...60 | 2 2 | AF370-40-22-11 | 1SFL607102R1122 | 6.400 |
| | | 48...130 | 48...130 | 2 2 | AF370-40-22-12 | 1SFL607102R1222 | 6.400 |
| | | 100...250 | 100...250 | 2 2 | AF370-40-22-13 | 1SFL607102R1322 | 6.400 |
| | | 250...500 | 250...500 | 2 2 | AF370-40-22-14 | 1SFL607102R1422 | 6.400 |

(1) For other auxiliary contacts arrangements, please contact your ABB local organization.



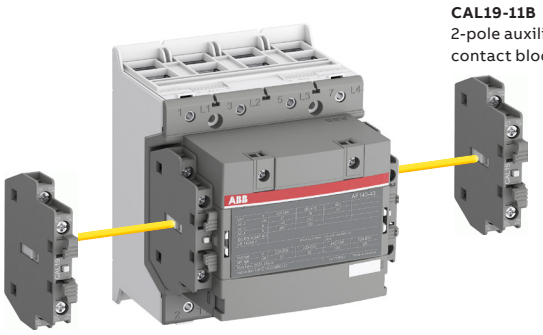
AF190, AF205

AF265, AF305, AF370

Main dimensions mm, inches

# AF116 ... AF370 4-pole contactors with 2 N.O. + 2 N.C. auxiliary contacts

## Contactors and main accessories




**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Available auxiliary contacts | Side-mounted accessories<br>Auxiliary contact blocks | | |
|---|---|---|---|---|---|
| | | | **CAL19-11 (1)** | **CAL19-11B (1)** | Mechanical interlock units (between two contactors) |
| AF116 ... AF370 | 4 0 | 2 2 | 2 x CAL19-11 included | + 2 x CAL19-11B | – |

(1) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

# EK550, EK1000 4-pole contactors

## 800 to 1000 A AC-1

## AC operated with 1 N.O. + 1 N.C. auxiliary contacts




EK1000-40-11

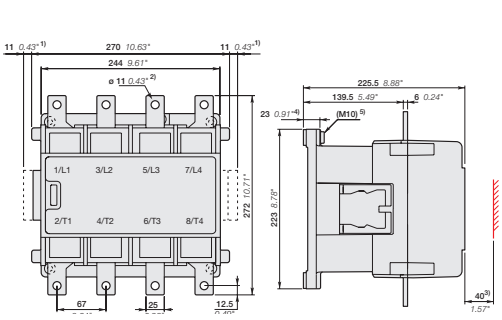
EK550 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 600 V DC, EK1000 up to 1000 V AC.

These contactors are of the block type design with:

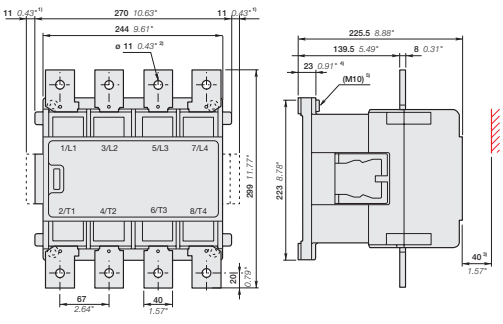
- 4 main poles
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC<br>Rated operational current<br>θ ≤ 40 °C<br>AC-1<br>A | UL/CSA<br>General use rating<br>600 V AC<br>A | Rated control circuit voltage<br>Uc<br>(1)<br>V 50 Hz | <br><br><br>V 60 Hz | Auxiliary contacts fitted | Type | Order code | Weight<br><br>Pkg<br>(1 pce)<br>kg |
|---|---|---|---|---|---|---|---|
| 800 | 540 | 220 | 220...240 | 1 1 | EK550-40-11 | SK827041-EL | 17.200 |
| | | 220...230 | 230...255 | 1 1 | EK550-40-11 | SK827041-EM | 17.200 |
| | | 400...415 | - | 1 1 | EK550-40-11 | SK827041-AR | 17.200 |
| 1000 | - | 220 | 220...240 | 1 1 | EK1000-40-11 | SK827044-EL | 17.500 |
| | | 220...230 | 230...255 | 1 1 | EK1000-40-11 | SK827044-EM | 17.500 |
| | | 400...415 | - | 1 1 | EK1000-40-11 | SK827044-AR | 17.500 |

(1) Other control voltages see voltage code table.




EK550




EK1000

1) Dimension for extra auxiliary contact block.
2) Screw, nut and washer by-packed.
3) Min. distance to uninsulated wall.
4) Damping elements are included.
5) Earthing screw.

Main dimensions mm, inches

# EK550, EK1000 4-pole contactors

## 800 to 1000 A AC-1

## DC operated with 2 N.O. + 1 N.C. auxiliary contacts



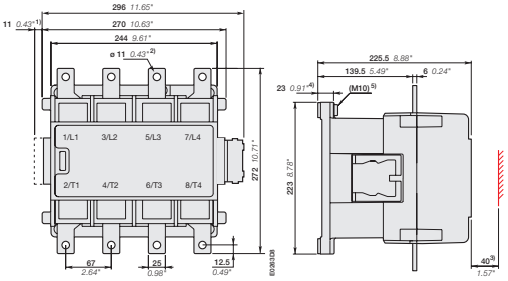

EK1000-40-21

EK550 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 600 V DC, EK1000 up to 1000 V AC.

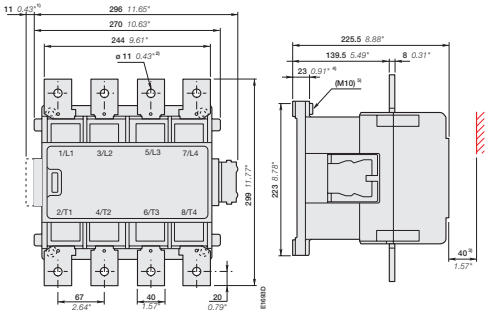
These contactors are of the block type design with:

- 4 main poles
- control circuit: DC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC<br>**Rated operational current**<br>**θ ≤ 40 °C**<br>**AC-1**<br>A | UL / CSA<br>**General use rating**<br>**600 V AC**<br>A | **Rated control circuit voltage Uc**<br>V DC | **Auxiliary contacts fitted**<br> | **Type** | **Order code** | **Weight**<br>**Pkg (1 pce)**<br>kg |
|---|---|---|---|---|---|---|
| 800 | 540 | 48 | 2 1 | EK550-40-21 | SK827041-DD | 17.200 |
| | | 110 | 2 1 | EK550-40-21 | SK827041-DE | 17.200 |
| | | 125 | 2 1 | EK550-40-21 | SK827041-DU | 17.200 |
| | | 220 | 2 1 | EK550-40-21 | SK827041-DF | 17.200 |
| 1000 | - | 36 | 2 1 | EK1000-40-21 | SK827044-DC | 17.500 |
| | | 48 | 2 1 | EK1000-40-21 | SK827044-DD | 17.500 |
| | | 60 | 2 1 | EK1000-40-21 | SK827044-DT | 17.500 |
| | | 110 | 2 1 | EK1000-40-21 | SK827044-DE | 17.500 |
| | | 125 | 2 1 | EK1000-40-21 | SK827044-DU | 17.500 |
| | | 220 | 2 1 | EK1000-40-21 | SK827044-DF | 17.500 |




EK550




EK1000

1) Dimension for extra auxiliary contact block.
2) Screw, nut and washer by-packed.
3) Min. distance to uninsulated wall.
4) Damping elements are included.
5) Earthing screw.

# EK550, EK1000 4-pole Contactors

## 800 to 1000 A AC-1

## AC operated with 2 N.O. + 2 N.C. auxiliary contacts




EK1000-40-22

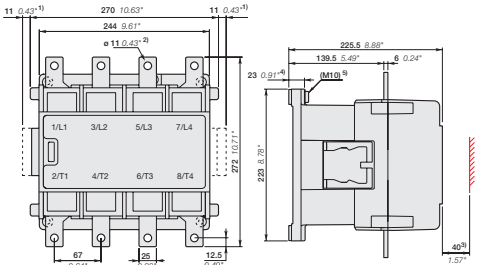
EK550 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and for controlling power circuits up to 1000 V AC and 600 V DC, EK1000 up to 1000 V AC.

These contactors are of the block type design with:

- 4 main poles
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories

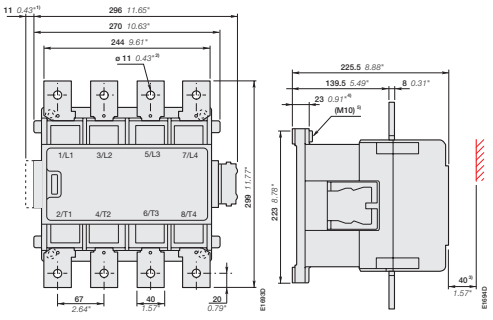
| IEC<br>Rated operational current<br>θ ≤ 40 °C<br>AC-1<br>A | UL/CSA<br>General use rating<br>600 V AC<br>A | Rated control circuit voltage<br>Uc<br>(1)<br>V 50 Hz | <br><br><br>V 60 Hz | Auxiliary contacts fitted<br> | Type | Order code | Weight<br><br>Pkg<br>(1 pce)<br>kg |
|---|---|---|---|---|---|---|---|
| 800 | 540 | 220 | 220...240 | 2 2 | EK550-40-22 | SK827043-EL | 17.200 |
| | | 220...230 | 230...255 | 2 2 | EK550-40-22 | SK827043-EM | 17.200 |
| | | 400...415 | - | 2 2 | EK550-40-22 | SK827043-AR | 17.200 |
| 1000 | - | 220 | 220...240 | 2 2 | EK1000-40-22 | SK827045-EL | 17.500 |
| | | 220...230 | 230...255 | 2 2 | EK1000-40-22 | SK827045-EM | 17.500 |
| | | 380 | 380...415 | 2 2 | EK1000-40-22 | SK827045-EP | 17.500 |
| | | 380...400 | 400...440 | 2 2 | EK1000-40-22 | SK827045-ER | 17.500 |
| | | 400...415 | - | 2 2 | EK1000-40-22 | SK827045-AR | 17.500 |

(1) Other control voltages see voltage code table.




EK550

1) Dimension for extra auxiliary contact block
2) Screw, nut and washer by-packed
3) Min. distance to uninsulated wall
4) Damping elements are included
5) Earthing screw



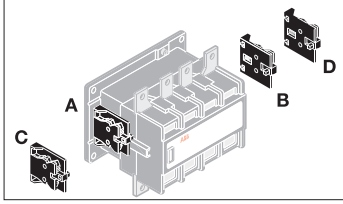

EK1000

Main dimensions mm, inches

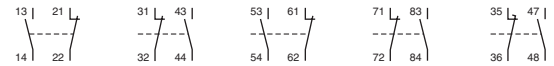
# EK550, EK1000 4-pole contactors with 1 N.O. + 1 N.C. and 2 N.O. + 1 N.C. auxiliary contacts

**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

**Mounting positions of the auxiliary contact**



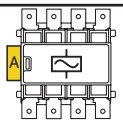
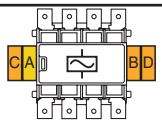
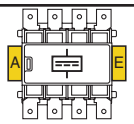
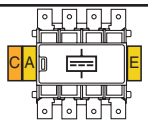

**Auxiliary contact types and connecting diagrams**



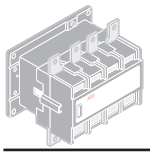
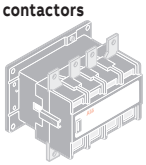
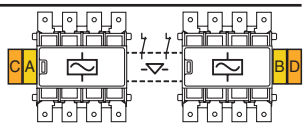
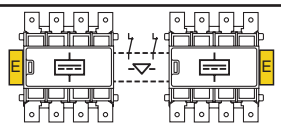

CAL16-11 A | CAL16-11 B | CAL16-11 C | CAL16-11 D | CCL16-11 E (1)

(1) Contact 35-36 used for some types of EK... contactors

## EK 4-pole contactors

| Contactor types | Main poles | Available auxiliary contacts | | | Add-on auxiliary contact blocks<br>**2-pole CAL16-11 ...** | **Mounting and positioning**<br>Factory mounted auxiliary contacts<br>Add-on CAL16-11 auxiliary contacts |
|---|---|---|---|---|---|---|
| **AC operated, 50 Hz, 60 Hz or 50/60 Hz** | | | | | | |
| EK550, EK1000 | 4 0 | 1 1 |  | + | 1 x CAL16-11B<br>+ 1 x CAL16-11C<br>+ 1 x CAL16-11D |  |
| **DC operated** | | | | | | |
| EK550, EK1000 | 4 0 | 2 1 |  | + | 1 x CAL16-11C |  |

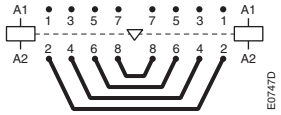
## EK 4-pole reversing contactors with VH800 mechanical and electrical interlock units

| **"Left hand" contactors** | **Interlocking** | **"Right hand" contactors** | | **Add-on auxiliary contact blocks**<br>**2-pole CAL16-11 ...** | **Mounting and positioning**<br>Factory mounted auxiliary contacts<br>Add-on CAL16-11 auxiliary contacts |
|---|---|---|---|---|---|
|  |  |  | | | |
| **AC operated, 50 Hz, 60 Hz or 50/60 Hz** | | | | | |
| EK550, EK1000 | VH800 | EK550, EK1000 | + | 1 x CAL16-11C<br>1 x CAL16-11D |  |
| **DC operated** | | | | | |
| EK550, EK1000 | VH800 | EK550, EK1000 | | – |  |

# EK550, EK1000 4-pole contactors with 1 N.O. + 1 N.C. auxiliary contacts

and 2 N.O. + 1 N.C. auxiliary contacts






BSS550 ... BSS1000




RC-EH

| For contactors | Auxiliary contacts | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|
| |  | | | | | kg |
| **Side-mounted auxiliary contact blocks** | | | | | | |
| EK | 1 | 1 | CAL16-11B | SK829002-B | 1 | 0.050 |
| | 1 | 1 | CAL16-11C | SK829002-C | 1 | 0.050 |
| | 1 | 1 | CAL16-11D | SK829002-D | 1 | 0.050 |
| | 1 | 1 | CCL16-11E (2) | SK829002-E | 1 | 0.050 |
| **Mechanical interlock unit for two horizontal mounted contactors** | | | | | | |
| EK550, EK1000 | | | VH800 | SK829070-F | 1 | 6.000 |
| **Connecting sets** | | | | | | |
| EK550 | | | BSS550 | SK829090-E | 1 | 3.300 |
| EK1000 | | | BSS1000 | SK829090-H | 1 | 5.500 |

**Surge suppressors**

| For contactors | Rated control circuit voltage Uc | | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|
| | V | AC | DC | | | | kg |
| EK550, EK1000 | 48...110 | ● | – | RC-EH800/110 | SK829007-C | 1 | 0.015 |
| EK550, EK1000 | 24...125 | – | ● | RC-EH800/110 | SK829007-C | 1 | 0.015 |
| EK550, EK1000 | 220...600 | ● | – | RC-EH800/600 | SK829007-D | 1 | 0.015 |

See "Main accessory fitting details" table.
(2) Mounting of CCL16-11E blocks does not allow an additional second block to be added on top of it.
All DC operated EK contactors are equipped with one CCL16-11E on the right side.

# AF09 ... AF80 4-pole contactors

## Technical data

### Main pole - Utilization characteristics according to IEC

| Contactor types | | AC / DC operated | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 |
|---|---|---|---|---|---|---|---|---|---|
| Standards | | | IEC/EN 60947-1, IEC/EN 60947-4-1 | | | | | | |
| Rated operational voltage Ue max. | | | 690 V | | | | | | 1000 V |
| Rated frequency (without derating) | | | 50 / 60 Hz | | | | | | |
| Conventional free-air thermal current Ith | | | | | | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | | 35 A | 35 A | 55 A | 55 A | 105 A | 105 A | 125 A |
| With conductor cross-sectional area | | | 6 mm² | 6 mm² | 16 mm² | 16 mm² | 35 mm² | 35 mm² | 50 mm² |
| AC-1 Utilization category | | | | | | | | | |
| For air temperature close to contactor | | | | | | | | | |
| Ie / Rated operational current AC-1 | | θ ≤ 40 °C | 25 A | 30 A | 45 A | 55 A | 70 A | 100 A | 125 A |
| Ue max. ≤ 690 V, 50/60 Hz | | θ ≤ 60 °C | 25 A | 30 A | 40 A | 45 A | 60 A | 80 A | 105 A |
| | | θ ≤ 70 °C | 22 A | 26 A | 32 A | 37 A | 50 A | 70 A | 90 A |
| With conductor cross-sectional area | | | 4 mm² | 6 mm² | 10 mm² | 16 mm² | 25 mm² | 35 mm² | 50 mm² |
| AC-3 Utilization category | | | | | | | | | |
| For air temperature close to contactor θ ≤ 60 °C | | | | | | | | | |
| Ie / Max. rated operational current AC-3 (1) | | | | | | | | | |
|  3-phase motors | | 220-230-240 V | 9 A | 18 A | 23.2 A | 23.2 A | 40 A | 53 A | 80 A |
| | | 380-400 V | 9 A | 18 A | 22 A | 22 A | 40 A | 53 A | 80 A |
| | | 415 V | 9 A | 18 A | 21.2 A | 21.2 A | 40 A | 53 A | 80 A |
| | | 440 V | 9 A | 18 A | 20 A | 20 A | 40 A | 53 A | 80 A |
| | | 500 V | 9.5 A | 15 A | 17.6 A | 17.6 A | 35 A | 45 A | 65 A |
| | | 690 V | 7 A | 10.5 A | 10.5 A | 10.5 A | 25 A | 35 A | 49 A |
| | | 1000 V | | | | | | | 25 A |
| Rated operational power AC-3 (1) | | | | | | | | | |
|  1500 r.p.m. 50 Hz<br>1800 r.p.m. 60 Hz<br>3-phase motors | | 220-230-240 V | 2.2 kW | 4 kW | 5.5 kW | 5.5 kW | 11 kW | 15 kW | 22 kW |
| | | 380-400 V | 4 kW | 7.5 kW | 11 kW (3) | 11 kW (3) | 18.5 kW | 22 kW | 37 kW |
| | | 415 V | 4 kW | 9 kW | 11 kW | 11 kW | 22 kW | 30 kW | 45 kW |
| | | 440 V | 4 kW | 9 kW | 11 kW | 11 kW | 22 kW | 30 kW | 45 kW |
| | | 500 V | 5.5 kW | 9 kW | 11 kW | 11 kW | 22 kW | 30 kW | 45 kW |
| | | 690 V | 5.5 kW | 9 kW | 9 kW | 9 kW | 22 kW | 30 kW | 45 kW |
| | | 1000 V | | | | | | | 35 kW |
| Rated making capacity AC-3 | | | 10 x Ie AC-3 acc. to IEC 60947-4-1 | | | | | | |
| Rated breaking capacity AC-3 | | | 8 x Ie AC-3 acc. to IEC 60947-4-1 | | | | | | |
| Short-circuit protection device for contactors | | | | | | | | | |
| Without thermal overload relay - Motor protection excluded | | | | | | | | | |
| Ue ≤ 500 V AC - gG type fuse | | | 25 A | 32 A | 50 A | 63 A | 80 A | 110 A | 160 A |
| Rated short-time withstand current Icw | | 1 s | 300 A | 300 A | 450 A | 450 A | 1000 A | 1000 A | 1200 A |
| at 40 °C ambient temperature, | | 10 s | 150 A | 150 A | 300 A | 300 A | 600 A | 600 A | 780 A |
| in free air from a cold state | | 30 s | 80 A | 80 A | 225 A | 225 A | 350 A | 350 A | 450 A |
| | | 1 min | 60 A | 60 A | 150 A | 150 A | 250 A | 250 A | 300 A |
| | | 15 min | 35 A | 35 A | 55 A | 55 A | 110 A | 110 A | 140 A |
| Maximum breaking capacity | N.O. main pole | at 440 V | 250 A | 250 A | - | - | 950 A | 950 A | 1100 A |
| cos ϕ = 0.45 | | at 690 V | 106 A | 106 A | - | - | 600 A | 600 A | 750 A |
| | N.C. Main pole | at 440 V | - | - | - | - | 600 A | - | 900 A |
| | | at 690 V | - | - | - | - | 300 A | - | 750 A |
| Power dissipation per pole | | Ie / AC-1 | 0.8 W | 1.2 W | 1.6 W | 2.3 W | 3 W | 6.3 W | 8 W |
| | | Ie / AC-3 | 0.1 W | 0.35 W | 0.42 W | 0.42 W | 1 W | 1.7 W | 3.2 W |
| Max. electrical switching frequency | | AC-1 | 600 cycles/h | | | | | | |

(1) For the corresponding kW/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor Rated Operational Powers and Currents"
(2) For the protection of motor starters against short circuits, see "Coordination with Short-circuit Protection Devices".
(3) 400 V 3-phase motors only.

# AF116 ... EK1000 4-pole contactors
## Technical data



### Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | EK550 | EK1000 |
|---|---|---|---|---|---|---|---|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1 | | | | | | | | |
| Rated operational voltage Ue max. | | 690 V | | 1000 V | | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | | | | |
| Conventional free-air thermal current Ith | | | | | | | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 160 A | 200 A | 275 A | 350 A | 400 A | 500 A | 525 A | 800 A | 1000 A |
| With conductor cross-sectional area | | 70 mm² | 95 mm² | 150 mm² | 240 mm² (3) | 240 mm² | 300 mm² (4) | 2x 185 mm² (4) | 2x 240 mm² | 2x 300 mm² |
| AC-1 Utilization category | | | | | | | | | | |
| For air temperature close to contactor | | | | | | | | | | |
| Ie / Rated operational current AC-1 | θ ≤ 40 °C | 160 A | 200 A | 275 A | 350 A | 400 A | 500 A | 525 A | 800 A | 1000 A |
| Ue max. ≤ 690 V, 50/60 Hz | θ ≤ 60 °C | 145 A | 175 A | 250 A | 300 A | 350 A | 400 A | 425 A | 650 A | 800 A |
| | θ ≤ 70 °C | 130 A | 160 A | 200 A | 240 A | 290 A | 325 A | 350 A | 575 A | 720 A |
| Ue max. ≤ 1000 V, 50/60 Hz | θ ≤ 40 °C | - | - | 250 A | 275 A | 350 A | 375 A | 400 A | 800 A | 1000 A |
| | θ ≤ 60 °C (2) | - | - | 225 A | 250 A | 300 A | 325 A | 350 A | 650 A | 800 A |
| | θ ≤ 70 °C | - | - | 185 A | 200 A | 240 A | 260 A | 290 A | 575 A | 720 A |
| With conductor cross-sectional area | | 70 mm² | 95 mm² | 150 mm² | 240 mm² (3) | 240 mm² | 300 mm² (4) | 2x 185 mm² (4) | 2x 240 mm² | 2x 300 mm² |
| AC-3 Utilization category | | | | | | | | | | |
| For air temperature close to contactor θ ≤ 60 °C (2) | | | | | | | | | | |
| Ie / Max. rated operational current AC-3 (1) | | | | | | | | | | |
| 3-phase motors | 220-230-240 V | 116 A | 140 A | 190 A | 205 A | 265 A | 305 A | 370 A | 550 A | - |
| | 380-400 V | 116 A | 140 A | 190 A | 205 A | 265 A | 305 A | 370 A | 550 A | - |
| | 415 V | 116 A | 140 A | 190 A | 205 A | 265 A | 305 A | 370 A | 550 A | - |
| | 440 V | 116 A | 140 A | 190 A | 205 A | 265 A | 305 A | 370 A | 550 A | - |
| | 500 V | - | - | - | - | - | - | - | 550 A | - |
| | 690 V | - | - | - | - | - | - | - | 550 A | - |
| | 1000 V | - | - | - | - | - | - | - | 175 A | - |
| Rated operational power AC-3 (1) | | | | | | | | | | |
| 1500 r.p.m. 50 Hz | 220-230-240 V | 30 kW | 37 kW | 55 kW | 55 kW | 75 kW | 90 kW | 110 kW | 160 kW | - |
| 1800 r.p.m. 60 Hz | 380-400 V | 55 kW | 75 kW | 90 kW | 110 kW | 132 kW | 160 kW | 200 kW | 280 kW | - |
| 3-phase motors | 415 V | 55 kW | 75 kW | 90 kW | 110 kW | 132 kW | 160 kW | 200 kW | 315 kW | - |
| | 440 V | 75 kW | 90 kW | 110 kW | 132 kW | 160 kW | 160 kW | 200 kW | 315 kW | - |
| | 500 V | - | - | - | - | - | - | - | 400 kW | - |
| | 690 V | - | - | - | - | - | - | - | 500 kW | - |
| | 1000 V | - | - | - | - | - | - | - | 250 kW | - |
| Rated making capacity AC-3 | | 10 x Ie AC-3 acc. to IEC 60947-4-1 | | | | | | | | |
| Rated breaking capacity AC-3 | | 8 x Ie AC-3 acc. to IEC 60947-4-1 | | | | | | | | |
| Short-circuit protection device for contactors | | | | | | | | | | |
| Without thermal overload relay - Motor protection excluded | | | | | | | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 200 A | 250 A | 355 A | 400 A | 630 A | 630 A | 630 A | 800 A | 1000 A |
| Rated short-time withstand current Icw | 1 s | 1300 A | 1460 A | 1900 A | 2050 A | 2650 A | 3050 A | 3700 A | 5500 A | 6800 A |
| at 40 °C ambient temperature, | 10 s | 928 A | 1168 A | 1520 A | 1640 A | 2120 A | 2440 A | 2960 A | 5300 A | 6400 A |
| in free air from a cold state | 30 s | 536 A | 674 A | 878 A | 947 A | 1224 A | 1409 A | 1709 A | 3700 A | 4400 A |
| | 1 min | 379 A | 477 A | 621 A | 670 A | 865 A | 996 A | 1208 A | 3000 A | 3400 A |
| | 15 min | 160 A | 200 A | 275 A | 350 A | 400 A | 500 A | 525 A | 1000 A | 1200 A |
| Maximum breaking capacity | at 440 V | 2000 A | 3000 A | 3300 A | 3500 A | 3800 A | 4600 A | 5000 A | 5400 A | - |
| cos ϕ = 0.45 | at 690 V | - | - | - | - | - | - | - | 5400 A | - |
| Power dissipation per pole | Ie / AC-1 | 12 W | 18 W | 15 W | 25 W | 32 W | 50 W | 72 W | 60 W | 80 W |
| | Ie / AC-3 | - | - | - | - | - | - | - | 25 W | - |
| Max. electrical switching frequency | AC-1 | 300 cycles/h | | | | | | | | |
| | AC-3 | 300 cycles/h | | | | | | | | - |
| | AC-2, AC4 | - | | | | | | | 120 cycles/h | - |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) θ ≤ 55 °C for EK550, EK1000
(3) For currents above 275 A use terminal enlargements or terminal extensions.
(4) For currents above 450 A use terminal enlargements or terminal extensions.

# AF09 ... AF80 4-pole contactors

## Technical data

### Main pole - Utilization characteristics according to UL/NEMA/CSA

| Contactor types | AC / DC operated | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 |
|---|---|---|---|---|---|---|---|---|
| Standards | | UL 508<br>CSA C22.2 No. 60947-1-13<br>CSA C22.2 No. 60947-4-1 | | | | UL 60947-1, UL 60947-4-1<br>CSA C22.2 No. 60947-1:22<br>CSA C22.2 No. 60947-4-1:22 | | |
| Max. operational voltage | | 600 V | | | | | | |
| UL / CSA general use rating | | | | | | | | |
| | 600 V AC | 25 A | 30 A | 45 A | 55 A | 60 A | 80 A | 105 A |
| With conductor cross-sectional area | | AWG 10 | AWG 10 | AWG 8 | AWG 6 | AWG 6 | AWG 4 | AWG 2 |
| 1 pole | 80 V DC | 25 A (1) | 30 A (1) | 45 A | 55 A | 60 A | 80 A | 105 A |
| 2 poles in serie | 160 V DC | 25 A (1) | 30 A (1) | 45 A | 55 A | 60 A | 80 A | 105 A |
| 3 poles in serie | 240 V DC | 25 A | 30 A | 45 A | 55 A | 60 A | 80 A | 105 A |
| 4 poles in serie | 320 V DC | 25 A | 30 A | 45 A | 55 A | 60 A | 80 A | 105 A |
| With conductor cross-sectional area | | AWG 10 | AWG 10 | AWG 8 | AWG 8 | AWG 6 | AWG 4 | AWG 2 |
| Max. electrical switching frequency | | | | | | | | |
| For general use | | 600 cycles/h | | | | | | |

Note: 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles, see "General technical data".
(1) 20 A for AF09..-22-00 and AF16..-22-00.

### Main pole utilization characteristics - 4 N.O. non-reversing contactors

| Contactor types | AC / DC operated | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 |
|---|---|---|---|---|---|---|---|---|
| Lighting application - UL / CSA - breaking all lines | | | | | | | | |
| Electrical discharge lamps (ballast) | | | | | | | | |
| 1-phase per pole | 347 V AC | 20 A | 30 A | 45 A | 50 A | - | - | - |
| 3-phase break all lines | 600 V AC | 20 A | 30 A | 45 A | 50 A | - | - | - |
| Elevator control, load switching, 500 000 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.1 | | | | | | | | |
| 1-phase | | | | | | | | |
| Horse power rating | 110-120 V AC | - | 1/2 hp | - | - | - | - | - |
| | 220-240 V AC | - | 1-1/2 hp | - | - | - | - | - |
| 3-phase | | | | | | | | |
| Horse power rating | 200-208 V AC | - | 3 hp | - | - | - | - | - |
| | 220-240 V AC | - | 3 hp | - | - | - | - | - |
| | 440-480 V AC | - | 7-1/2 hp | - | - | - | - | - |
| | 550-600 V AC | - | 10 hp | - | - | - | - | - |

Note: 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles, see "General technical data".

# AF116 ... EK1000 4-pole contactors
## Technical data



### Main pole - Utilization characteristics according to UL/NEMA/CSA

| Contactor types | AC / DC operated | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | EK550 | EK1000 |
|---|---|---|---|---|---|---|---|---|---|---|
| Standards | | UL 60947-4-1A, CSA C22.2 No. 60947-4-1-07 | | | | | | | | |
| Max. operational voltage | | 600 V | | | | | | | | |
| UL / CSA general use rating | | | | | | | | | | |
| 600 V AC | | 160 A | 175 A | 230 A | 250 A | 300 A | 350 A | 420 A | 540 A | - |
| With conductor cross-sectional area | | AWG 2/0 | AWG 3/0 | MCM 250 | MCM 250 | MCM 400 | MCM 500 | 2//MCM 300 | - | - |
| 1 pole | 90 V DC | 200 A | 200 A | - | - | - | - | - | - | - |
| | 100 V DC | - | - | 250 A | 350 A | - | - | - | - | - |
| | 110 V DC | - | - | - | - | 400 A | 500 A | 520 A | - | - |
| 2 poles in serie | 175 V DC | 200 A | 200 A | - | - | - | - | - | - | - |
| | 200 V DC | - | - | 250 A | 350 A | - | - | - | - | - |
| | 225 V DC | - | - | - | - | 400 A | 500 A | 520 A | - | - |
| 3 poles in serie | 260 V DC | 200 A | 200 A | - | - | - | - | - | - | - |
| | 300 V DC | - | - | 250 A | 350 A | - | - | - | - | - |
| | 340 V DC | - | - | - | - | 400 A | 500 A | 520 A | - | - |
| 4 poles in series | 350 V DC | 200 A | 200 A | - | - | - | - | - | - | - |
| | 400 V DC | - | - | 250 A | 350 A | - | - | - | - | - |
| | 450 V DC | - | - | - | - | 400 A | 500 A | 520 A | - | - |
| With conductor cross-sectional area | | AWG 2/0 | AWG 3/0 | MCM 250 | MCM 250 | MCM 400 | MCM 500 | 2//MCM 300 | - | - |
| Max. electrical switching frequency | | | | | | | | | | |
| For general use | | 300 cycles/h | | | | | | | | |

### Main pole utilization characteristics - 4 N.O. non-reversing contactors

| Contactor types | AC / DC operated | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | EK550 | EK1000 |
|---|---|---|---|---|---|---|---|---|---|---|
| Lighting application - UL/CSA - breaking all lines | | | | | | | | | | |
| Electrical discharge lamps (ballast) | | | | | | | | | | |
| 1-phase per pole | 347 V AC | 160 A | 200 A | 250 A | 300 A | 400 A | 450 A | 520 A | - | - |
| 3-phase break all lines | 600 V AC | 160 A | 200 A | 250 A | 300 A | 400 A | 450 A | 520 A | - | - |

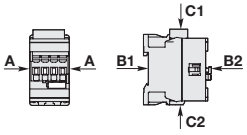
# AF09 ... AF80 4-pole contactors

## Technical data



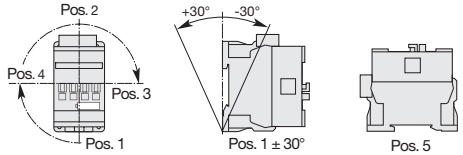
### General technical data

| Contactor types | AC / DC operated | | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 |
|---|---|---|---|---|---|---|---|---|---|
| Rated insulation voltage Ui | | | | | | | | | |
| acc. to IEC 60947-4-1 | | | 690 V | | | | | | 1000 V |
| acc. to UL / CSA | | | 600 V | | | | | | |
| Rated impulse withstand voltage Uimp. | | | 6 kV | | | | | | 8 kV |
| Electromagnetic compatibility | | | Devices complying with IEC/EN 60947-1 - Environment A and B (1) | | | | | | |
| Pollution degree | | | 3 | | | | | | |
| Ambient air temperature close to contactor | | | | | | | | | |
| Operation | | | -40...+70 °C | | | | | | |
| Storage | | | -60...+80 °C | | | | | | |
| Climatic withstand | | | Category B according to IEC 60947-1 Annex Q | | | | | | |
| Maximum operating altitude (without derating) | | | 3000 m | | | | | | |
| Mechanical durability | | | | | | | | | |
| Number of operating cycles | | | 10 millions operating cycles | | | | | | |
| Max. switching frequency | | | 3600 cycles/h | | | | | | |
| Shock withstand<br>acc. to IEC/EN 60068-2-27<br>Mounting position 1 | | | | | | | | | |
| | | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | | | | | |
| | 4 N.O.<br>Main poles | A | 30 g | | | | 20 g | | |
| | | B1 | 25 g Closed position / 5 g Open position | | | | 20 g Closed position / 5 g Open position | | |
| | | B2 | 15 g | | | | 10 g | | |
| | | C1 | 25 g | | | | 20 g | | |
| | | C2 | 25 g | | | | 20 g | | |
| | 2 N.O. + 2 N.C.<br>Main poles | A | 30 g | | 30 g Closed position / 25 g Open position | | 20 g | | |
| | | B1 | 25 g Closed position / 5 g Open position | | 25 g Closed position / 5 g Open position | | 20 g Closed position / 5 g Open position | | 20 g Closed position / 4 g Open position |
| | | B2 | 15 g | | 15 g Closed position / 10 g Open position | | 10 g | | |
| | | C1 | 25 g | | 25 g Closed position / 20 g Open position | | 20 g | | |
| | | C2 | 25 g | | 25 g Closed position / 20 g Open position | | 20 g | | |
| Vibration withstand<br>acc. to IEC 60068-2-6 | | | 5 ... 300 Hz<br>4 g Closed position / 2 g Open position | | | | 5 ... 300 Hz<br>3 g Closed position / 2 g Open position | | |



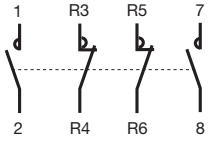

(1) Environment B: all AF09 ... AF38 contactors produced since week 08-2013.
AF09 ... AF38-..-..-12 (48...130 V 50/60 Hz-DC) compliant to environment A only: for environment B select AF09Z ... AF38Z-..-..-22.

### Mounting characteristics and conditions for use

| Contactor types | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 |
|---|---|---|---|---|---|---|---|
| Mounting positions |  Max. add-on N.C. auxiliary contacts: see accessory fitting details for a 4-pole contactor AF09 ... AF80 | | | | | | |
| Mounting distances | The contactors can be assembled side by side | | | | | | |
| Fixing | | | | | | | |
| On rail according to IEC/EN 60715 | 35 x 7.5 mm or 35 x 15 mm | | | | 35 x 15 mm | | |
| By screws (not supplied) | 2 x M4 screws placed diagonally | | | | 2 x M4 or 2 x M6 screws placed diagonally | | |



### Remark for 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles

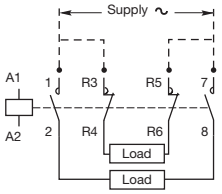



These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams beside). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK before MAKE.

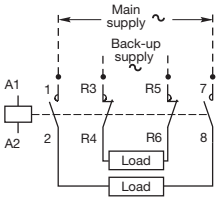
These contactors are not suitable for a reversing starter or for controlling a single load from 2 separate supplies.

### Block diagrams

- Single supply and 2 separate loads




- 2 separate supplies and 2 separate loads

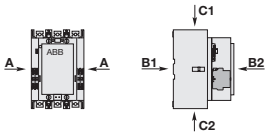


# AF116 ... EK1000 4-pole contactors

## Technical data

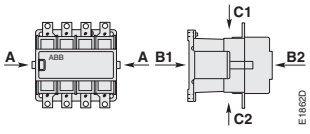


### General technical data

| Contactor types | AC / DC operated | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|---|---|---|---|---|---|---|---|
| Rated insulation voltage Ui | | | | | | | | |
| acc. to IEC 60947-4-1 | | 1000 V | | | | | | |
| acc. to UL / CSA | | 600 V | | | | | | |
| Rated impulse withstand voltage Uimp. | | 8 kV | | | | | | |
| Electromagnetic compatibility | | AF contactors comply with IEC/EN 60947-1 - Environment A | | | | | | |
| Pollution degree | | 3 | | | | | | |
| Ambient air temperature close to contactor | | | | | | | | |
| Operation | | -40 to +70 °C | | | | | | |
| Storage | | -40 to +70 °C | | | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | | | |
| Mechanical durability | | | | | | | | |
| Number of operating cycles | | 5 million operating cycles | | | | | | |
| Maximum switching frequency | | 300 cycles/h | | | | | | |
| Shock withstand | | | | | | | | |
| acc. to IEC/EN 60068-2-27 | | | | | | | | |
| Mounting position 1 | | No change in contact position, closed or open position | | | | | | |
|  | Shock direction | 1/2 sinusoidal shock for 11 ms | | | 1/2 sinusoidal shock for 30 ms | | | |
| | A | 20 g | | | 20 g | | | |
| | B1 | 15 g closed position / 3 g open position | | | 15 g closed position / 3 g open position | | | |
| | B2 | 15 g closed position / 3 g open position | | | 15 g closed position / 3 g open position | | | |
| | C1 | 20 g | | | 20 g | | | |
| | C2 | 20 g | | | 20 g | | | |
| Vibration withstand | | | | | | | | |
| acc to IEC 60068-2-6 | | 0.7 g closed position / 0.7 g open position 13.2...100 Hz | | | | | | |



### General technical data

| Contactor types | | AC or DC operated | EK550 | EK1000 |
|---|---|---|---|---|
| Rated insulation voltage Ui | | | | |
| acc. to IEC 60947-4-1 | | | 1000 V | |
| acc. to UL | | | 600 V | |
| Rated impulse withstand voltage Uimp. | | | 8 kV | |
| Electromagnetic compatibility | | | EK contactors complying with IEC/EN 60947-1 - Environment A | |
| Ambient air temperature close to contactor | | | | |
| Operation | Fitted with thermal overload relay | | -25 to +55 °C | - |
| | Without thermal overload relay | | -40 to +70 °C | - |
| Storage | | | -50 to +70 °C | - |
| Climatic withstand | | | Category B acc. to IEC 60068-2-30 | |
| Maximum operating altitude (without derating) | | | ≤ 3000 m | |
| Mechanical durability | | | | |
| Number of operating cycles | | | 5 millions operating cycles | 3 millions operating cycles |
| Max. switching frequency | | | 60 cycles/h | |
| Shock withstand | | | | |
| acc. to IEC/EN 60068-2-27 | | | | |
| Mounting position 1 | | | | |
| Closed or open position | | | | |
|  | | Shock direction | 1/2 sinusoidal shock for 15 ms: no change in contact position, closed or open position | |
| | | A | 10 g | |
| | | B1 | 10 g | |
| | | B2 | 10 g | |
| | | C1 | 10 g | |
| | | C2 | 10 g | |

# AF09 ... AF80 4-pole contactors
## Technical data

### Magnet system characteristics AF09 ... AF80 AC / DC operated

| Contactor types | AC / DC operated | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 |
|---|---|---|---|---|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max.<br>At θ ≤ 70 °C 0.85 x Uc min...Uc max. | | | | At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max | | |
| | DC supply | At θ ≤ 60 °C 0.85 x Uc min ... 1.1 x Uc max<br>At θ ≤ 70 °C 0.85 x Uc min ... Uc max | | | | At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max | | |
| AC control voltage 50/60 Hz | | | | | | | | |
| Rated control circuit voltage Uc | | 24...500 V AC | | | | | | |
| Coil consumption | Average pull-in value | 50 VA | | | | 40 VA | | |
| | Average holding value | 2.2 VA / 2 W | | | | 4 VA / 2 W | | |
| DC control voltage | | | | | | | | |
| Rated control circuit voltage Uc | | 20...500 V DC | | | | 20...500 V DC | | |
| Coil consumption | Average pull-in value | 50 W | | | | 40 W | | |
| | Average holding value | 2 W | | | | 2 W | | |
| PLC-output control | | AF...-11 not suitable for direct control by PLC-output. | | | | - | | |
| Drop-out voltage | | ≤ 60 % of Uc min. | | | | ≤ 60 % of Uc min. | | |
| Voltage sag immunity acc. to SEMI F47-0706 | | – | | | | conditions of use on request | | |
| Dips withstand -20 °C ≤ θ ≤ +60 °C | | – | | | | 20 ms average | | |
| Operating time | | | | | | | | |
| Between coil energization and: | N.O. contact closing | 40...95 ms | | | | 48...120 ms | | |
| | N.C. contact opening | 38...90 ms | | | | 44...115 ms | | |
| Between coil de-energization and: | N.O. contact opening | 11...95 ms | | | | 16...110 ms | | |
| | N.C. contact closing | 13...98 ms | | | | 18...113 ms | | |

### Magnet System Characteristics AF09Z...AF38Z 24V DC operated designed for PLC - coil 30

| Contactor types | DC operated | AF09Z | AF16Z |
|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | DC supply | At θ ≤ 60 °C 0.85 ... 1.1x Uc<br>At θ ≤ 70 °C Uc | |
| DC control voltage | | | |
| Rated control circuit voltage Uc | | 24 V DC | |
| Coil consumption | Average pull-in value | 6 W | |
| | Average holding value | 1.7 W | |
| PLC-output control | | ≥ 250 mA 24 V DC for PLCs and safety PLCs using broken wire detection | |
| Drop-out voltage | | ≤ 60 % of Uc min. | |
| Voltage sag immunity acc. to SEMI F47-0706 | | - | |
| Dips withstand -20 °C ≤ θ ≤ +60 °C | | - | |
| Operating time | | | |
| Between coil energization and: | N.O. contact closing | 27 ... 53 ms | |
| | N.C. contact opening | 20 ... 35 ms | |
| Between coil de-energization and: | N.O. contact opening | 17 ... 29 ms | |
| | N.C. contact closing | 22 ... 57 ms | |

### Magnet System Characteristics AF09Z...AF38Z AC / DC operated for specific applications - coils 20, 21, 22, 23

| Contactor types | AC / DC operated | AF09Z | AF16Z | AF26Z | AF38Z |
|---|---|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max.<br>At θ ≤ 70 °C 0.85 x Uc min...Uc max. | | | |
| | DC supply | At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max | | | |
| AC control voltage 50/60 Hz | | | | | |
| Rated control circuit voltage Uc | | 24...250 V AC | | | |
| Coil consumption | Average pull-in value | 16 VA | | | |
| | Average holding value | 1.7 VA / 1.5 W | | | |
| DC control voltage | | | | | |
| Rated control circuit voltage Uc | | 12...250 V DC | | | |
| Coil consumption | Average pull-in value | 12 ... 16 W | | | |
| | Average holding value | 1.7 W | | | |
| PLC-output control | | (AF..Z coil 21) ≥ 500 mA 24 V DC for PLCs - Not suitable for safety PLCs | | | |
| Drop-out voltage | | ≤ 60 % of Uc min. | | | |
| Voltage sag immunity acc. to SEMI F47-0706 | | (AF..Z coil 21, 22, 23) conditions of use on request | | | |
| Dips withstand -20 °C ≤ θ ≤ +60 °C | | (AF..Z coil 21, 22, 23) 20 ms average for Uc ≥ 24 V 50/60 Hz or Uc ≥ 20 V DC | | | |
| Operating time | | | | | |
| Between coil energization and: | N.O. contact closing | 40...95 ms | | | |
| | N.C. contact opening | 38...90 ms | | | |
| Between coil de-energization and: | N.O. contact opening | 11...95 ms | | | |
| | N.C. contact closing | 13...98 ms | | | |

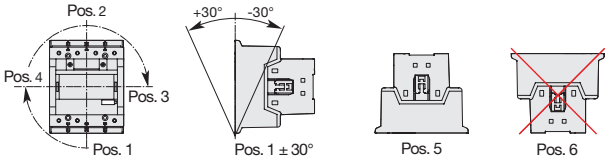
# AF116 ... AF370 4-pole contactors
## Technical data



### Magnet system characteristics

| Contactor types | AC / DC operated | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|---|---|---|---|---|---|---|---|
| Coil operating limits | AC supply | At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max | | | | | | |
| acc. to IEC 60947-4-1 | DC supply | At θ ≤ 70 °C 0.80 x Uc min ... 1.1 x Uc max | | | | | | |
| Rated control circuit voltage Uc | | 24...500 V AC, 20...500 V DC | | | | | | |
| Coil consumption | | | | | | | | |
| AC control voltage 50/60 Hz | | | | | | | | |
| 24...60 V AC | Average pull-in value | 225 VA | | 165 VA | | 475 VA | | |
| | Average holding value | 5.5 VA / 2.5 W | | 5 VA / 3 W | | 9 VA / 3 W | | |
| 48...130 V AC | Average pull-in value | 180 VA | | 180 VA | | 340 VA | | |
| | Average holding value | 6 VA / 2 W | | 6 VA / 2 W | | 17 VA / 3 W | | |
| 100...250 V AC | Average pull-in value | 130 VA | | 220 VA | | 385 VA | | |
| | Average holding value | 8 VA / 2.5 W | | 8 VA / 2.5 W | | 20 VA / 4.5 W | | |
| 250...500 V AC | Average pull-in value | 260 VA | | 260 VA | | 550 VA | | |
| | Average holding value | 18 VA / 4 W | | 18 VA / 4 W | | 27 VA / 4.5 W | | |
| DC control voltage | | | | | | | | |
| 20...60 V DC | Average pull-in value | 210 W | | 205 W | | 400 W | | |
| | Average holding value | 2.5 W | | 2.5 W | | 3.5 W | | |
| 48...130 V DC | Average pull-in value | 150 W | | 150 W | | 360 W | | |
| | Average holding value | 2.5 W | | 2.5 W | | 2.5 W | | |
| 100...250 V DC | Average pull-in value | 135 W | | 190 W | | 410 W | | |
| | Average holding value | 3 W | | 2.5 W | | 4.5 W | | |
| 250...500 V DC | Average pull-in value | 230 W | | 230 W | | 650 W | | |
| | Average holding value | 4 W | | 4 W | | 4.7 W | | |
| Drop-out voltage | | 55 % of Uc min | | | | | | |
| Voltage sag immunity acc. to SEMI F47 | | Conditions of use on request | | | | | | |
| Dips withstand | | 20 ms | | | | | | |
| Operating time Coil supply between A1 - A2 | | | | | | | | |
| Between coil energization and: | N.O. contact closing | 20...55 ms | | 25...60 ms | | 30...60 ms | | |
| Between coil de-energization and: | N.O. contact opening | 40..70 ms | | 45...80 ms | | 45...80 ms | | |

### Mounting characteristics and conditions for use

| Contactor types | AC / DC operated | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|---|---|---|---|---|---|---|---|
| Mounting positions | |  Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor AF116 ... AF370 | | | | | | |
| Mounting distances | | The contactors can be assembled side by side | | | | | | |
| Fixing | | | | | | | | |
| On rail acc. to IEC/EN 60715 | | - | | | | | | |
| By screws | | 4 x M4 | | 4 x M5 | | | | |

# EK550 ... EK1000 4-pole contactors

## Technical data

### Magnet system characteristics

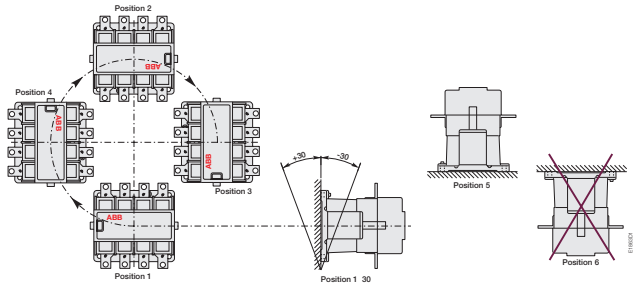
| Contactor types | | AC operated | EK550 | EK1000 |
|---|---|---|---|---|
| Coil operating limits | | AC supply | At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max. | |
| acc. to IEC 60947-4-1 | | | Please also refer to "Mounting characteristics and conditions for use" | |
| AC control voltage | | | | |
| Rated control circuit voltage | | 50 Hz | 48...500 V | |
| | | 60 Hz | 110...600 V | |
| Coil consumption | Average pull-in value | 50 Hz | 3500 VA | |
| | | 60 Hz | 4000 VA | |
| | 50/60 Hz (1) | | 3800 / 3400 VA | |
| | Average holding value | 50 Hz | 125 VA / 50 W | |
| | | 60 Hz | 140 VA / 60 W | |
| | 50/60 Hz (1) | | 140 VA /60 W | |
| Drop-out voltage in % of Uc min. | | | approx. 45...65 % | |
| Operating time | | | | |
| Between coil energization and: | | N.O. contact closing | 30...60 ms | |
| | | N.C. contact opening | 25...55 ms | |
| Between coil de-energization and: | | N.O. contact opening | 10...20 ms | |
| | | N.C. contact closing | 13...23 ms | |

(1) "A" coil voltage: see "Coil voltage code table".

### Magnet system characteristics

| Contactor types | | DC operated | EK550 | EK1000 |
|---|---|---|---|---|
| Coil operating limits | | DC supply | At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max. | |
| acc. to IEC 60947-4-1 | | | Please also refer to "Mounting characteristics and conditions for use" | |
| DC control voltage | | | | |
| Rated control circuit voltage | | | 24...220 V | |
| Coil consumption | | Average pull-in value | 1100 W | |
| | | Average holding value | 20 W | |
| Drop-out voltage | | | approx. 15...50 % of Uc min. | |
| Coil time constant | | | | |
| Open | | L/R | 12 ms | |
| Closed | | L/R | 60 ms | |
| Operating time | | | | |
| Between coil energization and: | | N.O. contact closing | 60...80 ms | |
| | | N.C. contact opening | 55...75 ms | |
| Between coil de-energization and: | | N.O. contact opening | 10...35 ms | |
| | | N.C. contact closing | 13...38 ms | |

### Mounting characteristics and conditions for use

| Contactor types | | AC / DC operated | EK550 | EK1000 |
|---|---|---|---|---|
| Mounting positions | | |  Max. N.O. or N.C. built-in and add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor EK550, EK1000 | |
| Control voltage / Ambient temperature | | | | |
| Mounting positions | 1, 1±30°, 2, 3, 4, 5 | at θ ≤ 70 °C | 0.85...1.1 x Uc | |
| | 6 | at θ ≤ 70 °C | Unauthorized | |
| Mounting distances | | | The contactors can be assembled side by side | |
| Fixing | | | | |
| On rail according to IEC/EN 60715 | | | – | |
| By screws | | | 4 x M6 (2) | |

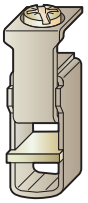
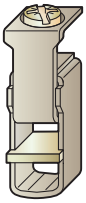
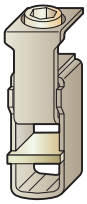
(2) Damping elements are supplied.

# AF09 ... AF80 4-pole contactors

## Technical data



### Connecting characteristics

| Contactor types | | | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 |
|---|---|---|---|---|---|---|---|---|---|
| Main terminals | | |  Screw terminals with cable clamp | |  Screw terminals with double connector 2 x (5.5 width x 6.8 depth) | |  Screw terminals with double connector 2 x (9.3 width x 7.9/10.3 depth) | |  Screw terminals with double connector 2 x (12.4 width x 9.3/11.1 depth) |
| Connection capacity (min. ... max.) | | | | | | | | | |
| Main conductors (poles) | | | | | | | | | |
| Rigid | Solid (≤ 4 mm²) | 1 x | 1...6 mm² | | 1.5...16 mm² | | 6...35 mm² | | 6...70 mm² |
| | Stranded (≥ 1 mm²) | 2 x | 1...6 mm² | | 1.5...16 mm² | | 6...35 mm² | | 6...50 mm² |
| Flexible with non insulated ferrule | | 1 x | 0.75...6 mm² | | 1.5...16 mm² | | 4...35 mm² | | 6...50 mm² |
| | | 2 x | 0.75...6 mm² | | 1.5...16 mm² | | 4...35 mm² | | 6...50 mm² |
| Flexible with insulated ferrule | | 1 x | 0.75...4 mm² | | 1.5...16 mm² | | 4...35 mm² | | 6...50 mm² |
| | | 2 x | 0.75...2.5 mm² | | 1.5...16 mm² | | 4...35 mm² | | 6...50 mm² |
| L Bars or lugs | | L < | 9.6 mm | | - | | 9.2 mm | | 12.2 mm |
| Connection capacity acc. to UL/CSA | | 1 or 2 x | AWG 16...10 | | AWG 16...6 | | AWG 10...2 | | AWG 6...1 |
| Stripping length | | | 10 mm | | 12 mm | | 16 mm | | 17 mm |
| Tightening torque | | | 1.5 Nm / 13 lb.in | | 2.5 Nm / 22 lb.in | | 4 Nm / 35 lb.in | | 6 Nm / 53 lb.in |
| Auxiliary conductors (coil terminals) | | | | | | | | | |
| Rigid solid/stranded | | 1 x | 1...2.5 mm² | | | | | | |
| | | 2 x | 1...2.5 mm² | | | | | | |
| Flexible with non insulated ferrule | | 1 x | 0.75...2.5 mm² | | | | | | |
| | | 2 x | 0.75...2.5 mm² | | | | | | |
| Flexible with insulated ferrule | | 1 x | 0.75...2.5 mm² | | | | | | |
| | | 2 x | 0.75...1.5 mm² | | | | | | |
| L Lugs | | L < | 8 mm | | | | | | |
| Connection capacity acc. to UL/CSA | | 1 or 2 x | AWG 18...14 | | | | | | |
| Stripping length | | | 10 mm | | | | | | |
| Tightening torque | | | 1.2 Nm / 11 lb.in | | | | | | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | | | | | | |
| Main terminals | | | IP20 | | | | IP10 * | | |
| Coil terminals | | | IP20 | | | | | | |
| Screw terminals | | | Delivered in open position, screws of unused terminals must be tightened | | | | | | |
| Main terminals | | | M3.5 | | M4.5 | | M6 | | M8 |
| | Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 | | | | Flat Ø 6.5 / Pozidriv 2 | | hexagon socket (s = 4 mm) |
| Coil terminals | | | M3.5 | | | | | | |
| | Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 | | | | | | |

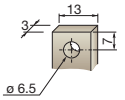
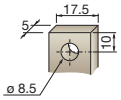
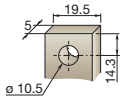
* For IP20 degree of protection, use LT terminal shroud accessory.

# AF116 ... AF370 4-pole contactors

## Technical data



### Connecting characteristics

| Contactor types | AC / DC operated | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|---|---|---|---|---|---|---|---|
| Main terminals Flat type | |  | |  | |  | | |
| Connection capacity (min. ... max.) | | | | | | | | |
| Main conductors (poles) | | | | | | | | |
| Cu cable - Stranded | 1 x | 10...95 mm² | | 6...150 mm² | | 16...300 mm² | | |
| Clamp type | | LD... included (1) | | 1SDA066917R1 | | 1SDA055016R1 | | |
| Tightening torque | | 8 Nm | | 14 Nm | | 25 Nm | | |
| Cu cable - Stranded | 2 x | 10...95 mm² | | 50...120 mm² | | 70...185 mm² | | |
| Clamp type | | LD... included (1) | | 1SFN074709R1000, LZ185-2C/120 | | 1SCA022194R0890, OZXB4 | | |
| Tightening torque | | 8 Nm | | 16 Nm | | 22 Nm | | |
| Al cable - Stranded | 1 x | – | | 95...185 mm² | | 185...240 mm² | | |
| Clamp type | | – | | 1SDA054988R1 | | 1SDA055020R1 | | |
| Tightening torque | | – | | 31 Nm | | 43 Nm | | |
| Cu cable - Flexible | 1 x | 10...70 mm² | | 6...120 mm² | | 16...240 mm² | | |
| Clamp type | | LD... included (1) | | 1SDA066917R1 | | 1SDA055016R1 | | |
| Tightening torque | | 8 Nm | | 14 Nm | | 25 Nm | | |
| Cu cable - Flexible | 2 x | 10...70 mm² | | 50...95 mm² | | 70...185 mm² | | |
| Clamp type | | LD... included (1) | | 1SFN074709R1000, LZ185-2C/120 | | 1SCA022194R0890, OZXB4 | | |
| Tightening torque | | 8 Nm | | 16 Nm | | 22 Nm | | |
| Lugs | L ≤ | 22 mm (.866 in) | | 24 mm (.945 in) | | 32 mm (1.260 in) | | |
| | Ø > | 6 mm (.236 in) | | 8 mm (.315 in) | | 10 mm (.394 in) | | |
| Socket type | | LL... included | | LL... included | | LL... included | | |
| Tightening torque | | 9 Nm / 80 lb.in | | 18 Nm / 160 lb.in | | 28 Nm / 248 lb.in | | |
| Connection capacity acc. to UL / CSA | 1 x | AWG 6...3/0 | | 6...300 MCM | | 4...400 MCM | | |
| Clamp type | | LD... included (1) | | ATK185 (2) | | ATK300 (2) | | |
| Tightening torque | | 8 Nm / 71 lb.in | | 34 Nm / 301 lb.in | | 42 Nm / 372 lb.in | | |
| Connection capacity acc. to UL / CSA | 2 x | AWG 6...3/0 | | – | | 4...500 MCM | | |
| Clamp type | | LD... included (1) | | – | | ATK300/2 (2) | | |
| Tightening torque | | 8 Nm / 71 lb.in | | – | | 42 Nm / 372 lb.in | | |
| Auxiliary conductors (coil terminals) | | | | | | | | |
| Rigid Solid/Stranded | 1 x | 1...4 mm² | | | | | | |
| | 2 x | 1...4 mm² | | | | | | |
| Flexible | 1 x | 0.75...2.5 mm² | | | | | | |
| | 2 x | 0.75...2.5 mm² | | | | | | |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² | | | | | | |
| | 2 x | 0.75...2.5 mm² | | | | | | |
| Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² | | | | | | |
| | 2 x | 0.75...2.5 mm² | | | | | | |
| Lugs | L < | 8 mm | | | | | | |
| | I > | 3.5 mm | | | | | | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 | | | | | | |
| Stripping length | | 9 mm | | | | | | |
| Tightening torque | | 1.00 Nm / 9 lb.in | | | | | | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | | | | | |
| Main terminals | | IP00 | | | | | | |
| Coil terminals | | IP20 | | | | | | |
| Screw terminals | | | | | | | | |
| Main terminals | | M6 | | M8 | | M10 | | |
| Screwdriver type | | Screws and bolts | | | | | | |
| Coil terminals (delivered in open position) | | M3.5 | | | | | | |
| Screwdriver type | | Flat Ø 5.5 mm / Pozidriv 2 | | | | | | |

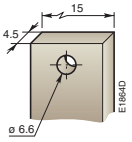
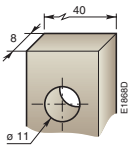
(1) LD... not included for AF116 ... AF146-30-..B.
(2) Available in North America only.

# EK550 ... EK1000 4-pole contactors

## Technical data



### Connecting characteristics

| Contactor types | | | | **EK550** | **EK1000** |
|---|---|---|---|---|---|
| | | AC or DC operated | | | |
| Main terminals<br>Flat type | | | |  |  |
| Connection capacity (min. ... max.) | | | | | |
| Main conductors (poles) | | | | | |
| Rigid with connector | | Cu cable | 1 x | 70...300 mm² | - |
| | | Al/Cu cable | 1 x | 70...300 mm² | 95...300 mm² |
| | | Al/Cu cable | 2 x | 35...185 mm² | 95...300 mm² |
| Bars or lugs | | | L ≤ | 55 mm | |
| | | | Ø > | 10 mm | |
| Connection capacity acc. to UL/CSA | | | 1 or 2 x | 3 x 4 - 500 MCM | - |
| Tightening torque | | Recommended | | 18 Nm / 160 lb.in | |
| | | Max. | | 22 Nm | |
| Auxiliary conductors<br>(coil terminals) | | | | | |
| Rigid Solid/Stranded | | | 1 x | 0.5...2.5 mm² | |
| | | | 2 x | 0.5...2.5 mm² | |
| Flexible with ferrule | | | 1 x | 0.5...2.5 mm² | |
| | | | 2 x | 0.5...2.5 mm² | |
| Bars or lugs | | | L ≤ | 8 mm | |
| | | | I > | 3.7 mm | |
| Connection capacity acc. to UL/CSA | | | 1 or 2 x | 18...14 AWG | |
| Tightening torque | | Recommended | | 1.00 Nm / 9 lb.in | |
| | | Max. | | 1.20 Nm | |
| Degree of protection<br>acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | | |
| Main terminals | | | | IP00 | |
| Coil terminals | | | | IP20 | |
| Screw terminals | | | | | |
| Main terminals | | | | M10 | |
| | | | | Screws and bolts | |
| Coil terminals (delivered in open positions) | | | | M3.5 | |
| | | | Screwdriver type | Flat Ø 5.5 mm / Pozidriv 2 | |

# 4-pole contactors

## Electrical durability and utilization categories

**General**

Utilization categories determine the current making and breaking conditions relating to the characteristics of the loads to be controlled by the contactors. International standard IEC 60947-4-1 and European standard EN 60947-4-1 are the standards to be referred to.

If Ic is the current to be broken by the contactor and Ie the rated operational current normally drawn by the load, then:

- Categories AC-1: Ic = Ie

Generally speaking Ic = m x Ie where m is a multiple of the load operational current.

On next pages, the curves corresponding to categorie AC-1 represent the electrical durability variation of standard contactors in relation to the breaking current Ic.

**Electrical durability curves:**

- categories AC-1: the curves represent the electrical durability variation of standard contactors in relation to the breaking current Ic.

Electrical durability is expressed in millions of operating cycles.

**Curve utilization mode**

**Electrical durability forecast and contactor selection for categories AC-1**

- Note the characteristics of the load to be controlled:
  - Operational voltage..... Ue
  - Current normally drawn..... Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents").
  - Utilization category..... AC-1
  - Breaking current..... Ic = Ie for AC-1
- Define the number of operating cycles N required.
- On the diagram corresponding to the operational category, select the contactor with the curve immediately above the intersection point (Ic ; N).

**Case of uninterrupted duty**

For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us).

The combined effect of environmental conditions and the proper temperature of the product may require some disposals.

As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

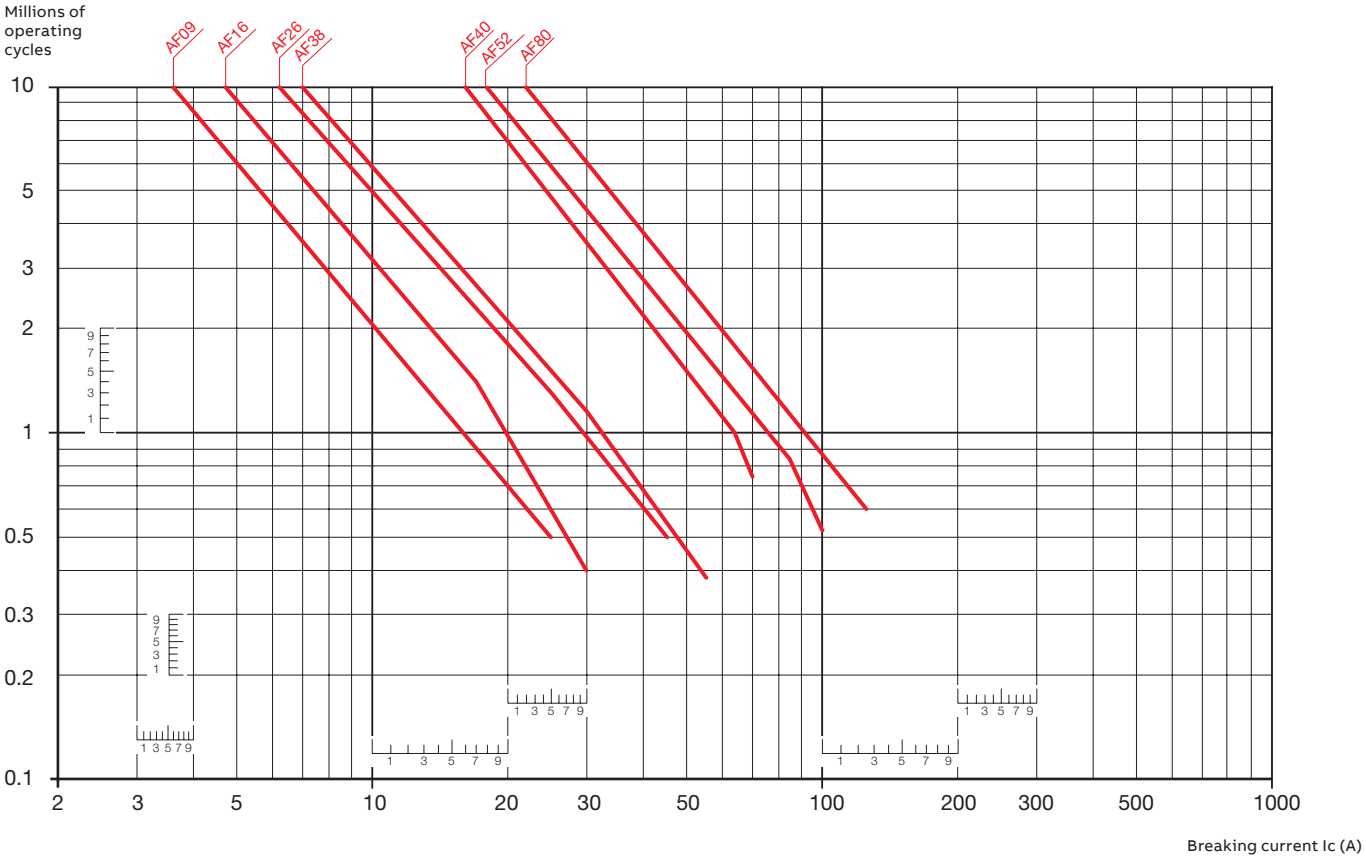
# 4-pole contactors

## Electrical durability



**Electrical durability for AC-1 utilization category - Ue ≤ 690 V**
**Switching non-inductive or slightly inductive loads. The breaking current Ic for AC-1 is equal to the rated operational current of the load.**

Ambient temperature and maximum electrical switching frequency: see "Technical data".



# Notes




**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**1SBL137205R1300**

# Push-In Spring 4-pole contactors



**25 to 30 A AC-1**

**3/**222 AF09..K ... AF16..K AC/DC operated

**3/**223 AF09Z..K ... AF16Z..K AC/DC operated for specific applications

**3/**224 **Main Accesories**

**3/**225 **Technical data**

**3/**230 **Electrical durability**

# AF09..K ... AF16..K 4-pole contactors with Push-in Spring terminals

25 to 30 A AC-1

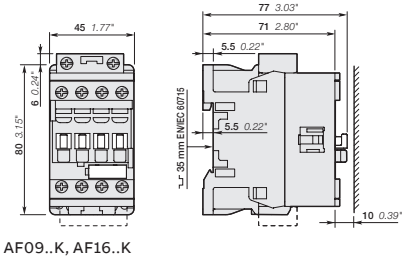
AC / DC operated



AF09..K ... AF16..K 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | UL/CSA | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 40 °C | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| A | A | V 50/60 Hz | V DC | | | | kg |
| **4 N.O. main poles** | | | | | | | |
| 25 | 25 | 24...60 | 20...60 | 0 0 | AF09-40-00K-11 | 1SBL137205R1100 | 0.285 |
| | | 48...130 | 48...130 | 0 0 | AF09-40-00K-12 | 1SBL137205R1200 | 0.285 |
| | | 100...250 | 100...250 | 0 0 | AF09-40-00K-13 | 1SBL137205R1300 | 0.285 |
| | | 250...500 | 250...500 | 0 0 | AF09-40-00K-14 | 1SBL137205R1400 | 0.285 |
| 30 | 30 | 24...60 | 20...60 | 0 0 | AF16-40-00K-11 | 1SBL177205R1100 | 0.285 |
| | | 48...130 | 48...130 | 0 0 | AF16-40-00K-12 | 1SBL177205R1200 | 0.285 |
| | | 100...250 | 100...250 | 0 0 | AF16-40-00K-13 | 1SBL177205R1300 | 0.285 |
| | | 250...500 | 250...500 | 0 0 | AF16-40-00K-14 | 1SBL177205R1400 | 0.285 |
| **2 N.O. + 2 N.C. main poles** | | | | | | | |
| 25 | 25 | 24...60 | 20...60 | 0 0 | AF09-22-00K-11 | 1SBL137505R1100 | 0.285 |
| | | 48...130 | 48...130 | 0 0 | AF09-22-00K-12 | 1SBL137505R1200 | 0.285 |
| | | 100...250 | 100...250 | 0 0 | AF09-22-00K-13 | 1SBL137505R1300 | 0.285 |
| | | 250...500 | 250...500 | 0 0 | AF09-22-00K-14 | 1SBL137505R1400 | 0.285 |
| 30 | 30 | 24...60 | 20...60 | 0 0 | AF16-22-00K-11 | 1SBL177505R1100 | 0.285 |
| | | 48...130 | 48...130 | 0 0 | AF16-22-00K-12 | 1SBL177505R1200 | 0.285 |
| | | 100...250 | 100...250 | 0 0 | AF16-22-00K-13 | 1SBL177505R1300 | 0.285 |
| | | 250...500 | 250...500 | 0 0 | AF16-22-00K-14 | 1SBL177505R1400 | 0.285 |




AF09..K, AF16..K

Main dimensions mm, inches

# AF09Z..K ... AF16Z..K 4-pole contactors with Push-in Spring terminals

25 to 30 A AC-1

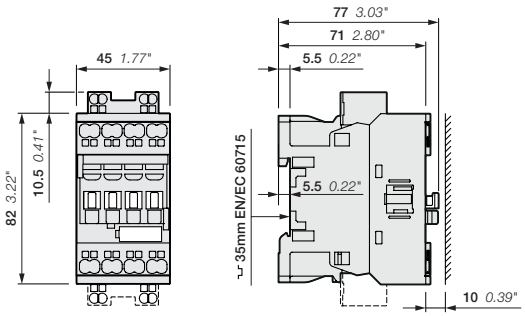
AC / DC operated - low consumption



AF09Z..K ... AF16Z..K 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | UL/CSA | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 40 °C AC-1 | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| A | A | V 50/60 Hz | V DC | | | | kg |
| **4 N.O. main poles** | | | | | | | |
| 25 | 25 | - | 12...20 | 2 2 | AF09Z-40-00K-20 | 1SBL136205R2000 | 0.315 |
| | | 24...60 | 20...60 | 2 2 | AF09Z-40-00K-21 | 1SBL136205R2100 | 0.315 |
| | | 48...130 | 48...130 | 2 2 | AF09Z-40-00K-22 | 1SBL136205R2200 | 0.315 |
| | | 100...250 | 100...250 | 2 2 | AF09Z-40-00K-23 | 1SBL136205R2300 | 0.315 |
| 30 | 30 | - | 12...20 | 2 2 | AF16Z-40-00K-20 | 1SBL176205R2000 | 0.315 |
| | | 24...60 | 20...60 | 2 2 | AF16Z-40-00K-21 | 1SBL176205R2100 | 0.315 |
| | | 48...130 | 48...130 | 2 2 | AF16Z-40-00K-22 | 1SBL176205R2200 | 0.315 |
| | | 100...250 | 100...250 | 2 2 | AF16Z-40-00K-23 | 1SBL176205R2300 | 0.315 |
| **2 N.O. + 2 N.C. main poles** | | | | | | | |
| 25 | 25 | - | 12...20 | 2 2 | AF09Z-22-00K-20 | 1SBL136505R2000 | 0.315 |
| | | 24...60 | 20...60 | 2 2 | AF09Z-22-00K-21 | 1SBL136505R2100 | 0.315 |
| | | 48...130 | 48...130 | 2 2 | AF09Z-22-00K-22 | 1SBL136505R2200 | 0.315 |
| | | 100...250 | 100...250 | 2 2 | AF09Z-22-00K-23 | 1SBL136505R2300 | 0.315 |
| 30 | 30 | - | 12...20 | 2 2 | AF16Z-22-00K-20 | 1SBL176505R2000 | 0.315 |
| | | 24...60 | 20...60 | 2 2 | AF16Z-22-00K-21 | 1SBL176505R2100 | 0.315 |
| | | 48...130 | 48...130 | 2 2 | AF16Z-22-00K-22 | 1SBL176505R2200 | 0.315 |
| | | 100...250 | 100...250 | 2 2 | AF16Z-22-00K-23 | 1SBL176505R2300 | 0.315 |



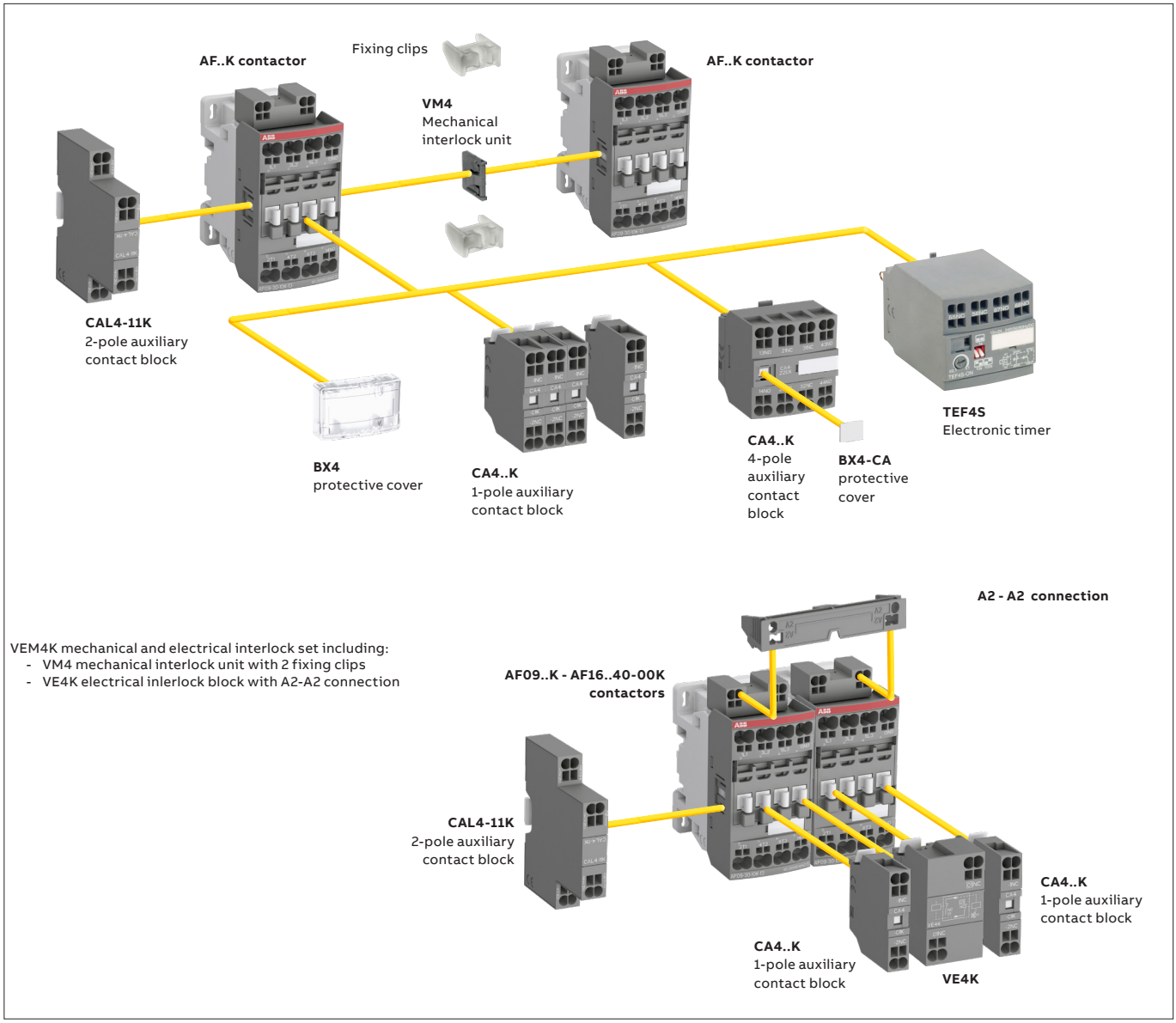

AF09..K, AF16..K

Main dimensions mm, inches

# AF09..K ... AF16..K 4-pole contactors - with Push-in Spring terminals

## Main accessories

### Contactor and main accessories (other accessories available)




**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

**Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.**

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories | | | | | Side-mounted accessories | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Auxiliary contact blocks | | Electronic timer | Mechanical interlock set (between 2 contactors) | | Auxiliary contact blocks 2-pole CAL4-11K | |
| | | | 1-pole CA4..K | 4-pole CA4..K | TEF4S | VEM4K | | Left side | Right side |
| **AF09(Z)..K ... AF16(Z)..K (1)** | | | | | | | | | |
| AF09..K ... AF16..K | 4 | 0 0 (1) | 4 max. | **or 1** | **or 1** | – | + | **1** | – |
| | | | 2 max. | – | **or 1** | – | + | **1** | **+ 1** |
| | | | 3 max. | – | – | **+ 1(3)** | + | **1** | **or 1** |
| AF09..K... AF16..K | 2 | 2 0 (2) | 4 max. | **or 1** | **or 1** | – | + | **1** | – |
| | | | 2 max. | – | **or 1** | – | + | **1** | **+ 1** |

(1) Including add-on: 4 N.C. auxiliary contacts max. on positions 1, 2, 3, 4 and 3 N.C. auxiliary contacts max. on positions 1 ±30°, 5.
(2) Including add-oncontacts: 3 N.C. auxiliary contacts max. on positions 1, 2, 3, 4 and 2 N.C. auxiliary contacts max. on positions 1 ±30°, 5.
(3) VEM4K not suitable for AF..Z..K contactors with DC control voltages 12...20 V DC (coil 20). Use VM4 side-mounted mechanical interlock unit.

# AF09 ..K... AF16..K 4-pole contactors - with Push-in Spring terminals

## Technical data

### Main pole - Utilization characteristics according to IEC

| Contactor types | | AC / DC operated | AF09..K | AF16..K |
|---|---|---|---|---|
| Standards | | | IEC/EN 60947-1, IEC/EN 60947-4-1 | |
| Rated operational voltage Ue max. | | | 690 V | |
| Rated frequency (without derating) | | | 50 / 60 Hz | |
| Conventional free-air thermal current Ith | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | | 35 A | 35 A |
| With conductor cross-sectional area | | | 6 mm² | 6 mm² |
| AC-1 Utilization category | | | | |
| For air temperature close to contactor | | | | |
| Ie / Rated operational current AC-1 | | θ ≤ 40 °C | 25 A | 30 A |
| Ue max. ≤ 690 V, 50/60 Hz | | θ ≤ 60 °C | 25 A | 30 A |
| | | θ ≤ 70 °C | 22 A | 26 A |
| With conductor cross-sectional area | | | 4 mm² | 6 mm² |
| AC-3 Utilization category | | | | |
| For air temperature close to contactor θ ≤ 60 °C | | | | |
| Ie / Max. rated operational current AC-3 (1) | | | | |
|  | 3-phase motors | 220-230-240 V | 9 A | 18 A |
| | | 380-400 V | 9 A | 18 A |
| | | 415 V | 9 A | 18 A |
| | | 440 V | 9 A | 18 A |
| | | 500 V | 9.5 A | 15 A |
| | | 690 V | 7 A | 10.5 A |
| Rated operational power AC-3 (1) | | | | |
|  | 1500 r.p.m. 50 Hz | 220-230-240 V | 2.2 kW | 4 kW |
| | 1800 r.p.m. 60 Hz | 380-400 V | 4 kW | 7.5 kW |
| | 3-phase motors | 415 V | 4 kW | 9 kW |
| | | 440 V | 4 kW | 9 kW |
| | | 500 V | 5.5 kW | 9 kW |
| | | 690 V | 5.5 kW | 9 kW |
| Rated making capacity AC-3 | | | 10 x Ie AC-3 acc. to IEC 60947-4-1 | |
| Rated breaking capacity AC-3 | | | 8 x Ie AC-3 acc. to IEC 60947-4-1 | |
| Short-circuit protection device for contactors | | | | |
| Without thermal overload relay - Motor protection excluded | | | | |
| Ue ≤ 500 V AC - gG type fuse | | | 25 A | 32 A |
| Rated short-time withstand current Icw | | 1 s | 300 A | 300 A |
| at 40 °C ambient temperature, | | 10 s | 150 A | 150 A |
| in free air from a cold state | | 30 s | 80 A | 80 A |
| | | 1 min | 60 A | 60 A |
| | | 15 min | 35 A | 35 A |
| Maximum breaking capacity | N.O. main pole | at 440 V | 250 A | 250 A |
| cos ϕ = 0.45 | | at 690 V | 106 A | 106 A |
| | N.C. Main pole | at 440 V | - | - |
| | | at 690 V | - | - |
| Power dissipation per pole | | Ie / AC-1 | 1.2 W | 1.7 W |
| | | Ie / AC-3 | 0.2 W | 0.6 W |
| Max. electrical switching frequency | | AC-1 | 600 cycles/h | |

(1) For the corresponding kW/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor Rated Operational Powers and Currents"
(2) For the protection of motor starters against short circuits, see "Coordination with Short-circuit Protection Devices".
(3) 400 V 3-phase motors only.

# AF09 ..K... AF16..K 4-pole contactors - with Push-in Spring terminals

Technical data



## Main pole - Utilization characteristics according to UL/NEMA/CSA

| Contactor types | AC / DC operated | AF09..K | AF16..K |
|---|---|---|---|
| Standards | | UL 508, CSA C22.2 No. 60947-1-13, CSA C22.2 No. 60947-4-1 | |
| Max. operational voltage | | 600 V | |
| UL / CSA general use rating | | | |
| | 600 V AC | 25 A | 30 A |
| With conductor cross-sectional area | | AWG 10 | AWG 10 |
| 1 pole | 80 V DC | 25 A (1) | 30 A (1) |
| 2 poles in serie | 160 V DC | 25 A (1) | 30 A (1) |
| 3 poles in serie | 240 V DC | 25 A | 30 A |
| 4 poles in serie | 320 V DC | 25 A | 30 A |
| With conductor cross-sectional area | | AWG 10 | AWG 10 |
| Max. electrical switching frequency | | | |
| For general use | | 600 cycles/h | |

Note: 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles, see "General technical data".
(1) 20 A for AF09..-22-00K and AF16..-22-00K.

## Main pole utilization characteristics - 4 N.O. non-reversing contactors

| Contactor types | AC / DC operated | AF09..K | AF16..K |
|---|---|---|---|
| Lighting application - UL / CSA - breaking all lines | | | |
| Electrical discharge lamps (ballast) | | | |
| 1-phase per pole | 347 V AC | 20 A | 30 A |
| 3-phase break all lines | 600 V AC | 20 A | 30 A |
| Elevator control, load switching, 500 000 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.1 | | | |
| 1-phase | | | |
| Horse power rating | 110-120 V AC | - | 1/2 hp |
| | 220-240 V AC | - | 1-1/2 hp |
| 3-phase | | | |
| Horse power rating | 200-208 V AC | - | 3 hp |
| | 220-240 V AC | - | 3 hp |
| | 440-480 V AC | - | 7-1/2 hp |
| | 550-600 V AC | - | 10 hp |

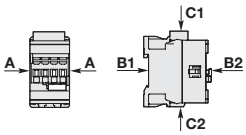
Note: 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles, see "General technical data".

# AF09..K... AF16..K 4-pole contactors - with Push-in Spring terminals

## Technical data

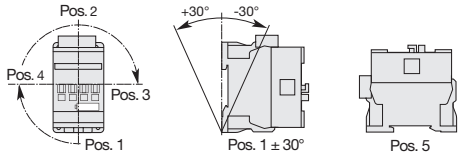
### General technical data

| Contactor types | AC / DC operated | | AF09..K | AF16..K |
|---|---|---|---|---|
| Rated insulation voltage Ui | | | | |
| acc. to IEC 60947-4-1 | | | 690 V | |
| acc. to UL / CSA | | | 600 V | |
| Rated impulse withstand voltage Uimp. | | | 6 kV | |
| Electromagnetic compatibility | | | Devices complying with IEC/EN 60947-1 - Environment A and B (1) | |
| Ambient air temperature close to contactor | | | | |
| Operation | | | -40...+70 °C | |
| Storage | | | -60...+80 °C | |
| Climatic withstand | | | Category B according to IEC 60947-1 Annex Q | |
| Maximum operating altitude (without derating) | | | 3000 m | |
| Mechanical durability | | | | |
| Number of operating cycles | | | 10 millions operating cycles | |
| Max. switching frequency | | | 3600 cycles/h | |
| Shock withstand | | | | |
| acc. to IEC/EN 60068-2-27 | | | | |
| Mounting position 1 | | | | |
| | Shock direction | | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | |
| | 4 N.O. Main poles | A | 30 g | |
| | | B1 | 25 g Closed position / 5 g Open position | |
| | | B2 | 15 g | |
| | | C1 | 25 g | |
| | | C2 | 25 g | |
| | 2 N.O. + 2 N.C. Main poles | A | 30 g | |
| | | B1 | 25 g Closed position / 5 g Open position | |
| | | B2 | 15 g | |
| | | C1 | 25 g | |
| | | C2 | 25 g | |
| Vibration withstand | | | 5 ... 300 Hz | |
| acc. to IEC 60068-2-6 | | | 4 g Closed position / 2 g Open position | |



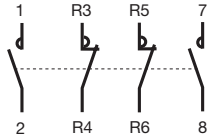

(1) Environment B: all AF09 ... AF38 contactors produced since week 08-2013.
AF09 ... AF38-..-..-12 (48...130 V 50/60 Hz-DC) compliant to environment A only: for environment B select AF09Z ... AF38Z-..-..-22.

### Mounting characteristics and conditions for use

| Contactor types | AF09..K | AF16..K |
|---|---|---|
| Mounting positions |  Max. add-on N.C. auxiliary contacts: see accessory fitting details for a 4-pole contactor AF09 ... AF16 | |
| Mounting distances | The contactors can be assembled side by side | |
| Fixing | | |
| On rail according to IEC/EN 60715 | 35 x 7.5 mm or 35 x 15 mm | |
| By screws (not supplied) | 2 x M4 screws placed diagonally | |



### Remark for 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles

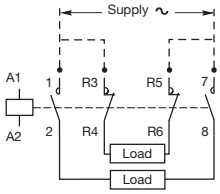



These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams beside). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK before MAKE.

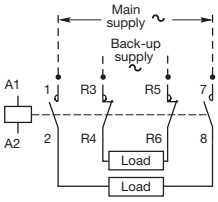
These contactors are not suitable for a reversing starter or for controlling a single load from 2 separate supplies.

**Block diagrams**

- Single supply and 2 separate loads




- 2 separate supplies and 2 separate loads



# AF09..K... AF16..K 4-pole contactors - with Push-in Spring terminals

## Technical data



### Magnet system characteristics AF09..K ... AF16..K AC / DC operated

| Contactor types | AC / DC operated | AF09..K | AF16..K |
|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max.<br>At θ ≤ 70 °C 0.85 x Uc min...Uc max. | |
| | DC supply | At θ ≤ 60 °C 0.85 x Uc min ... 1.1 x Uc max<br>At θ ≤ 70 °C 0.85 x Uc min ... Uc max | |
| AC control voltage 50/60 Hz | | | |
| Rated control circuit voltage Uc | | 24...500 V AC | |
| Coil consumption | Average pull-in value | 50 VA | |
| | Average holding value | 2.2 VA / 2 W | |
| DC control voltage | | | |
| Rated control circuit voltage Uc | | 20...500 V DC | |
| Coil consumption | Average pull-in value | 50 W | |
| | Average holding value | 2 W | |
| PLC-output control | | AF...-11 not suitable for direct control by PLC-output. | |
| Drop-out voltage | | ≤ 60 % of Uc min. | |
| Voltage sag immunity acc. to SEMI F47-0706 | | – | |
| Dips withstand -20 °C ≤ θ ≤ +60 °C | | – | |
| Operating time | | | |
| Between coil energization and: | N.O. contact closing | 40...95 ms | |
| | N.C. contact opening | 38...90 ms | |
| Between coil de-energization and: | N.O. contact opening | 11...95 ms | |
| | N.C. contact closing | 13...98 ms | |

### Magnet System Characteristics AF09Z..K ... AF16Z..K AC / DC operated for specific applications - coils 20, 21, 22, 23

| Contactor types | AC / DC operated | AF09Z..K | AF16Z..K |
|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max.<br>At θ ≤ 70 °C 0.85 x Uc min...Uc max. | |
| | DC supply | At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max | |
| AC control voltage 50/60 Hz | | | |
| Rated control circuit voltage Uc | | 24...250 V AC | |
| Coil consumption | Average pull-in value | 16 VA | |
| | Average holding value | 1.7 VA / 1.5 W | |
| DC control voltage | | | |
| Rated control circuit voltage Uc | | 12...250 V DC | |
| Coil consumption | Average pull-in value | 12 ... 16 W | |
| | Average holding value | 1.7 W | |
| PLC-output control | | (AF..Z coil 21) ≥ 500 mA 24 V DC for PLCs - Not suitable for safety PLCs | |
| Drop-out voltage | | ≤ 60 % of Uc min. | |
| Voltage sag immunity acc. to SEMI F47-0706 | | (AF..Z coil 21, 22, 23) conditions of use on request | |
| Dips withstand -20 °C ≤ θ ≤ +60 °C | | (AF..Z coil 21, 22, 23) 20 ms average for Uc ≥ 24 V 50/60 Hz or Uc ≥ 20 V DC | |
| Operating time | | | |
| Between coil energization and: | N.O. contact closing | 40...95 ms | |
| | N.C. contact opening | 38...90 ms | |
| Between coil de-energization and: | N.O. contact opening | 11...95 ms | |
| | N.C. contact closing | 13...98 ms | |

# AF09..K ... AF16..K 4-pole contactors - with Push-in Spring terminals

## Technical data



### Connecting characteristics

| Contactor types | AC / DC operated | | AF09..K | AF16..K |
|---|---|---|---|---|
| Main terminals | | |  Push-in Spring terminals | |
| Connection capacity (min. ... max.) | | | | |
| Main conductors (poles) | | | | |
| Rigid | Solid (≤ 2.5 mm²) | 1 x | 1 ... 6 mm² | |
| | Stranded (≥ 4 mm²) | 2 x | 1 ... 6 mm² | |
| Flexible | | 1 x | 1 (push-in) / 0.5 (spring) ... 4 mm² | |
| with non insulated ferrule | | 2 x | 1 (push-in) / 0.5 (spring) ... 4 mm² | |
| Flexible with insulated ferrule | | 1 x | 1 (push-in) / 0.5 (spring) ... 4 mm² | |
| | | 2 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm² | |
| Flexible without ferrule | | 1 x | (spring) 0.5 ... 4 mm² | |
| | | 2 x | (spring) 0.5 ... 4 mm² | |
| Connection capacity acc. to UL/CSA (Solid ≤ AWG 14) | | 1 or 2 x | AWG 18 ... 10 | |
| Stripping length | | | 12 mm | |
| Auxiliary conductors (coil terminals) | | | | |
| Rigid solid | | 1 x | 1 ... 2.5 mm² | |
| | | 2 x | 1 ... 2.5 mm² | |
| Flexible with | | 1 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm² | |
| non insulated ferrule | | 2 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm² | |
| Flexible with insulated ferrule | | 1 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm² | |
| | | 2 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm² | |
| Flexible without ferrule | | 1 x | (spring) 0.5 ... 2.5 mm² | |
| | | 2 x | (spring) 0.5 ... 2.5 mm² | |
| Connection capacity acc. to UL/CSA | | 1 or 2 x | AWG 18 ... 14 | |
| Stripping length | | | 10 mm | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | |
| Main terminals | | | IP20 | |
| Coil terminals | | | IP20 | |
| Built-in auxiliary terminals | | | IP20 | |
| Screwdriver type | All terminals | | Flat Ø 3 mm x 0.5 mm | |

# 4-pole contactors - with Push-in Spring terminals

## Electrical durability and utilization categories



**General**

Utilization categories determine the current making and breaking conditions relating to the characteristics of the loads to be controlled by the contactors. International standard IEC 60947-4-1 and European standard EN 60947-4-1 are the standards to be referred to.

If Ic is the current to be broken by the contactor and Ie the rated operational current normally drawn by the load, then:

- Categories AC-1: Ic = Ie

Generally speaking Ic = m x Ie where m is a multiple of the load operational current.

On next pages, the curves corresponding to categorie AC-1 represent the electrical durability variation of standard contactors in relation to the breaking current Ic.

**Electrical durability curves:**

- categories AC-1: the curves represent the electrical durability variation of standard contactors in relation to the breaking current Ic.

Electrical durability is expressed in millions of operating cycles.

Curve utilization mode

Electrical durability forecast and contactor selection for categories AC-1

- Note the characteristics of the load to be controlled:
  - Operational voltage..... Ue
  - Current normally drawn..... Ie (Ue / Ie / kW relation for motors, see "Motor rated operational powers and currents").
  - Utilization category..... AC-1
  - Breaking current..... Ic = Ie for AC-1
- Define the number of operating cycles N required.
- On the diagram corresponding to the operational category, select the contactor with the curve immediately above the intersection point (Ic ; N).

Case of uninterrupted duty

For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us).

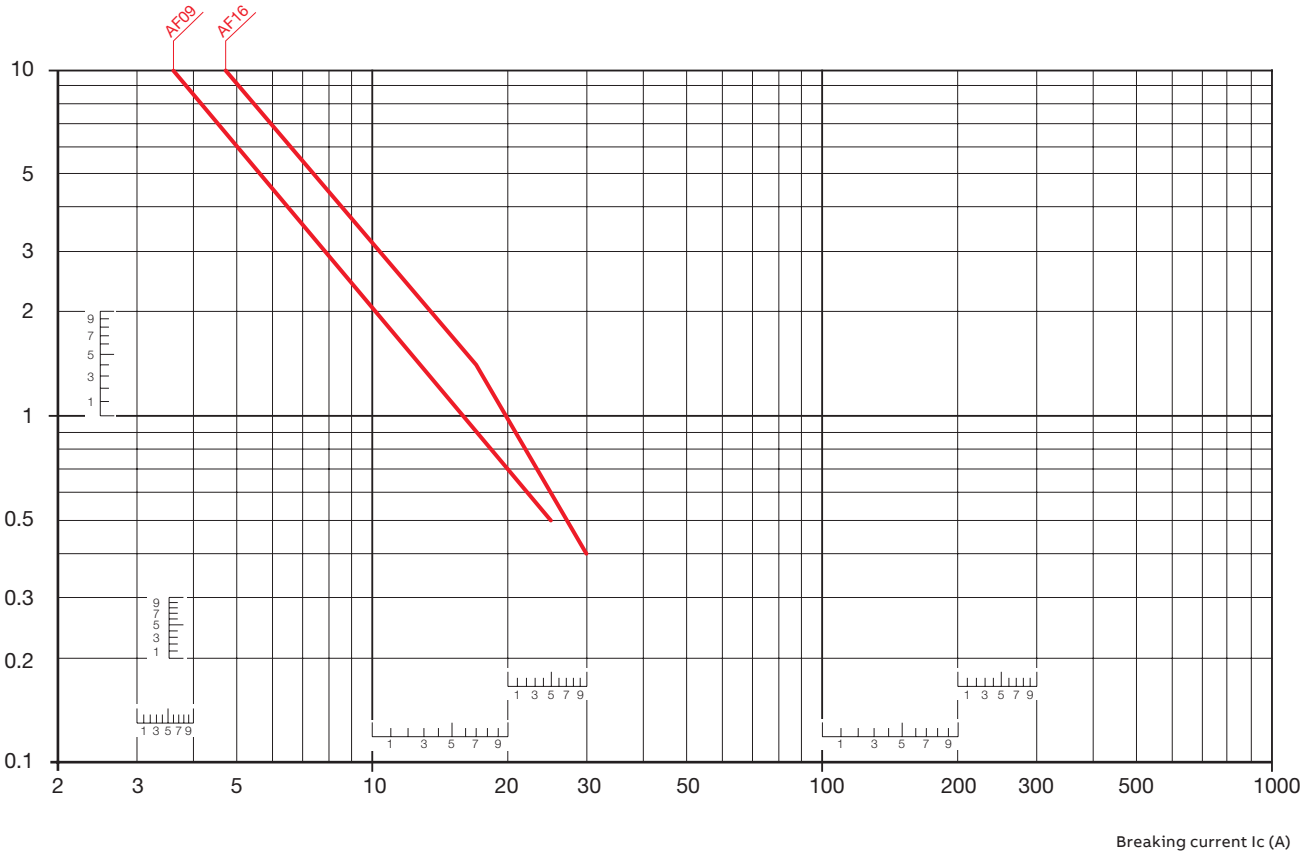
The combined effect of environmental conditions and the proper temperature of the product may require some disposals.

As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

# 4-pole contactors with Push-in Spring terminals

## Electrical durability

**Electrical durability for AC-1 utilization category - Ue ≤ 690 V**
**Switching non-inductive or slightly inductive loads. The breaking current Ic for AC-1 is equal to the rated operational current of the load.**
Ambient temperature and maximum electrical switching frequency: see "Technical data".





**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**1SFL617731R5122**

# Contactors for DC switching



**GF contactors**

**3/**235 **Overview**

**Ordering details**

**3/**238 GF875 ... GF1325 AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts

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**GAF contactors**

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**3/**246 Contactors for DC switching applications
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**Ordering details**

**3/**248 AF09 ... AF96 DC circuit switching
**3/**249 AF116 ... AF2650 DC circuit switching
**3/**250 EK550, EK1000 DC circuit switching

**600 to 875 A DC-1**

**3/**252 GAF460 ... GAF750 AC / DC operated with 1 N.O. + 1 N.C.

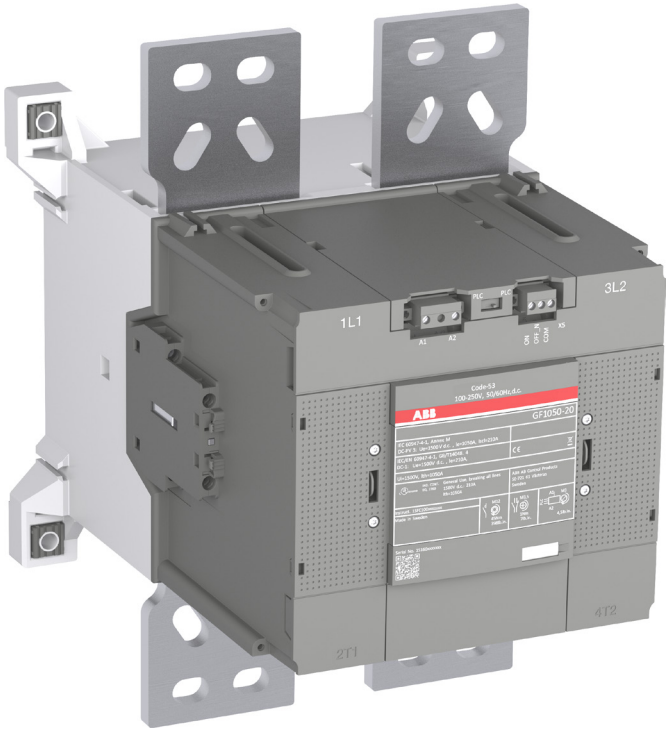
**1040 to 1750 A DC-1**

**3/**253 GAF1250 ... GAF2050 AC / DC operated with 1 N.O. + 1 N.C.

**3/**254 **Technical data**

# GF contactors for DC switching

## The compact and efficient way of DC switching




The renewable energy industry is continuously striving towards increasing its efficiency in order to compete with traditional power sources. Photovoltaic (PV) solar power is one of the sources leading the way. In moving from 1000 V DC to 1500 V DC, costs of utility-scale power plants are greatly reduced.

The GF range of contactors expands ABB's current AF and GAF PV solar product offering by adding contactor switching capabilities for 1500 V DC.

### Energy Efficiency

GF contactors offer tailored solutions to enable remote, automatic and energy efficient switching of 1500 V DC circuits in central PV inverter optimization.
The GF contactors are built with ABB's standard low energy electronic coils for safe and controlled operation.

### Continuous operation

The GF contactor features AF technology with continuous voltage and current control during the contactors operation. This ensures distinct, safe and energy efficient operations even in unstable networks. Voltage sags, dips or surges pose no threat. The GF contactor secures application uptime.

### Speed up your projects

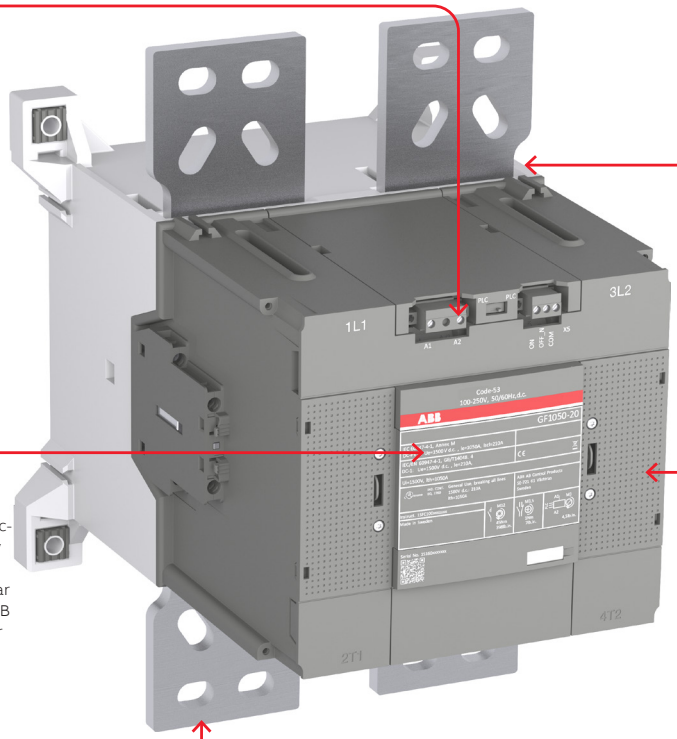
ABB's GF contactor complies with all major international standards.
It features AC/DC controlled wide voltage range coils together with easily accessible coil terminals to make easier and quicker product selection and installation.

# GF contactor range

## The compact and efficient way of DC switching

### Easy installation

GF contactors are designed for easy installation. Coil terminals and PLC control terminals are easily identified and accessed from the front of the contactor.




### AF technology

GF contactors feature AF technology that ensures controlled, distinct and energy efficient operation of the contactor.
Only two coils to cover
24 ... 60 V AC / DC
and 100 ... 250 V AC / DC.

### New IEC rating

DC-PV3 and DC-PV4 are two new contactor utilization categories introduced by IEC in 2018.
Both are specifically tailored for PV solar applications. As a technical pioneer, ABB offers the GF contactor as the first ever DC-PV3 rated contactor.

### Bidirectional design

The GF's two pole bidirectional design allows it to break both plus and minus, through the entire current range.
Each pole is rated for 750 V DC.

### Up to 1325 A 1500 V DC-PV3

The new GF range of DC contactors extends up to 1325 A for DC-PV3.

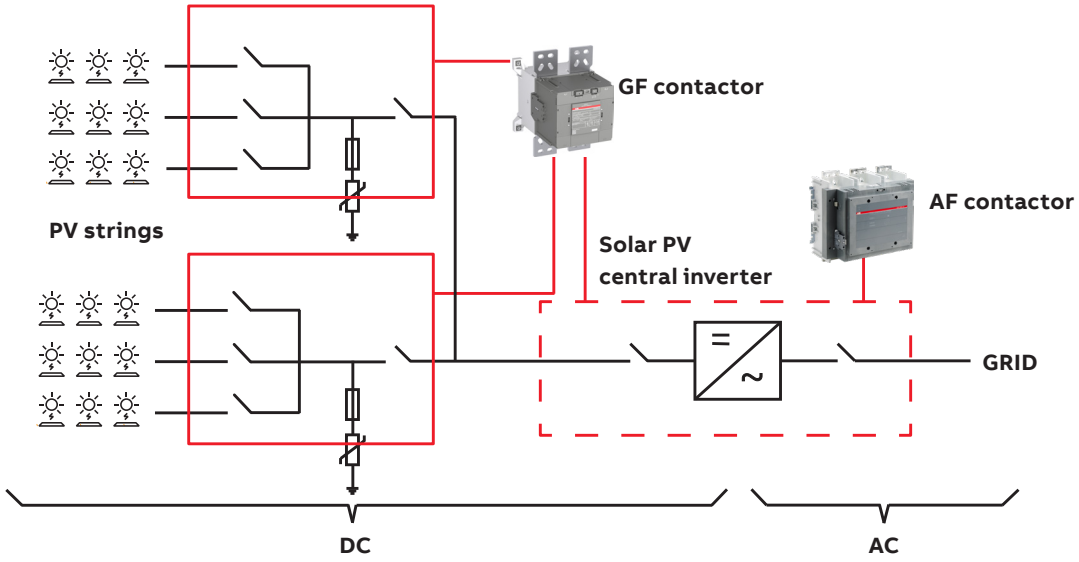
**Switching DC in PV Plants**

Contactors are typically selected for applications that need automatic remote control and switching. In a central PV inverter it can be necessary to switch the DC side in order to disconnect PV strings for output optimization. Grid codes sometime require a central PV inverter to be used for grid stabilization at night, this requires all PV panels to be disconnected on the DC side.



GF contactors allow remote and energy efficient switching in DC applications.
By bringing contactor switching capabilities to 1500 V DC there are now additional options for PV inverter manufacturers to solve DC switching.
Together with breakers and switch disconnects, ABB now have the most complete DC switching portfolio available for PV solar power.

**PV solar plant**

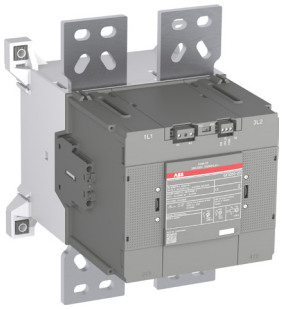





# GF875 ... GF1325 AC / DC operated

## 875 to 1325 A DC-PV3

## AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts

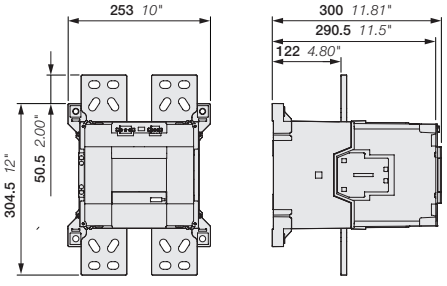


GF1050-30-22

GF875 ... GF1325 contactors are specifically designed for 1500 V DC PV solar central inverters. These contactors are of the block type design with 2 main poles. The main poles are fitted with special arcing contacts enabling bi-directional breaking of currents up to 750 V DC per pole.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V DC), only 2 coils to cover control voltages between 24 ... 60 V AC / DC and 100 ... 250 V AC / DC.
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags.
- built-in surge suppression

| IEC | UL/CSA | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 40 °C 1500 V DC-PV3 | General use rating θ ≤ 40 °C 1500 V DC | | | | | | Pkg (1 pce) |
| A | A | V 50/60 Hz | V DC | | | | kg |
| 875 | 210 | 24...60 | 24...60 | 2 2 | GF875-20-22-51 | 1SFL617731R5122 | 14.3 |
| | | 100...250 | 100...250 | 2 2 | GF875-20-22-53 | 1SFL617731R5322 | 14.3 |
| 1050 | 210 | 24...60 | 24...60 | 2 2 | GF1050-20-22-51 | 1SFL637731R5122 | 14.3 |
| | | 100...250 | 100...250 | 2 2 | GF1050-20-22-53 | 1SFL637731R5322 | 14.3 |
| 1325 | 210 | 24...60 | 24...60 | 2 2 | GF1325-20-22-51 | 1SFL647731R5122 | 14.3 |
| | | 100...250 | 100...250 | 2 2 | GF1325-20-22-53 | 1SFL647731R5322 | 14.3 |




GF875, GF1050

Main dimensions mm, inches

# GF875 ... GF1325 contactors

## Technical data

### Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | GF875 | GF1050 | GF1325 |
|---|---|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1 | | |
| Rated operational voltage Ue max. | | 1500 V DC | | |
| Conventional free-air thermal current Ith acc. to IEC 60947-4-1 | | | | |
| For air temperature close to contactor | θ ≤ 60 °C | 875 A | 1050 A | 1325 A |
| | θ ≤ 70 °C | 650 A | 850 A | 1050 A |
| With conductor cross-sectional area | | 600 mm² | 800 mm² | 1000 mm² |
| DC-PV3 Utilization category for air temperature close to contactor Ue max. ≤ 1500, Iscl = 210 A | | | | |
| | θ ≤ 60 °C | 875 A | 1050 A | 1325 A |
| | θ ≤ 70 °C | 650 A | 850 A | 1050 A |
| DC-PV4 Utilization category for air temperature close to contactor | | | | |
| Ue max. ≤ 1500, Iscl = 256 A | | 325 A | 390 A | 490 A |
| Maximum electrical switching frequency | | 15 cycles/h | | |

### Main pole - Utilization characteristics according to UL / CSA

| Contactor types | AC / DC operated | GF875 | GF1050 | GF1325 |
|---|---|---|---|---|
| Standards | | UL 60947-4-1 | | |
| Thermal current Ith | | 875 A | 1050 A | 1325 A |
| DC general use acc. to UL60947-4-1, Ue max. ≤ 1500 | | 210 A | 210 A | 210 A |

### General technical data

| Contactor types | AC / DC operated | GF875 | GF1050 | GF1325 |
|---|---|---|---|---|
| Rated insulation voltage Ui | | | | |
| acc. to IEC 60947-4-1 | | 1500 V | | |
| acc. to UL | | 1500 V | | |
| Rated impulse withstand voltage Uimp. | | | | |
| Main contacts | | 8 kV | | |
| Coil terminal | | 4 kV | | |
| Pollution degree | | 3 | | |
| Ambient air temperature close to contactor | | | | |
| Operation | | -40 to +70 °C | | |
| Storage | | -40 to +70 °C | | |
| Climatic withstand | | acc. to IEC 60068-2-30 | | |
| Maximum operating altitude (without derating) | | 2000 m | | |
| Rated short-time withstand current Icw at 40 °C ambient temp. in free air from a cold state | | | | |
| | 1 s | 6218 A | 7600 A | 9500 A |
| | 10 s | 5184 A | 6336 A | 7920 A |
| | 30 s | 1450 A | 5072 A | 6340 A |
| | 1 min | 3109 A | 3800 A | 4750 A |
| | 15 min | 1139 A | 1392 A | 1740 A |
| Mechanical durability | | | | |
| Number of operating cycles, 1500 V DC | | 50 000 | | |
| Max. switching frequency | | 15 cycles/h | | |

# GF875 ... GF1325 contactors
## Technical data

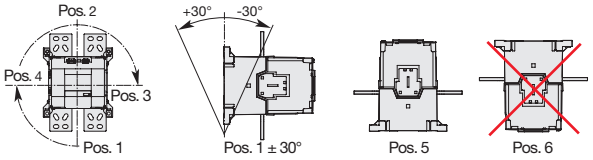


### Magnet system characteristics

| Contactor types | AC / DC operated | GF875 | GF1050 | GF1325 |
|---|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | AC or DC supply | At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max. | | |
| Rated control circuit voltage Uc Coil Consumption (1) | | | | |
| AC control voltage | | | | |
| 24...60 V AC 50/60Hz | Max. pull-in value | 600 VA | | |
| | Max. holding value | 17 VA | | |
| 100...250 V AC 50/60Hz | Max. pull-in value | 600 VA | | |
| | Max. holding value | 23 VA | | |
| DC control voltage | | | | |
| 24...60 V DC | Max. pull-in value | 700 W | | |
| | Max. holding value | 12 W | | |
| 100...250 V DC | Max. pull-in value | 505 W | | |
| | Max. holding value | 12 W | | |
| Drop-out voltage | | 55 % of Uc min. | | |
| Dips withstand -20 °C ≤ θ ≤ +60 °C | | ≥ 20 ms | | |
| Operating time Coil supply between A1 - A2 | | | | |
| Between coil energization and: | Main contact opening | 50...120 ms | | |
| Between coil de-energization and: | Main contact closing | 33...70 ms | | |
| Control input for PLC's | | | | |
| Between coil energization and: | Main contact closing | 40...90 ms | | |
| Between coil de-energization and: | Main contact opening | 10...30 ms | | |

(1) Internal measurement for indication.
Official values pending.

### Mounting characteristics and conditions for use

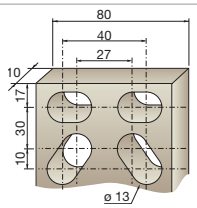
| Contactor types | AC / DC operated | GF875 | GF1050 | GF1325 |
|---|---|---|---|---|
| Mounting positions | |   | | |
| Control voltage / Ambient temperature | | | | |
| Mounting positions | 1, 1±30°, 2, 3, 4, 5 at θ ≤ 70 °C | 0.85 x Uc min...1.1 x Uc max. | | |
| | 6 | Unauthorized | | |
| Fixing by screws | | 4 x M5 | | |

# GF875 ... GF1050 contactors

## Technical data



### Connecting characteristics

| Contactor types | AC / DC operated | GF875 | GF1050 | GF1325 |
|---|---|---|---|---|
| Main terminals<br>Flat type | |  | | |
| Connection capacity (min. ... max.) | | | | |
| Main conductors (poles) | | | | |
| Bars or lugs | L ≤ | 100 mm | | |
| | Ø > | 12 mm | | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | busbars only | | |
| Tightening torque Recommended | | 45 Nm /<br>398 lb.in | | |
| Max. | | 49 Nm | | |
| Auxiliary conductors | | | | |
| Rigid Solid/Stranded | 1 x | 1...4 mm² (coil terminals : 2.5 mm²) | | |
| | 2 x | 1...4 mm² (coil terminals : 1.5 mm²) | | |
| Flexible with ferrule | 1 x | 0.75...2.5 mm² | | |
| | 2 x | 0.75...2.5 mm² | | |
| Lugs | L ≤ | 8 mm | | |
| | l > | 3.7 mm | | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 18...14 | | |
| Tightening torque Recommended | | 1.00 Nm / 9 lb.in | | |
| Max. | | 1.20 Nm | | |
| Degree of protection<br>acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | |
| Main terminals | | IP00 | | |
| Coil terminals | | IP00 | | |
| Screw terminals | | | | |
| Main terminals | | M12 | | |
| | | Screws and bolts | | |
| Coil terminals (delivered in open position) | | M3.5 | | |
| | Screwdriver type | Flat Ø 5.5 mm / Pozidriv 2 | | |

# Accessories






CAL20-11

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits for standard industrial environments.

Types of auxiliary contact blocks for side mounting:

- CAL 2-pole block, with instantaneous N.O. + N.C. contacts.

For clipping onto the right- and/or left-hand side of the contactors.

The CAL20-11B is a second block for mounting in addition to a first CAL20-11 block, right- and/or left-hand of the GF875 ... GF1050 contactors.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| **Side-mounted instantaneous auxiliary contact blocks** | | | | | |
| GF875, GF1050, GF1325 | 1 1 | CAL20-11 | 1SFN010920R1011 | 1 | 0.040 |
| | 1 1 | CAL20-11B | 1SFN010920R3011 | 1 | 0.040 |

# Auxiliary contact blocks for GF875 ... GF1050 contactors



## Technical data

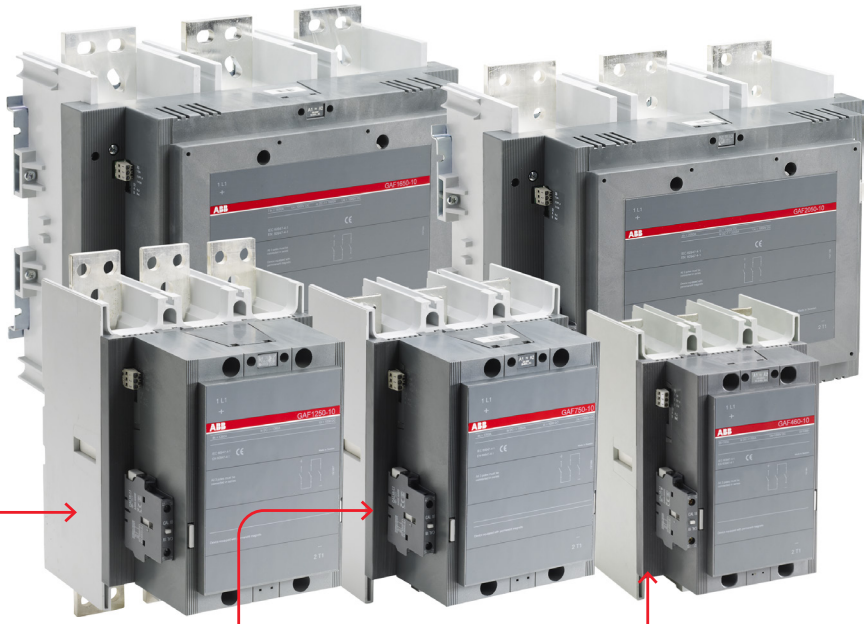
| Type | | | CAL20 |
|---|---|---|---|
| **Contact utilization characteristics according to IEC** | | | |
| Standards | | | IEC/EN 60947-5-1 |
| Rated insulation voltage Ui acc. to IEC 60947-5-1 | | | 690 V |
| Rated impulse withstand voltage Uimp. | | | 6 kV |
| Rated operational voltage Ue max. | | | 24...690 V AC |
| Conventional thermal current Ith - θ ≤ 40 °C | | | 16 A |
| Rated frequency (without derating) | | | 50/60 Hz |
| Ie / Rated operational current AC-15 | | | |
| acc. to IEC 60947-5-1 | | 24-127 V 50/60 Hz | 6 A |
| | | 220-240 V 50/60 Hz | 4 A |
| | | 380-440 V 50/60 Hz | 3 A |
| | | 500-690 V 50/60 Hz | 2 A |
| Making capacity acc. to IEC 60947-5-1 | | | 10 x Ie AC-15 |
| Breaking capacity acc. to IEC 60947-5-1 | | | 10 x Ie AC-15 |
| Ie / Rated operational current DC-13 | | | |
| acc. to IEC 60947-5-1 | | 24 V DC | 3 A / 72 W |
| | | 48 V DC | 1.5 A / 72 W |
| | | 72 V DC | 1 A / 72 W |
| | | 110 V DC | 0.55 A / 60 W |
| | | 125 V DC | 0.55 A / 69 W |
| | | 220 V DC | 0.3 A / 69 W |
| | | 250 V DC | 0.3 A / 75 W |
| Short-circuit protection device gG type fuse | | | 10 A |
| Rated short-time withstand current Icw | | for 1.0 s | 100 A |
| θ = 40 °C | | for 0.1 s | 140 A |
| Minimum switching capacity | | | 24 V / 50 mA |
| with failure rate acc. to IEC 60947-5-4 | | | ≤ $10^{-6}$ |
| Power dissipation per pole at 6 A | | | 0.15 W |
| Mechanical durability | Number of operating cycles | | 3 millions |
| | Max. switching frequency | | 300 cycles/h |
| Max. electrical switching frequency | | AC-15 | 300 cycles/h |
| | | DC-13 | 300 cycles/h |

| | |
|---|---|
| **Contact utilization characteristics according to UL / CSA** | |
| Standards | UL 508, CSA C22.2 No. 14 |
| Max. operational voltage | 600 V AC, 250 V DC |
| Pilot duty | A600, Q300 |
| AC thermal rated current | 10 A |
| AC maximum volt-ampere making | 7200 V A |
| AC maximum volt-ampere breaking | 720 V A |
| DC thermal rated current | 2.5 A |
| DC maximum volt-ampere making-breaking | 69 V A |

| | | | |
|---|---|---|---|
| **Connecting characteristics** | | | |
| Connection capacity (min. ... max.) | | | |
|  | Rigid Solid/Stranded | 1 x | 1...4 mm² |
|  | | 2 x | 1...4 mm² |
|  | Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² |
|  | | 2 x | 0.75...2.5 mm² |
|  | Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² |
|  | | 2 x | 0.75...2.5 mm² |
|  | Lugs | L ≤ | 8 mm |
| | | l > | 3.7 mm |
| Connection capacity acc. to UL/CSA | | 1 or 2 x | AWG18...14 |
| Stripping length | | | 9 mm |
| Tightening torque | | | 1 Nm |
| Degree of protection | | | |
| acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | IP20 |
| Screw terminals | | | Delivered in open position, screws of unused terminals must be tightened |
| All terminals | | | M3.5 |
| Screwdriver type | | | Flat Ø 5.5 / Pozidriv 2 |

# GAF contactors

## The compact efficient way to switch DC loads



DC

### Up to 2050 A 1000 V DC-1

The GAF range of DC contactors extends from 250 A up to 2050 A for DC-1 and UL DC general use at 1000 V.

### Proven technology

The GAF range of contactor is based on the tested and well proven AFcontactor range. The GAF share all accessories with the AF range, reducing the number of parts needed.

### Easy selection

The GAF contactors feature ABBs AF technology and all of its features. With only four coils the entire voltage range of 20 V DC and 24 V AC to 500 V AC / DC is covered. The built in surge suppression takes away the need of a separate surge suppressor. All to enable easier selection of contactors.



**PV plant applications for DC switching**

Contactors are typically selected for applications that need remote control and switching of the central inverter's DC side at least once per day. Application examples include: disconnection of the inverter from PV strings; or changing the string configuration to increase plant capacity.

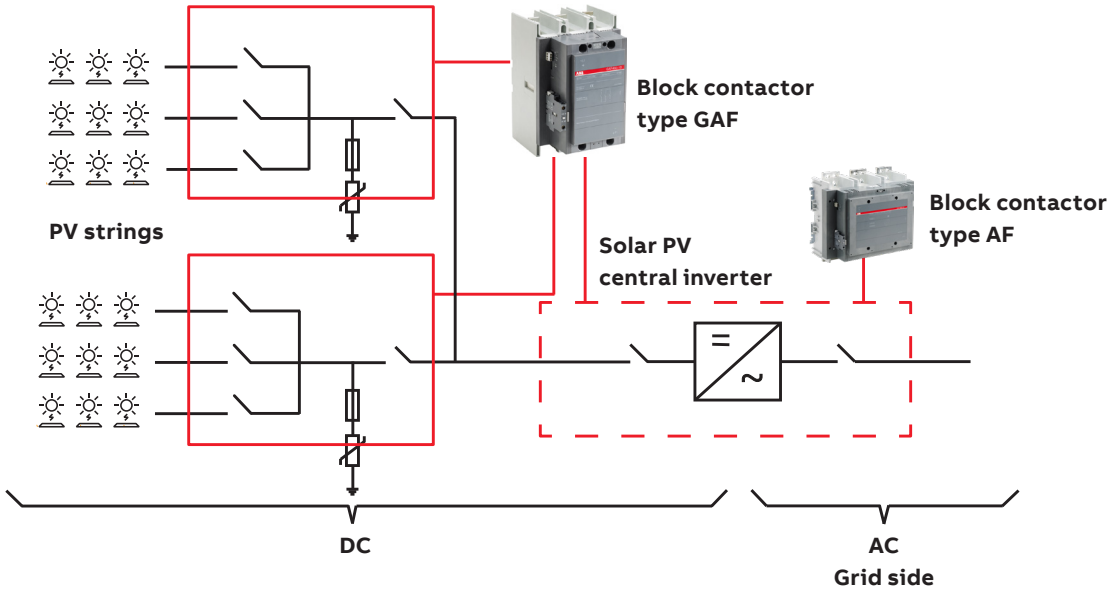
# GAF contactors

## The compact efficient way to switch DC loads

### Optimised for central inverters

ABB offers the widest range of compact contactors for DC load switching in low voltage power distribution applications. Due to their breaking performance for DC circuits, GAF contactors can switch DC loads of up to 2050 A 1000 V DC-1.

**PV solar plant**






# Contactors for DC switching applications

## DC-1, DC-3, DC-5 applications according to IEC 60947-4-1

The circuit switching on DC is more difficult than on AC, as alternating current go to zero according to the frequency of the supply source while DC current has a continuous value.
The main parameters to be considered for selecting a contactor are the current, the voltage and the L/R time constant of the controlled load.

**Time constant and utilization categories**
In DC applications, the nature of load to switch (resistor, inductance or a combination) is characterized by the ratio of the inductance to the resistance (L (inductance of operated circuit) / R (resistance of operated circuit) = mH/Ω = ms)
This ratio L/R is called the time constant of the circuit.

DC current utilization categories are defined according to IEC 60947-4-1:
- DC-1 non inductive or slightly inductive loads, resistance furnaces (L/R ≤ 1 ms)
- DC-3 shunt motors: starting, plugging, inching, dynamic breaking of DC motors (L/R ≤ 2 ms)
- DC-5 series motors: starting, plugging, inching, dynamic breaking of DC motors (L/R ≤ 7.5 ms).

The higher the time constant value is, the more difficult it is to break the arc.
The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs, by reducing the time constant.

**Operational voltage**
- The higher the operational voltage value is, the more difficult it is to break the arc.
- The use of main poles connected in series will allow to increase the value of switched voltage.

However, the maximum switched voltage must be within the max operational voltage of the contactor.
All the poles required for breaking must be connected in series between the load and the source polarity not linked to earth (or chassis) (see recommended connection diagrams).

**ABB offer a large choice of possibilities for DC switching applications (see selection tables):**
- Standard 3-pole or 4-pole contactors with either 1- pole breaking or breaking with poles connected in series.
- Special contactors designed for DC breaking with permanent magnets fitted on the main poles for use with the 3 poles connected in series and considered as 1-pole devices:
  GAF460 ... GAF2050 contactors: the 3 poles must be connected in series by the user according to conductor cross-sectional area (refer to main pole technical data) or by using LP connection bars to be ordered separately.

**Selection tables**
The enclosed selection tables will guide your choice through all contactor variants according to utilization category, for operational voltage up to 1000 V DC-1 and operational current up to 2050 A in ambient temperatures from -25 °C up to 40 °C.
For higher values of current or voltage or heavy DC switching applications see bar mounted R contactors.

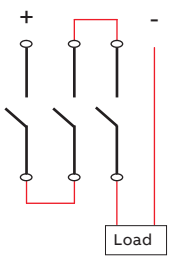
# Connection diagrams

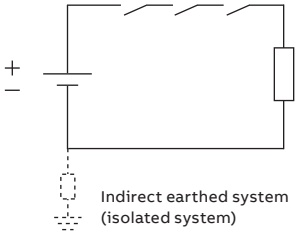


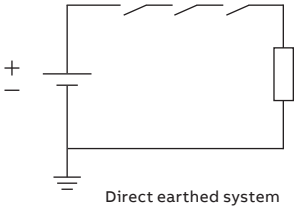
## Connection diagrams

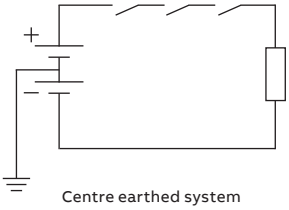
### Recommended connection

In the example below, the 3 poles are connected in series without the load in between.
This connection is recommended in systems according to the following configurations.



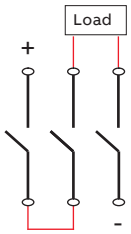



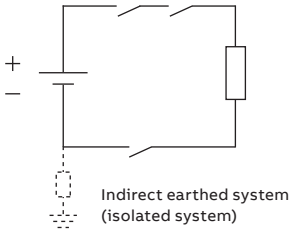




### Alternative connection

The load could be placed in between the contacts in a indirect earthed system. If not connected according to the configuration below, a fault to earth could result in one or two contacts breaking the full load which the contactor is not approved for.




### Points to consider

The above relates to power circuit switching. The SCPD (Short Circuit Protection Device) must comply with applicable protection rules.

### Polarity:

For all GAF types, connection polarities must be respected.
(See instruction leaflet and see markings on the main terminals or the contactor front)

# AF09 ... AF96 contactors

## DC circuit switching



### General

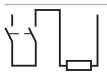
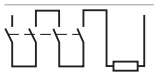
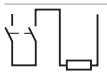
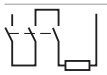
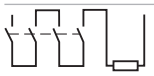
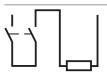
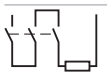
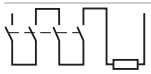
The arc switching on DC is more difficult than on AC.

- For selecting a contactor it is essential to determine the current, the voltage and the L/R time constant of the controlled load
- For information, typical time constant values are quoted hereafter: non inductive loads such as resistance furnaces (L/R ≈ 1 ms), inductive loads such as shunt motors (L/R ≈ 2 ms) or series motors (L/R ≈ 7.5 ms)
- The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs
- All the poles required for breaking must be connected in series between the load and the source polarity not linked to earth (or chassis).

### Technical data

- The tables indicate for the standard contactors the Ie max. operating currents depending on: the utilization category (i.e. L/R) DC-1, DC-3, DC-5 as defined in the IEC 60947-4-1 publication, the operating voltage Ue and the pole coupling details. Ampere values quoted in these tables are valid for a -25...+70 °C temperature close to the contactors, as long as these values do not exceed the AC-1 Ampere values for the corresponding ambient temperature
- Max. switching frequency: 300 cycles/h.

### Selection table

| Contactor types | | AF09 | AF12 | AF16 | AF26 | | AF30 | AF38 | | AF40 | AF52 | AF65 | AF80 | AF96 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3 or 4-pole | | | 3-pole | 4-pole | 3-pole | 3-pole | 4-pole | 3 or 4-pole | 3 or 4-pole | 3-pole | 3 or 4-pole | 3-pole |
| **Utilization category DC-1, L/R ≤ 1 ms** | | | | | | | | | | | | | | |
|  | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | 45 A | 50 A | 50 A | 55 A | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 110 V | 10 A | 15 A | 20 A | - | - | - | - | - | - | - | - | - | - |
| | 220 V | - | - | - | - | - | - | - | - | - | - | - | - | - |
|  | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | 45 A | 50 A | 50 A | 55 A | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 110 V | 25 A | 27 A | 30 A | 45 A | 45 A | 50 A | 50 A | 55 A | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 220 V | 10 A | 15 A | 20 A | - | - | - | - | - | - | - | - | - | - |
|  | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | 45 A | 50 A | 50 A | 55 A | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 110 V | 25 A | 27 A | 30 A | 45 A | 45 A | 50 A | 50 A | 55 A | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 220 V | 25 A | 27 A | 30 A | 45 A | 45 A | 50 A | 50 A | 55 A | 70 A | 100 A | 105 A | 125 A | 130 A |
|  | ≤ 72 V | 25 A | - | 30 A | - | 45 A | - | - | 55 A | 70 A | 100 A | - | 125 A | - |
| | 110 V | 25 A | - | 30 A | - | 45 A | - | - | 55 A | 70 A | 100 A | - | 125 A | - |
| | 220 V | 25 A | - | 30 A | - | 45 A | - | - | 55 A | 70 A | 100 A | - | 125 A | - |
| | 440 V | 10 A | - | 20 A | - | - | - | - | - | - | - | - | - | - |
| **Utilization category DC-3, L/R ≤ 2 ms** | | | | | | | | | | | | | | |
|  | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 110 V | 6 A | 7 A | 8 A | - | - | - | - | - | - | - | - | - | - |
| | 220 V | - | - | - | - | - | - | - | - | - | - | - | - | - |
|  | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 110 V | 25 A | 27 A | 30 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 220 V | 6 A | 7 A | 8 A | - | - | - | - | - | - | - | - | - | - |
|  | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 110 V | 25 A | 27 A | 30 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 220 V | 25 A | 27 A | 30 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
|  | ≤ 72 V | 25 A | - | 30 A | - | - | - | - | - | 70 A | 100 A | - | 125 A | - |
| | 110 V | 25 A | - | 30 A | - | - | - | - | - | 70 A | 100 A | - | 125 A | - |
| | 220 V | 25 A | - | 30 A | - | - | - | - | - | 70 A | 100 A | - | 125 A | - |
| | 440 V | 6 A | - | 8 A | - | - | - | - | - | - | - | - | - | - |
| **Utilization category DC-5, L/R ≤ 7.5 ms** | | | | | | | | | | | | | | |
|  | ≤ 72 V | 9 A | 12 A | 16 A | 20 A | - | 25 A | 25 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 110 V | 4 A | 4 A | 4 A | - | - | - | - | - | - | - | - | - | - |
| | 220 V | - | - | - | - | - | - | - | - | - | - | - | - | - |
|  | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 110 V | 10 A | 15 A | 20 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 220 V | 4 A | 4 A | 4 A | - | - | - | - | - | - | - | - | - | - |
|  | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 110 V | 25 A | 27 A | 30 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 220 V | 9 A | 12 A | 16 A | 20 A | - | 25 A | 25 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
|  | ≤ 72 V | 25 A | - | 30 A | - | - | - | - | - | 70 A | 100 A | - | 125 A | - |
| | 110 V | 25 A | - | 30 A | - | - | - | - | - | 70 A | 100 A | - | 125 A | - |
| | 220 V | 10 A | - | 20 A | - | - | - | - | - | 70 A | 100 A | - | 125 A | - |
| | 440 V | 4 A | - | 4 A | - | - | - | - | - | - | - | - | - | - |

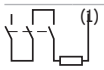
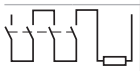
For additional ratings ≥ 440 V, please consult us.
Note: For AFS09 ... AFS96 safety contactors, DC switching rating are the same as AF09 ... AF96 3-pole contactors.

# AF116 ... AF2650 contactors

## DC circuit switching

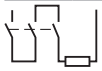


### Selection table

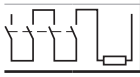
| Contactor types | | AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3 or 4-pole | | 3-pole | 3 or 4-pole | | | | | 3-pole | | | | | | | | |
| **Utilization category DC-1, L/R ≤ 1 ms** | | | | | | | | | | | | | | | | | | |
|  | ≤ 72 V | 160 | 200 | 200 | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A |
| | 90 V | 160 | 200 | 200 | 250 | 350 | 400 | 500 | 520 | - | - | - | - | - | - | - | - | - |
| | 100 V | - | - | - | 250 | 350 | 400 | 500 | 520 | - | - | - | - | - | - | - | - | - |
| | 110 V | - | - | - | - | - | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A |
|  | ≤ 72 V | 160 | 200 | 200 | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A |
| | 110 V | 160 | 200 | 200 | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A |
| | 175 V | 160 | 200 | 200 | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
| | 200 V | - | - | - | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
| | 220 V | - | - | - | - | - | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
|  (1) | ≤ 72 V | 160 | 200 | 200 | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A |
| | 110 V | 160 | 200 | 200 | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A |
| | 220 V | 160 | 200 | 200 | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A |
| | 260 V | 160 | 200 | 200 | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A |
| | 300 V | - | - | - | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A |
| | 340 V | - | - | - | - | - | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A |
| | 440 V | - | - | - | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A |
| | 600 V | - | - | - | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A |
| | 780 V | - | - | - | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A |
| | 850 V | - | - | - | - | - | - | - | - | - | - | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A |
|  | < 350 V | 200 | 200 | - | 250 | 350 | 400 | 500 | 520 | - | - | - | - | - | - | - | - | - |
| | 400 V | - | - | - | 250 | 350 | 400 | 500 | 520 | - | - | - | - | - | - | - | - | - |
| | 440 V | - | - | - | - | - | 400 | 500 | 520 | - | - | - | - | - | - | - | - | - |

(1) AF2650 at 780 V DC = 2650 A

### Utilization category DC-3, L/R ≤ 2 ms

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | ≤ 72 V | - | - | | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | - | - | - |
| | 110 V | - | - | | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | - | - | - |
|  | ≤ 72 V | 145 A | 160 A | | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | - | - | - |
| | 110 V | 145 A | 160 A | | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | - | - | - |
| | 220 V | - | - | | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
|  | ≤ 72 V | 145 A | 160 A | | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | - | - | - |
| | 110 V | 145 A | 160 A | | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | - | - | - |
| | 220 V | 145 A | 160 A | | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | - | - | - |
| | 440 V | - | - | | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | - | - | - |
| | 600 V | - | - | | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | - | - | - |
|  | 320 V | 145 A | 160 A | - | 250 A | 275 A | 350 A | 400 A | 450 A | - | - | - | - | - | - | - | - | - |

### Utilization category DC-5, L/R ≤ 7.5 ms

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | ≤ 72 V | - | - | | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | - | - | - |
| | 110 V | - | - | | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | - | - | - |
|  | ≤ 72 V | 145 A | 160 A | | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | - | - | - |
| | 110 V | 145 A | 160 A | | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | - | - | - |
| | 220 V | - | - | | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
|  | ≤ 72 V | 145 A | 160 A | | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | - | - | - |
| | 110 V | 145 A | 160 A | | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | - | - | - |
| | 220 V | 145 A | 160 A | | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | - | - | - |
| | 440 V | - | - | | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | - | - | - |
| | 600 V | - | - | | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | - | - | - |
|  | 320 V | 145 A | 160 A | - | 250 A | 275 A | 350 A | 400 A | 450 A | - | - | - | - | - | - | - | - | - |

For additional ratings ≥ 440 V, please consult us.

# EK550, EK1000 contactors

## DC circuit switching



### Selection table

| Contactor types | | | EK550 | EK1000 |
|---|---|---|---|---|
| **Utilization category DC-1, L/R ≤ 1 ms** | | | | |
|   | | | | |
| | ≤ 72 V | A | 550 | – |
| | 110 V | A | 550 | – |
|   | ≤ 72 V | A | 800 | – |
| | 110 V | A | 800 | – |
| | 220 V | A | 800 | – |
|   | ≤ 72 V | A | 800 | – |
| | 110 V | A | 800 | – |
| | 220 V | A | 800 | – |
| | 440 V | A | 650 | – |
| | 600 V | A | 650 | – |
|   | ≤ 72 V | A | 800 | – |
| | 110 V | A | 800 | – |
| | 220 V | A | 800 | – |
| | 440 V | A | 650 | – |
| | 600 V | A | 650 | – |
| **Utilization category DC-3, L/R ≤ 2 ms** | | | | |
|   | | | | |
| | | | | |
| | ≤ 72 V | A | 550 | – |
|   | ≤ 72 V | A | 650 | – |
| | 110 V | A | 650 | – |
| | 220 V | A | 650 | – |
|   | ≤ 72 V | A | 650 | – |
| | 110 V | A | 650 | – |
| | 220 V | A | 650 | – |
| | 440 V | A | 650 | – |
| | 600 V | A | 650 | – |
|   | ≤ 72 V | A | 650 | – |
| | 110 V | A | 650 | – |
| | 220 V | A | 650 | – |
| | 440 V | A | 650 | – |
| | 600 V | A | 650 | – |
| **Utilization category DC-5, L/R ≤ 7.5 ms** | | | | |
|   | ≤ 72 V | A | 650 | – |
| | 110 V | A | 650 | – |
| | 220 V | A | 650 | – |
|   | ≤ 72 V | A | 650 | – |
| | 110 V | A | 650 | – |
| | 220 V | A | 650 | – |
| | 440 V | A | 650 | – |
| | 600 V | A | 650 | – |
|   | ≤ 72 V | A | 650 | – |
| | 110 V | A | 650 | – |
| | 220 V | A | 650 | – |
| | 440 V | A | 650 | – |
| | 600 V | A | 650 | – |

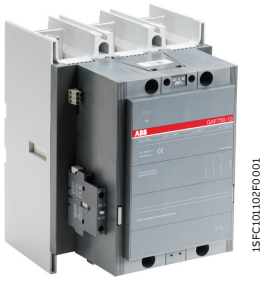
# Notes

# GAF460 ... GAF750 1-pole (3-pole in serie) contactors
# 600 to 875 A DC-1

## AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts




GAF460-10-11




GAF750-10-11

GAF460 ... GAF750 contactors are designed for controlling resistive or slightly inductive loads up to 1000 V DC.

These contactors are of the block type design with 3 main poles for connection in series by the user according to conductor cross-sectional area or by using LP connection bars to be ordered separately.

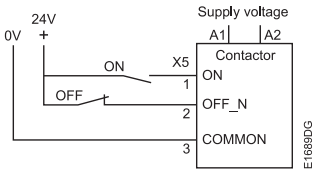
- main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

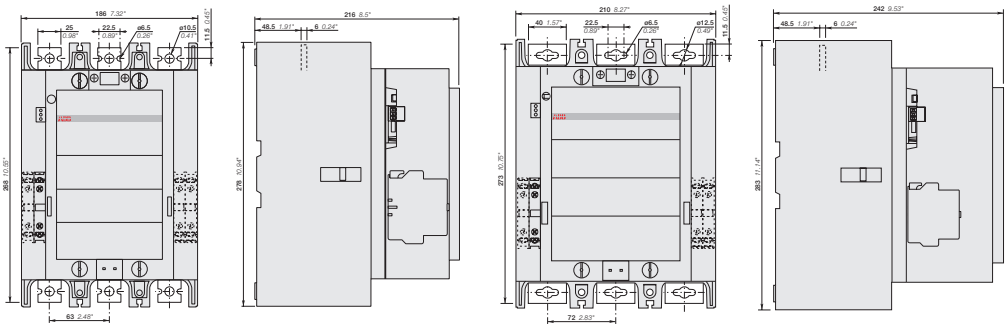
| IEC | UL / CSA | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 55 °C 1000 V DC-1 | General use rating θ ≤ 40 °C 1000 V DC | | | | | | Pkg (1 pce) |
| A | A | V 50/60 Hz | V DC | | | | kg |
| 600 | 650 | - | 24...60 | 1 1 | GAF460-10-11 (1) | 1SFL597025R6811 | 12.000 |
| | | 48...130 | 48...130 | 1 1 | GAF460-10-11 | 1SFL597025R6911 | 12.000 |
| | | 100...250 | 100...250 | 1 1 | GAF460-10-11 | 1SFL597025R7011 | 12.000 |
| | | 250...500 | 250...500 | 1 1 | GAF460-10-11 | 1SFL597025R7111 | 12.000 |
| 875 | 900 | - | 24...60 | 1 1 | GAF750-10-11 (1) | 1SFL637025R6811 | 15.000 |
| | | 48...130 | 48...130 | 1 1 | GAF750-10-11 | 1SFL637025R6911 | 15.000 |
| | | 100...250 | 100...250 | 1 1 | GAF750-10-11 | 1SFL637025R7011 | 15.000 |
| | | 250...500 | 250...500 | 1 1 | GAF750-10-11 | 1SFL637025R7111 | 15.000 |

(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.

GAF460 ... GAF750 are equipped with low voltage inputs for control, for example by a PLC.

### Control inputs



GAF460 GAF750

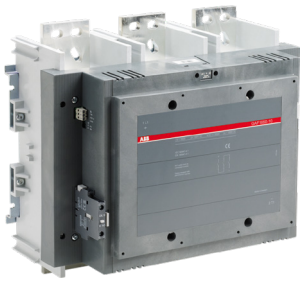
Main dimensions mm, inches

# GAF1250 ... GAF2050 1-pole (3-pole in serie) contactors
# 1040 to 1750 A DC-1

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts




GAF1250-10-11




GAF1650-10-11

GAF1250 ... GAF2050 contactors are designed for controlling resistive or slightly inductive loads up to 1000 V DC.

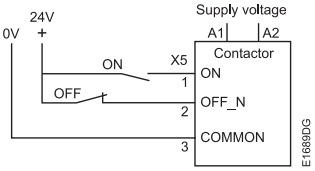
These contactors are of the block type design with 3 main poles for connection in series by the user according to conductor cross-sectional area or by using LP connection bars to be ordered separately.

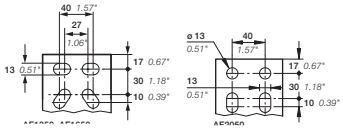
- main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
  - can manage large control voltage variations
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 55 °C 1000 V DC-1 | General use rating θ ≤ 40 °C 1000 V | | | | | | Pkg (1 pce) |
| A | A | V 50/60 Hz | V DC | | | | kg |
| 1040 | 1210 | - | 24...60 | 1 1 | GAF1250-10-11 | 1SFL647025R6811 | 16.000 |
| | | 48...130 | 48...130 | 1 1 | GAF1250-10-11 | 1SFL647025R6911 | 16.000 |
| | | 100...250 | 100...250 | 1 1 | GAF1250-10-11 | 1SFL647025R7011 | 16.000 |
| | | 250...500 | 250...500 | 1 1 | GAF1250-10-11 | 1SFL647025R7111 | 16.000 |
| 1450 | 1650 | 100...250 | 100...250 | 1 1 | GAF1650-10-11 | 1SFL677025R7011 | 35.000 |
| 1750 | 2050 | 100...250 | 100...250 | 1 1 | GAF2050-10-11 | 1SFL707025R7011 | 35.000 |

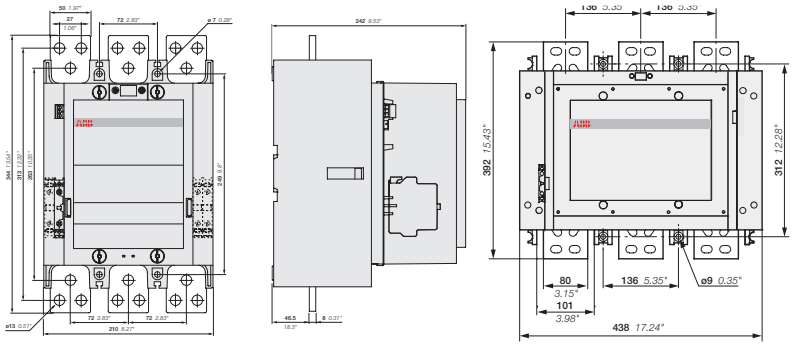
GAF1250 ... GAF2050 are equipped with low voltage inputs for control, for example by a PLC

## Control inputs



GAF1650 GAF2050



GAF1250 GAF1650, GAF2050

Main dimensions mm, inches

# GAF460 ... GAF2050 contactors
## Technical data



### Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | GAF460 | GAF750 | GAF1250 | GAF1650 | GAF2050 |
|---|---|---|---|---|---|---|
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | |
| Rated operational voltage Ue max. | | 1000 V DC | | | | |
| DC-1 Utilization category, L/R ≤ 1 ms | | | | | | |
| For air temperature close to contactor | | | | | | |
| Ie / Rated operational current DC-1 | | | | | | |
| θ ≤ 40 °C | 220 V | 700 A | 1050 A | 1250 A | 1650 A | 2050 A |
| | 440 V | 700 A | 1050 A | 1250 A | 1650 A | 2050 A |
| | 600 V | 700 A | 1050 A | 1250 A | 1650 A | 2050 A |
| | 1000 V | 700 A | 1050 A | 1250 A | 1650 A | 2050 A |
| θ ≤ 55 °C | 220 V | 600 A | 875 A | 1040 A | 1450 A | 1750 A |
| | 440 V | 600 A | 875 A | 1040 A | 1450 A | 1750 A |
| | 600 V | 600 A | 875 A | 1040 A | 1450 A | 1750 A |
| | 1000 V | 600 A | 875 A | 1040 A | 1450 A | 1750 A |
| θ ≤ 70 °C | 220 V | 480 A | 720 A | 875 A | 1270 A | 1500 A |
| | 440 V | 480 A | 720 A | 875 A | 1270 A | 1500 A |
| | 600 V | 480 A | 720 A | 875 A | 1270 A | 1500 A |
| | 1000 V | 480 A | 720 A | 875 A | 1270 A | 1500 A |
| With conductor cross-sectional area (3) | | 2x 240 mm² | 2x 50x8 mm² | 2x 100x5 mm² | 3x 100x5 mm² | 4x 100x5 mm² |
| Maximum electrical switching frequency | | | | | | |

(1) Refer to IEC 60947-1, table 9.
(2) For currents up to 370 A, use 2 x LP300 kits.For higher currents, use 300 mm² conductors of minimum length 500 mm together with terminal extension/enlargement (LX300/LW300).
(3) To minimize terminal temperature for GAF460 ... GAF2050, length of connection should be at least 0.5 m per pole.

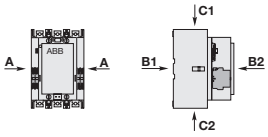
### Main pole - Utilization characteristics according to UL / CSA

| Contactor types | AC / DC operated | GAF460 | GAF750 | GAF1250 | GAF1650 | GAF2050 |
|---|---|---|---|---|---|---|
| Standards | | UL 60947-4-1, CSA C22.2 No. 60947-4-1 | | | | |
| Maximum operational voltage | | 1000 V DC | | | | |
| UL / CSA DC general use rating | | | | | | |
| θ ≤ 40 °C | 440 V | 650 A | 900 A | 1210 A | 1650 A | 2050 A |
| | 600 V | 650 A | 900 A | 1210 A | 1650 A | 2050 A |
| | 1000 V | 650 A | 900 A | 1210 A | 1650 A | 2050 A |
| Maximum electrical switching frequency | | | | | | |

# GAF460 ... GAF2050 contactors

## Technical data

### General technical data

| Contactor types | AC / DC operated | GAF460 | GAF750 | GAF1250 | GAF1650 | GAF2050 |
|---|---|---|---|---|---|---|
| Rated insulation voltage Ui | | | | | | |
| acc. to IEC 60947-4-1 | | 1000 V | | | | |
| acc. to UL | | 1000 V | | | | |
| Rated impulse withstand voltage Uimp. | | 8 kV | | | | |
| Pollution degree | | 3 | | | | |
| Ambient air temperature close to contactor | | | | | | |
| Operation | | -40 to +70 °C | | | | |
| Storage | | -40 to +70 °C | | | | |
| Climatic withstand | | acc. to IEC 60068-2-30 | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | |
| Mechanical durability | | | | | | |
| Number of operating cycles | | 5 millions operating cycles | | 0.5 millions | 0.5 millions operating cycles | |
| Max. switching frequency | | 300 cycles/h | | | 60 cycles/h | |
| Shock withstand<br>acc. to IEC/EN 60068-2-27<br>Mounting position 1 | | | | | | |
|  | Shock direction | 1/2 sinusoidal shock for 30 ms: no change in contact position, closed or open position | | | | |
| | A | 5 g | | | - | |
| | B1 | 5 g | | | - | |
| | B2 | 5 g | | | - | |
| | C1 | 5 g | | | - | |
| | C2 | 5 g | | | - | |

# GAF460 ... GAF2050 contactors

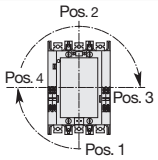
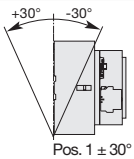
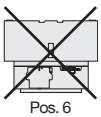
## Technical data



### Magnet system characteristics

| Contactor types | AC / DC operated | GAF460 | GAF750 | GAF1250 | GAF1650 | GAF2050 |
|---|---|---|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | AC or DC supply | At θ ≤ 70 °C 0.85 x Uc min...1.1 x Uc max. Please also refer to "Mounting characteristics and conditions for use" | | | | |
| AC control voltage 50/60 Hz | | | | | | |
| Rated control circuit voltage Uc | | 48...500 V AC | | | 100...250 V AC | |
| Coil consumption | Average pull-in value | 890 VA | 850 VA | | 1900 VA | |
| | Average holding value | 12 VA / 4 W | 12 VA / 4.5 W | | 48 VA / 17 W | |
| DC control voltage | | | | | | |
| Rated control circuit voltage Uc | | 24...500 V DC | | | 100...250 V DC | |
| Coil consumption | Average pull-in value | 990 W | 950 W | | 1700 W | |
| | Average holding value | 4 W | 4.5 W | | 16 W | |
| Drop-out voltage | | 55 % of Uc min. | | | | |
| Dips withstand -20 °C ≤ θ ≤ +60 °C | | ≥ 20 ms | | | | |
| Operating time | | | | | | |
| Coil supply between A1 - A2 | | | | | | |
| Between coil energization and: | N.O. contact closing | 50...120 ms | | | 50...80 ms | |
| | N.C. contact opening | 50...120 ms | | | 50...80 ms | |
| Between coil de-energization and: | N.O. contact opening | 33...70 ms | | | 35...55 ms | |
| | N.C. contact closing | 33...70 ms | | | 35...55 ms | |
| Control input for PLC's | | | | | | |
| Between coil energization and: | N.O. contact closing | 40...60 ms | 40...90 ms | | 40...65 ms | |
| | N.C. contact opening | 40...60 ms | 40...90 ms | | 40...65 ms | |
| Between coil de-energization and: | N.O. contact opening | 10...30 ms | | | 10...30 ms | |
| | N.C. contact closing | 10...30 ms | | | 10...30 ms | |

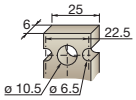
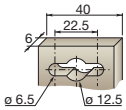
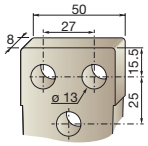
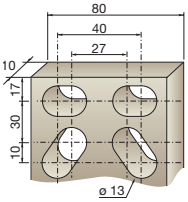
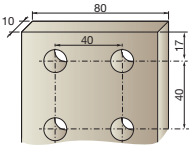
### Mounting characteristics and conditions for use

| Contactor types | | AC / DC operated | GAF460 | GAF750 | GAF1250 | GAF1650 | GAF2050 |
|---|---|---|---|---|---|---|---|
| Mounting positions | | |   |   |   |   | |
| Control voltage / Ambient temperature | | | | | | | |
| Mounting positions | 1, 1±30°, 2, 3, 4, 5 | at θ ≤ 70 °C | 0.85 x Uc min...1.1 x Uc max. | | | | |
| | 6 | | Unauthorized | | | | |
| Mounting distances | | | The contactors can be assembled side by side | | | | |
| Fixing | | | – | | | | |
| On rail according to IEC/EN 60715 | | | | | | | |
| By screws (not supplied) | | | 4 x M5 | 4 x M6 | | 4 x M8 | |

# GAF460 ... GAF2050 contactors

## Technical data

### Connecting characteristics

| Contactor types | | | AC / DC operated | GAF460 | GAF750 | GAF1250 | GAF1650 | GAF2050 |
|---|---|---|---|---|---|---|---|---|
| Main terminals<br>Flat type | | | |  |  GAF750 |  GAF1250 |  GAF1650 |  GAF2050 |
| Connection capacity (min. ... max.) | | | | | | | | |
| Main conductors (poles) | | | | | | | | |
| Rigid with connector | | Single for Cu cable | | 240 mm² | 300 mm² | | – | |
| | | Single for Al/Cu cable | | 240 mm² | 300 mm² | | – | |
| | | Double for Al/Cu cable | | 2 x 240 mm² | 3 x 185 mm² | | – | |
| Bars or lugs | | | L ≤ | 47 mm | 52 mm | | 100 mm | |
| | | | Ø > | 10 mm | 12 mm | | 12 mm | |
| Connection capacity acc. to UL/CSA | | | 1 or 2 x | 2//250 - 500 MCM | 3// 2/0 - 500 MCM | | 1/0 - 750 MCM | |
| Tightening torque | | Recommended | | 35 Nm /<br>310 lb.in | 45 Nm /<br>398 lb.in | | 45 Nm /<br>398 lb.in | |
| | | Max. | | 40 Nm | 49 Nm | | 49 Nm | |
| Auxiliary conductors<br>(coil terminals) | | | | | | | | |
| Rigid Solid/Stranded | | | 1 x | 1...4 mm² | | | | |
| | | | 2 x | 1...4 mm² | | | | |
| Flexible with ferrule | | | 1 x | 0.75...2.5 mm² | | | | |
| | | | 2 x | 0.75...2.5 mm² | | | | |
| Lugs | | | L ≤ | 8 mm | | | | |
| | | | I > | 3.7 mm | | | | |
| Connection capacity acc. to UL/CSA | | | 1 or 2 x | AWG 18...14 | | | | |
| Tightening torque | | Recommended | | 1.00 Nm / 9 lb.in | | | | |
| | | Max. | | 1.20 Nm | | | | |
| Degree of protection<br>acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | | | | | |
| Main terminals | | | | IP00 | | | | |
| Coil terminals | | | | IP20 | | | | |
| Screw terminals | | | | | | | | |
| Main terminals | | | | M10 | M12 | | | |
| | | | | Screws and bolts | | | | |
| Coil terminals (delivered in open position) | | | | M3.5 | | | | |
| | | | Screwdriver type | Flat Ø 5.5 mm / Pozidriv 2 | | | | |



**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**1SBH137005R1322**

# Contactors for capacitor switching



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**UA16..RA up to UA110..RA - Unlimited peak current Î**
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**UA16 up to UA110**
**Peak current Î ≤ 100 times the rms current**
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# Contactors for capacitor switching

## AC-6b utilization category according to IEC 60947-4-1

### Capacitor transient conditions

In Low Voltage industrial installations, capacitors are mainly used for reactive energy correction (raising the power factor). When these capacitors are energized, overcurrents of high amplitude and high frequencies (3 to 15 kHz) occur during the transient period (1 to 2 ms).

The amplitude of these current peaks, also known as "inrush current peaks", depends on the following factors:

- The network inductances.
- The transformer power and short-circuit voltage.
- The type of power factor correction.

**There are 2 types of power factor correction: fixed or automatic.**

**Fixed power factor correction** consists of inserting, in parallel on the network, a capacitor bank whose total power is provided by the assembly of capacitors of identical or different ratings.

The bank is energized by a contactor that simultaneously supplies all the capacitors (a single step).

The inrush current peak, in the case of fixed correction, can reach 30 times the nominal current of the capacitor bank.

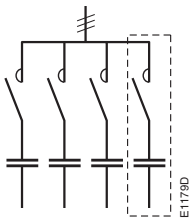



**Single-step capacitor bank scheme**
Use the AF... or UA... contactor ranges

**An automatic power factor correction** system, on the other hand, consists of several capacitor banks of identical or different ratings (several steps), energized separately according to the value of the power factor to be corrected.

An electronic device automatically determines the power of the steps to be energized and activates the relevant contactors.

The inrush current peak, in the case of automatic correction, depends on the power of the steps already on duty, and can reach 100 times the nominal current of the step to be energized.




Multi-step capacitor bank scheme
Use the UA... or UA..RA contactor ranges.

### Steady state condition data

The presence of harmonics and the network's voltage tolerance lead to a current, estimated to be 1.3 times the nominal current In of the capacitor, permanently circulating in the circuit.

Taking into account the manufacturing tolerances, the exact power of a capacitor can reach 1.15 times its nominal power.

Standard IEC 60831-1 Edition 2002 specifies that the capacitor must therefore have a maximum thermal current IT of:

$$IT = 1.3 \times 1.15 \times In = 1.5 \times In$$

### Consequences for the contactors

To avoid malfunctions (welding of main poles, abnormal temperature rise, etc.), contactors for capacitor bank switching must be sized to withstand:

- **A permanent current that can reach 1.5 times the nominal current of the capacitor bank.**
- **The short but high peak current on pole closing** (maximum permissible peak current $\hat{I}$ ).

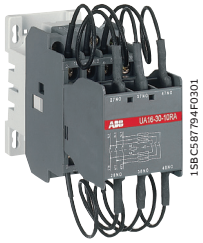
# Contactors for capacitor switching

## The ABB solutions

**ABB offers 2 contactor versions according to the value of the inrush current peak and the power of the capacitor bank.**

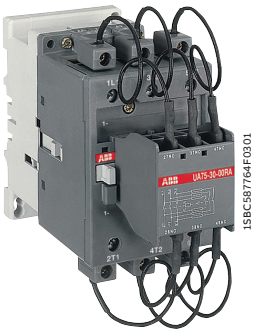
### UA..RA contactors for capacitor switching (UA16..RA to UA110..RA) with insertion of damping resistors

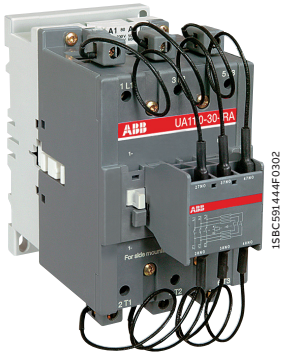
The insertion of damping resistors protects the contactor and the capacitor from the highest inrush currents.







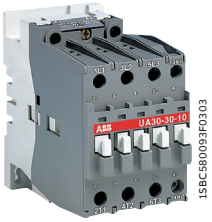


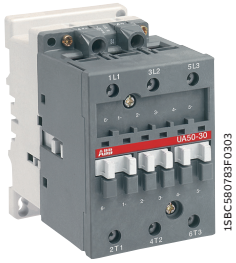




### UA contactors for capacitor switching (UA16 to UA110)

Maximum permissible peak current $\hat{I} \leq 100$ times the nominal rms current of the switched capacitor.



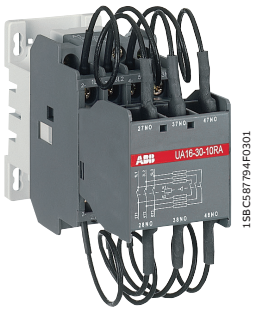






# UA16..RA ... UA30..RA 3-pole contactors for capacitor switching

## 12.5 to 30 kvar - Unlimited peak current Î

## AC operated




UA16-30-10RA




UA30-30-10RA

UA..RA contactors for capacitor switching can be used for installations in which the peak current far exceeds 100 times nominal rms current. The contactors are delivered complete with their damping resistors and must be used without additional inductances.

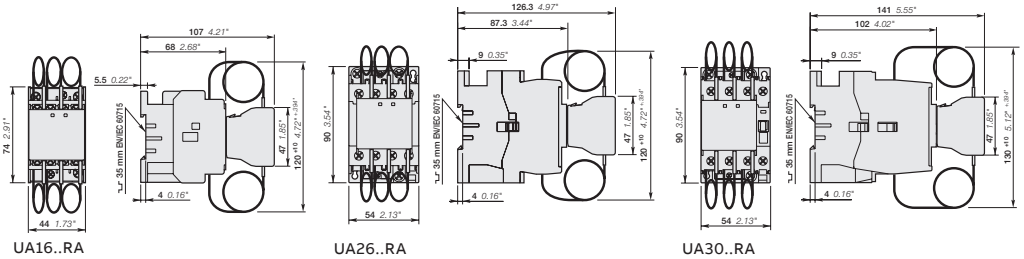
The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

These contactors are of the block type design with:

- 3 main poles and 1 built-in auxiliary contact
- the UA..RA contactors are fitted with a special front-mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank
  - their connection also ensures capacitor precharging in order to limit the second current peak occurring upon making of the main poles
  - the insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL/CSA | Rated control circuit voltage Uc (1) | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|
| Rated operational power θ ≤ 40 °C 400 V AC-6b | Rated operational power θ ≤ 40 °C 480 V | | | | | | Pkg (1 pce) |
| kvar | kvar | V 50 Hz | V 60 Hz | | | | kg |
| 12.5 | 16 | 24 | 24 | 1 0 | UA16-30-10RA | 1SBL181024R8110 | 0.460 |
| | | 110 | 110...120 | 1 0 | UA16-30-10RA | 1SBL181024R8410 | 0.460 |
| | | 220...230 | 230...240 | 1 0 | UA16-30-10RA | 1SBL181024R8010 | 0.460 |
| | | 230...240 | 240...260 | 1 0 | UA16-30-10RA | 1SBL181024R8810 | 0.460 |
| | | 380...400 | 400...415 | 1 0 | UA16-30-10RA | 1SBL181024R8510 | 0.460 |
| | | 400...415 | 415...440 | 1 0 | UA16-30-10RA | 1SBL181024R8610 | 0.460 |
| 22 | 22 | 24 | 24 | 1 0 | UA26-30-10RA | 1SBL241024R8110 | 0.710 |
| | | 110 | 110...120 | 1 0 | UA26-30-10RA | 1SBL241024R8410 | 0.710 |
| | | 220...230 | 230...240 | 1 0 | UA26-30-10RA | 1SBL241024R8010 | 0.710 |
| | | 230...240 | 240...260 | 1 0 | UA26-30-10RA | 1SBL241024R8810 | 0.710 |
| | | 380...400 | 400...415 | 1 0 | UA26-30-10RA | 1SBL241024R8510 | 0.710 |
| | | 400...415 | 415...440 | 1 0 | UA26-30-10RA | 1SBL241024R8610 | 0.710 |
| 30 | 28 | 24 | 24 | 1 0 | UA30-30-10RA | 1SBL281024R8110 | 0.810 |
| | | 110 | 110...120 | 1 0 | UA30-30-10RA | 1SBL281024R8410 | 0.810 |
| | | 220...230 | 230...240 | 1 0 | UA30-30-10RA | 1SBL281024R8010 | 0.810 |
| | | 230...240 | 240...260 | 1 0 | UA30-30-10RA | 1SBL281024R8810 | 0.810 |
| | | 380...400 | 400...415 | 1 0 | UA30-30-10RA | 1SBL281024R8510 | 0.810 |
| | | 400...415 | 415...440 | 1 0 | UA30-30-10RA | 1SBL281024R8610 | 0.810 |

(1) Other control voltages see voltage code table.

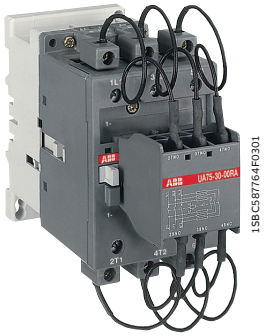



Main dimensions mm, inches

# UA50..RA ... UA75..RA 3-pole contactors for capacitor switching

## 40 to 60 kvar - Unlimited peak current Î

## AC operated




UA75-30-00 RA

UA..RA contactors for capacitor switching can be used for installations in which the peak current far exceeds 100 times nominal rms current. The contactors are delivered complete with their damping resistors and must be used without additional inductances.

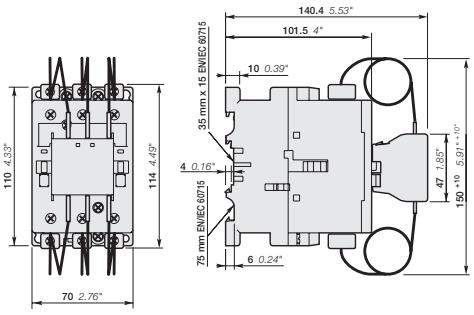
The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

These contactors are of the block type design with:

- 3 main poles
- the UA..RA contactors are fitted with a special front-mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank
  - their connection also ensures capacitor precharging in order to limit the second current peak occurring upon making of the main poles
  - the insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL/CSA | Rated control circuit voltage Uc (1) | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|
| Rated operational power θ ≤ 40 °C 400 V AC-6b | Rated operational power θ ≤ 40 °C 480 V | | | | | | Pkg (1 pce) |
| kvar | kvar | V 50 Hz | V 60 Hz | | | | kg |
| 40 | 50 | 24 | 24 | 0 0 | UA50-30-00RA | 1SBL351024R8100 | 1.350 |
| | | 110 | 110...120 | 0 0 | UA50-30-00RA | 1SBL351024R8400 | 1.350 |
| | | 220...230 | 230...240 | 0 0 | UA50-30-00RA | 1SBL351024R8000 | 1.350 |
| | | 230...240 | 240...260 | 0 0 | UA50-30-00RA | 1SBL351024R8800 | 1.350 |
| | | 380...400 | 400...415 | 0 0 | UA50-30-00RA | 1SBL351024R8500 | 1.350 |
| | | 400...415 | 415...440 | 0 0 | UA50-30-00RA | 1SBL351024R8600 | 1.350 |
| 50 | 55 | 24 | 24 | 0 0 | UA63-30-00RA | 1SBL371024R8100 | 1.350 |
| | | 110 | 110...120 | 0 0 | UA63-30-00RA | 1SBL371024R8400 | 1.350 |
| | | 220...230 | 230...240 | 0 0 | UA63-30-00RA | 1SBL371024R8000 | 1.350 |
| | | 230...240 | 240...260 | 0 0 | UA63-30-00RA | 1SBL371024R8800 | 1.350 |
| | | 380...400 | 400...415 | 0 0 | UA63-30-00RA | 1SBL371024R8500 | 1.350 |
| | | 400...415 | 415...440 | 0 0 | UA63-30-00RA | 1SBL371024R8600 | 1.350 |
| 60 | 64 | 24 | 24 | 0 0 | UA75-30-00RA | 1SBL411024R8100 | 1.350 |
| | | 110 | 110...120 | 0 0 | UA75-30-00RA | 1SBL411024R8400 | 1.350 |
| | | 220...230 | 230...240 | 0 0 | UA75-30-00RA | 1SBL411024R8000 | 1.350 |
| | | 230...240 | 240...260 | 0 0 | UA75-30-00RA | 1SBL411024R8800 | 1.350 |
| | | 380...400 | 400...415 | 0 0 | UA75-30-00RA | 1SBL411024R8500 | 1.350 |
| | | 400...415 | 415...440 | 0 0 | UA75-30-00RA | 1SBL411024R8600 | 1.350 |

(1) Other control voltages see voltage code table.



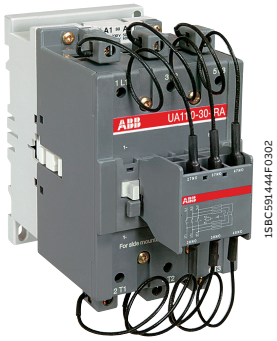

UA50..RA, UA63..RA, UA75..RA

Main dimensions mm, inches

# UA95..RA ... UA110..RA 3-pole contactors for capacitor switching

## 70 to 80 kvar - Unlimited peak current Î

## AC operated




UA110-30-00 RA

UA..RA contactors for capacitor switching can be used for installations in which the peak current far exceeds 100 times nominal rms current. The contactors are delivered complete with their damping resistors and must be used without additional inductances.

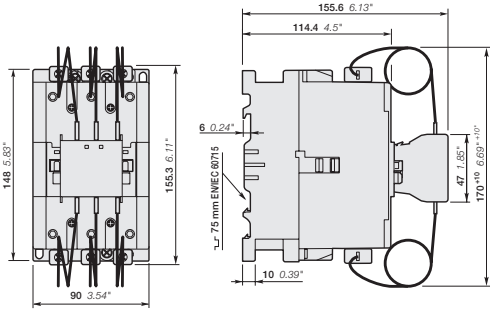
The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

These contactors are of the block type design with:

- 3 main poles
- the UA..RA contactors are fitted with a special front-mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank
  - their connection also ensures capacitor precharging in order to limit the second current peak occurring upon making of the main poles
  - the insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL/CSA | Rated control circuit voltage Uc (1) | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|
| Rated operational power θ ≤ 40 °C 400 V AC-6b | Rated operational power θ ≤ 40 °C 480 V | V 50 Hz | V 60 Hz | | | | Pkg (1 pce) |
| | | | | | | | kg |
| 70 | 80 | 24 | 24 | 0 0 | UA95-30-00RA | 1SFL431024R8100 | 2.000 |
| | | 110 | 110...120 | 0 0 | UA95-30-00RA | 1SFL431024R8400 | 2.000 |
| | | 220...230 | 230...240 | 0 0 | UA95-30-00RA | 1SFL431024R8000 | 2.000 |
| | | 230...240 | 240...260 | 0 0 | UA95-30-00RA | 1SFL431024R8800 | 2.000 |
| | | 380...400 | 400...415 | 0 0 | UA95-30-00RA | 1SFL431024R8500 | 2.000 |
| | | 400...415 | 415...440 | 0 0 | UA95-30-00RA | 1SFL431024R8600 | 2.000 |
| 80 | 95 | 24 | 24 | 0 0 | UA110-30-00RA | 1SFL451024R8100 | 2.000 |
| | | 110 | 110...120 | 0 0 | UA110-30-00RA | 1SFL451024R8400 | 2.000 |
| | | 220...230 | 230...240 | 0 0 | UA110-30-00RA | 1SFL451024R8000 | 2.000 |
| | | 230...240 | 240...260 | 0 0 | UA110-30-00RA | 1SFL451024R8800 | 2.000 |
| | | 380...400 | 400...415 | 0 0 | UA110-30-00RA | 1SFL451024R8500 | 2.000 |
| | | 400...415 | 415...440 | 0 0 | UA110-30-00RA | 1SFL451024R8600 | 2.000 |

(1) Other control voltages see voltage code table.




UA95..RA, UA100..RA

Main dimensions mm, inches

# UA..RA 3-pole contactors for capacitor switching

## Unlimited peak current Î

**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories
Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Available auxiliary contacts | Front-mounted accessories<br>Auxiliary contact blocks<br>1-pole CA5-.. | Side-mounted accessories<br>Auxiliary contact blocks<br>2-pole CAL... |
|---|---|---|---|---|
| UA16-30-10RA | 3 0 | 1 0 | – | 1 x CAL5-11 |
| UA26-30-10RA | 3 0 | 1 0 | – | 1 to 2 x CAL5-11 |
| UA30-30-10RA | 3 0 | 1 0 | 1 x CA5-... | + 1 to 2 x CAL5-11 |
| UA50-30-00RA | 3 0 | 0 0 | 1 to 2 x CA5-... | + 1 to 2 x CAL5-11 |
| UA63-30-00RA | 3 0 | 0 0 | | |
| UA75-30-00RA | 3 0 | 0 0 | | |
| UA95-30-00RA | 3 0 | 0 0 | 1 to 2 x CA5-... | + 1 to 2 x CAL18-11 |
| UA110-30-00RA | 3 0 | 0 0 | | |

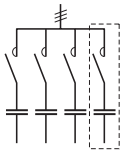
# UA16..RA ... UA110..RA 3-pole contactors for capacitor switching

## Unlimited peak current Î

## Technical data

### Main pole - Utilization characteristics according to IEC

| Contactor types | | AC operated | UA16..RA | UA26..RA | UA30..RA | UA50..RA | UA63..RA | UA75..RA | UA95..RA | UA110..RA |
|---|---|---|---|---|---|---|---|---|---|---|
| Standards | | | IEC/EN 60947-1, IEC/EN 60947-4-1 | | | | | | | |
| Rated operational voltage Ue max. | | | 690 V | | | | | | | |
| Rated frequency (without derating) | | | 50 / 60 Hz | | | | | | | |
| Pollution degree | | | 3 | | | | | | | |
| AC-6b Utilization category | | | | | | | | | | |
| Rated operational power AC-6b (1) | | | | | | | | | | |
| For air temperature close to contactor | θ ≤ 40 °C | 230-240 V | 8 kvar | 12.5 kvar | 16 kvar | 25 kvar | 30 kvar | 35 kvar | 40 kvar | 45 kvar |
| | | 400-415 V | 12.5 kvar | 22 kvar | 30 kvar | 40 kvar | 50 kvar | 60 kvar | 70 kvar | 80 kvar |
| | | 440 V | 15 kvar | 24 kvar | 32 kvar | 50 kvar | 55 kvar | 65 kvar | 75 kvar | 85 kvar |
| | | 500-550 V | 18 kvar | 30 kvar | 34 kvar | 55 kvar | 65 kvar | 75 kvar | 85 kvar | 95 kvar |
| | | 690 V | 22 kvar | 35 kvar | 45 kvar | 72 kvar | 80 kvar | 100 kvar | 120 kvar | 130 kvar |
| | θ ≤ 55 °C | 230-240 V | 7.5 kvar | 11.5 kvar | 16 kvar | 24 kvar | 27 kvar | 30 kvar | 35 kvar | 40 kvar |
| | | 400-415 V | 12.5 kvar | 20 kvar | 27.5 kvar | 40 kvar | 45 kvar | 50 kvar | 60 kvar | 70 kvar |
| | | 440 V | 13 kvar | 20 kvar | 30 kvar | 43 kvar | 48 kvar | 53 kvar | 65 kvar | 75 kvar |
| | | 500-550 V | 16 kvar | 25 kvar | 34 kvar | 50 kvar | 60 kvar | 65 kvar | 75 kvar | 82 kvar |
| | | 690 V | 21 kvar | 31 kvar | 45 kvar | 65 kvar | 75 kvar | 80 kvar | 105 kvar | 110 kvar |
| | θ ≤ 70 °C | 230-240 V | 6 kvar | 9 kvar | 11 kvar | 20 kvar | 23 kvar | 25 kvar | 30 kvar | 35 kvar |
| | | 400-415 V | 10 kvar | 15.5 kvar | 19.5 kvar | 35 kvar | 39 kvar | 41 kvar | 53 kvar | 60 kvar |
| | | 440 V | 11 kvar | 17 kvar | 20.5 kvar | 37 kvar | 42.5 kvar | 45 kvar | 58 kvar | 70 kvar |
| | | 500-550 V | 12.5 kvar | 20 kvar | 25 kvar | 46 kvar | 50 kvar | 55 kvar | 70 kvar | 78 kvar |
| | | 690 V | 17 kvar | 26 kvar | 32 kvar | 60 kvar | 65 kvar | 70 kvar | 85 kvar | 100 kvar |
| Max. permissible peak current Î | | | Unlimited | | | | | | | |
| Short-circuit protection device for contactors gG type fuse (2) | | | 80 A | 125 A | 200 A | | | | 250 A | |
| Max. electrical switching frequency | | | 240 cycles/h | | | | | | | |
| Electrical durability AC-6b | | Ue ≤ 440 V | 250 000 operating cycles | | | | | | | |
| | | 500 V ≤ Ue ≤ 690 V | 100 000 operating cycles | | | | | | | |



Multi-step capacitor bank scheme

(1) For 220 V and 380 V, multiply by 0.9 the rated values at 230 V and 400 V respectively.
Example: 50 kvar / 400 V corresponding to 0.9 x 50 = 45 kvar/380 V.
(2) The fuse ratings given represent the maximum ratings ensuring type 1 coordination according to the definition of standard IEC 60947-4-1.

### Main pole - Utilization characteristics according to UL / CSA

| Contactor types | | AC operated | UA16..RA | UA26..RA | UA30..RA | UA50..RA | UA63..RA | UA75..RA | UA95..RA | UA110..RA |
|---|---|---|---|---|---|---|---|---|---|---|
| Power - 60 Hz | | | | | | | | | | |
| For air temperature close to contactor | θ ≤ 40 °C | 240 V | 8 kvar | 11 kvar | 14 kvar | 25 kvar | 27.5 kvar | 32 kvar | 40 kvar | 45 kvar |
| | | 480 V | 16 kvar | 22 kvar | 28 kvar | 50 kvar | 55 kvar | 64 kvar | 80 kvar | 95 kvar |
| | | 600 V | 20 kvar | 27 kvar | 35 kvar | 62 kvar | 70 kvar | 80 kvar | 100 kvar | 120 kvar |
| Max. permissible peak Current Î | | | Unlimited | | | | | | | |

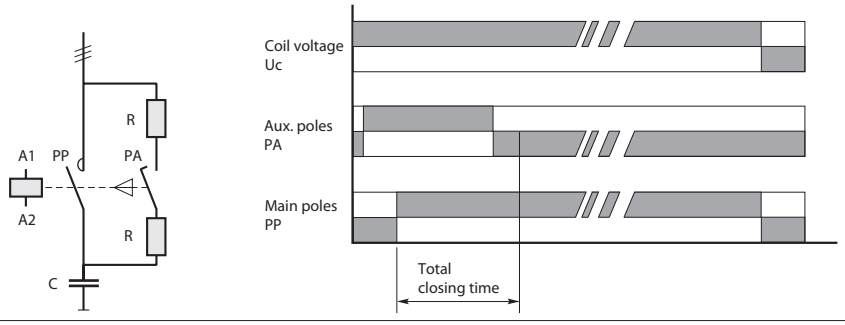
### Operating principle

The front-mounted block mechanism of the UA..RA contactors ensures:
- early making of the auxiliary "PA" poles with respect to the main "PP" poles
- automatic return to the open position of the auxiliary "PA" poles after the main poles are closed.

**When the coil is energized**, the early making auxiliary poles connect the capacitor to the network via the set of 3 resistors. The damping resistors attenuate the first current peak and the second inrush current when the main contacts begin to make. Once the main poles are in the closed position, the auxiliary poles automatically break.

**When the coil is de-energized**, the main poles break ensuring the breaking of the capacitor bank.

The contactor can then begin a new cycle.




The insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.

# UA16..RA ... UA110..RA 3-pole contactors for capacitor switching

## Unlimited peak current Î

## Technical data

### Connecting characteristics

| Contactor types | | | AC operated | UA16..RA | UA26..RA | UA30..RA | UA50..RA<br>UA63..RA<br>UA75..RA | UA95..RA<br>UA110..RA |
|---|---|---|---|---|---|---|---|---|
| Connection capacity (min. ... max.) | | | | | | | | |
| Main conductors (poles) | | | | | | | | |
| Rigid | Solid (≤ 4 mm²) | | 1 x | 1...4 mm² | 1.5...6 mm² | 2.5...16 mm² | 6...50 mm² | 10...95 mm² |
| | Stranded (≥ 6 mm²) | | 2 x | - | - | 2.5...16 + 2.5...6 mm² | 6...25 + 6...16 mm² | 6...35 mm² |
| Flexible with ferrule | | | 1 x | 0.75...2.5 mm² | 1.5...4 mm² | 2.5...10 mm² | 6...35 mm² | 10...70 mm² |
| | | | 2 x | - | - | 2.5...10 + 2.5...4 mm² | 6...16 + 6...10 mm² | 6...35 mm² |
| Bars or lugs | | | L ≤ | 7.7 mm | 10 mm | - | - | - |
| | | | I > | 3.7 mm | 4.2 mm | - | - | - |
| Connection capacity acc. to UL/CSA | | | 1 or 2 x | AWG 18...10 | AWG 12...8 | AWG 8...4 | AWG 8...1 | AWG 6...2/0 |
| Tightening torque | Recommended | | | 1 Nm / 9 lb.in | 1.7 Nm / 15 lb.in | 2.3 Nm / 20 lb.in | 4 Nm / 35 lb.in | 8 Nm / 53 lb.in |
| | Max. | | | 1.2 Nm | 2.2 Nm | 2.6 Nm | 4.5 Nm | 9 Nm |
| Auxiliary conductors<br>(built-in auxiliary terminals + coil terminals) | | | | | | | | |
| Rigid Solid/Stranded | | | 1 x | 1...4 mm² | | | | 0.75...2.5 mm² |
| | | | 2 x | 1...4 mm² | | | | 0.75...2.5 mm² |
| Flexible with ferrule | | | 1 x | 0.75...2.5 mm² | | | 1...2.5 mm² | 0.75...2.5 mm² |
| | | | 2 x | 0.75...2.5 mm² | | | | |
| Lugs | Coil terminals | | L ≤ | 8 mm | | | | |
| | | | I > | 3.7 mm | | | | |
| | Built-in auxiliary terminals | | L ≤ | 7.7 mm | 10 mm | 8 mm | - | - |
| | | | I > | 3.7 mm | 4.2 mm | 3.7 mm | - | - |
| Connection capacity acc. to UL/CSA | | | 1 or 2 x | AWG 18...14 | | | | |
| Tightening torque | | | | | | | | |
| Coil terminals | Recommended | | | 1 Nm / 9 lb.in | | | | |
| | Max. | | | 1.2 Nm | | | | |
| Built-in auxiliary terminals | Recommended | | | 1 Nm / 9 lb.in | | | | |
| | Max. | | | 1.2 Nm | | | | |
| Degree of protection<br>acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | | | | | |
| Main terminals | | | | IP20 | | IP10 | | |
| Coil terminals | | | | IP20 | | | | |
| Built-in auxiliary terminals | | | | IP20 | | | - | - |
| Screw terminals | | | | Delivered in open position, screws of unused terminals must be tightened | | | | |
| Main terminals | | | | M 3.5 | M 4 | M 5 | M6 | M8 |
| | | Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 | | Flat Ø 6.5 / Pozidriv 2 | | Hexagon socket<br>(s = 4 mm) |
| Coil terminals | | | | M 3.5 | | | | |
| | | Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 | | | | |
| Built-in auxiliary terminals | | | | M 3.5 | M 4 | M 3.5 | - | - |
| | | Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 | | | - | - |

Other technical characteristics are the same as those of standard A contactors.

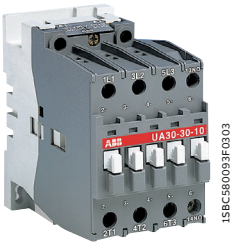
# UA16 ... UA30 3-pole contactors for capacitor switching

## 12.5 to 27.5 kvar - Peak current Î ≤ 100 times the rms current

## AC operated




UA16-30-10




UA30-30-10

UA contactors can be used for the switching of capacitor banks whose inrush current peaks are less than or equal to 100 times nominal rms current.

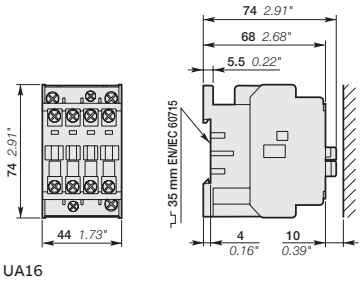
The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

These contactors are of the block type design with:

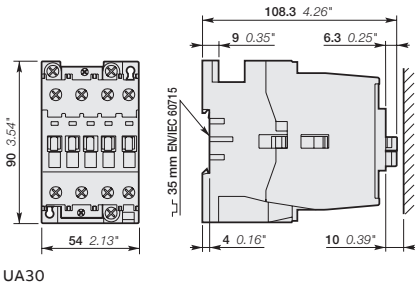
- 3 main poles and 1 built-in auxiliary contact
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | | UL/CSA | Rated control circuit voltage Uc (1) | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|
| Rated operational power θ ≤ 40 °C 400 V AC-6b | Max peak current Î | Rated operational power θ ≤ 40 °C 480 V | | | | | | Pkg (1 pce) |
| kvar | kA | kvar | V 50 Hz | V 60 Hz | | | | kg |
| 12.5 | 1.8 | - | 24 | 24 | 1 0 | UA16-30-10 | 1SBL181022R8110 | 0.340 |
| | | | 48 | 48 | 1 0 | UA16-30-10 | 1SBL181022R8310 | 0.340 |
| | | | 110 | 110...120 | 1 0 | UA16-30-10 | 1SBL181022R8410 | 0.340 |
| | | | 220...230 | 230...240 | 1 0 | UA16-30-10 | 1SBL181022R8010 | 0.340 |
| | | | 230...240 | 240...260 | 1 0 | UA16-30-10 | 1SBL181022R8810 | 0.340 |
| | | | 380...400 | 400...415 | 1 0 | UA16-30-10 | 1SBL181022R8510 | 0.340 |
| | | | 400...415 | 415...440 | 1 0 | UA16-30-10 | 1SBL181022R8610 | 0.340 |
| 20 | 3 | 25 | 24 | 24 | 1 0 | UA26-30-10 | 1SBL241022R8110 | 0.600 |
| | | | 48 | 48 | 1 0 | UA26-30-10 | 1SBL241022R8310 | 0.600 |
| | | | 110 | 110...120 | 1 0 | UA26-30-10 | 1SBL241022R8410 | 0.600 |
| | | | 220...230 | 230...240 | 1 0 | UA26-30-10 | 1SBL241022R8010 | 0.600 |
| | | | 230...240 | 240...260 | 1 0 | UA26-30-10 | 1SBL241022R8810 | 0.600 |
| | | | 380...400 | 400...415 | 1 0 | UA26-30-10 | 1SBL241022R8510 | 0.600 |
| | | | 400...415 | 415...440 | 1 0 | UA26-30-10 | 1SBL241022R8610 | 0.600 |
| 27.5 | 3.5 | 32 | 24 | 24 | 1 0 | UA30-30-10 | 1SBL281022R8110 | 0.710 |
| | | | 48 | 48 | 1 0 | UA30-30-10 | 1SBL281022R8310 | 0.710 |
| | | | 110 | 110...120 | 1 0 | UA30-30-10 | 1SBL281022R8410 | 0.710 |
| | | | 220...230 | 230...240 | 1 0 | UA30-30-10 | 1SBL281022R8010 | 0.710 |
| | | | 230...240 | 240...260 | 1 0 | UA30-30-10 | 1SBL281022R8810 | 0.710 |
| | | | 380...400 | 400...415 | 1 0 | UA30-30-10 | 1SBL281022R8510 | 0.710 |
| | | | 400...415 | 415...440 | 1 0 | UA30-30-10 | 1SBL281022R8610 | 0.710 |

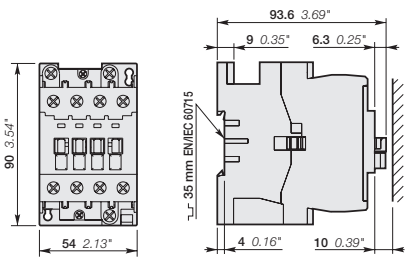
(1) Other control voltages see voltage code table.




UA16




UA30




UA26

Main dimensions mm, inches

# UA50 ... UA75 3-pole contactors for capacitor switching

## 33 to 50 kvar - Peak current Î ≤ 100 times the rms current

## AC operated




UA50-30-00

UA contactors can be used for the switching of capacitor banks whose inrush current peaks are less than or equal to 100 times nominal rms current.

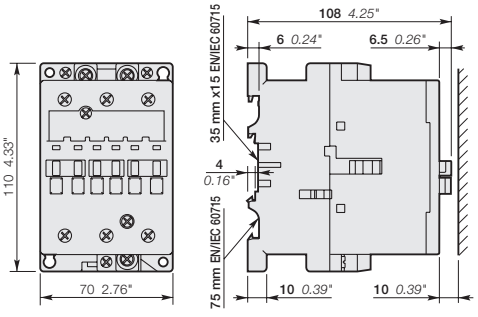
The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

These contactors are of the block type design with:

- 3 main poles
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | | UL/CSA | Rated control circuit voltage Uc (1) | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|
| Rated operational power θ ≤ 40 °C 400 V AC-6b | Max peak current Î | Rated operational power θ ≤ 40 °C 480 V | | | | | | Pkg (1 pce) |
| kvar | kA | kvar | V 50 Hz | V 60 Hz | | | | kg |
| 33 | 5 | 40 | 24 | 24 | 0 0 | UA50-30-00 | 1SBL351022R8100 | 1.160 |
| | | | 48 | 48 | 0 0 | UA50-30-00 | 1SBL351022R8300 | 1.160 |
| | | | 110 | 110...120 | 0 0 | UA50-30-00 | 1SBL351022R8400 | 1.160 |
| | | | 220...230 | 230...240 | 0 0 | UA50-30-00 | 1SBL351022R8000 | 1.160 |
| | | | 230...240 | 240...260 | 0 0 | UA50-30-00 | 1SBL351022R8800 | 1.160 |
| | | | 380...400 | 400...415 | 0 0 | UA50-30-00 | 1SBL351022R8500 | 1.160 |
| | | | 400...415 | 415...440 | 0 0 | UA50-30-00 | 1SBL351022R8600 | 1.160 |
| 45 | 6.5 | - | 24 | 24 | 0 0 | UA63-30-00 | 1SBL371022R8100 | 1.160 |
| | | | 48 | 48 | 0 0 | UA63-30-00 | 1SBL371022R8300 | 1.160 |
| | | | 110 | 110...120 | 0 0 | UA63-30-00 | 1SBL371022R8400 | 1.160 |
| | | | 220...230 | 230...240 | 0 0 | UA63-30-00 | 1SBL371022R8000 | 1.160 |
| | | | 230...240 | 240...260 | 0 0 | UA63-30-00 | 1SBL371022R8800 | 1.160 |
| | | | 380...400 | 400...415 | 0 0 | UA63-30-00 | 1SBL371022R8500 | 1.160 |
| | | | 400...415 | 415...440 | 0 0 | UA63-30-00 | 1SBL371022R8600 | 1.160 |
| 50 | 7.5 | 55 | 24 | 24 | 0 0 | UA75-30-00 | 1SBL411022R8100 | 1.160 |
| | | | 48 | 48 | 0 0 | UA75-30-00 | 1SBL411022R8300 | 1.160 |
| | | | 110 | 110...120 | 0 0 | UA75-30-00 | 1SBL411022R8400 | 1.160 |
| | | | 220...230 | 230...240 | 0 0 | UA75-30-00 | 1SBL411022R8000 | 1.160 |
| | | | 230...240 | 240...260 | 0 0 | UA75-30-00 | 1SBL411022R8800 | 1.160 |
| | | | 380...400 | 400...415 | 0 0 | UA75-30-00 | 1SBL411022R8500 | 1.160 |
| | | | 400...415 | 415...440 | 0 0 | UA75-30-00 | 1SBL411022R8600 | 1.160 |

(1) Other control voltages see voltage code table.




UA50, UA63, UA75

Main dimensions mm, inches

# UA95 ... UA110 3-pole contactors for capacitor switching

## 65 to 75 kvar - Peak current Î ≤ 100 times the rms current

## AC operated




UA110-30-00

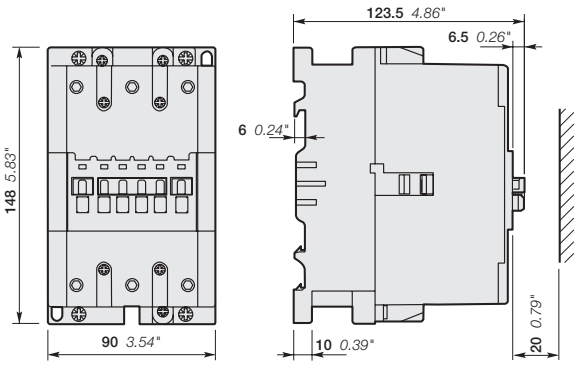
UA contactors can be used for the switching of capacitor banks whose inrush current peaks are less or equal to 100 times nominal rms current.
The capacitors must be discharges (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

These contactors are of the block type design with:

- 3 main poles
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | | UL/CSA | Rated control circuit voltage Uc (1) | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|
| Rated operational power θ ≤ 40 °C 400 V AC-6b | Max peak current Î | Rated operational power θ ≤ 40 °C 480 V | | | | | | Pkg (1 pce) |
| kvar | kA | kvar | V 50 Hz | V 60 Hz | | | | kg |
| 65 | 9.3 | 70 | 24 | 24 | 0 0 | UA95-30-00 | 1SFL431022R8100 | 2.000 |
| | | | 48 | 48 | 0 0 | UA95-30-00 | 1SFL431022R8300 | 2.000 |
| | | | 110 | 110...120 | 0 0 | UA95-30-00 | 1SFL431022R8400 | 2.000 |
| | | | 220...230 | 230...240 | 0 0 | UA95-30-00 | 1SFL431022R8000 | 2.000 |
| | | | 230...240 | 240...260 | 0 0 | UA95-30-00 | 1SFL431022R8800 | 2.000 |
| | | | 380...400 | 400...415 | 0 0 | UA95-30-00 | 1SFL431022R8500 | 2.000 |
| | | | 400...415 | 415...440 | 0 0 | UA95-30-00 | 1SFL431022R8600 | 2.000 |
| 75 | 10.5 | 80 | 24 | 24 | 0 0 | UA110-30-00 | 1SFL451022R8100 | 2.000 |
| | | | 48 | 48 | 0 0 | UA110-30-00 | 1SFL451022R8300 | 2.000 |
| | | | 110 | 110...120 | 0 0 | UA110-30-00 | 1SFL451022R8400 | 2.000 |
| | | | 220...230 | 230...240 | 0 0 | UA110-30-00 | 1SFL451022R8000 | 2.000 |
| | | | 230...240 | 240...260 | 0 0 | UA110-30-00 | 1SFL451022R8800 | 2.000 |
| | | | 380...400 | 400...415 | 0 0 | UA110-30-00 | 1SFL451022R8500 | 2.000 |
| | | | 400...415 | 415...440 | 0 0 | UA110-30-00 | 1SFL451022R8600 | 2.000 |

(1) Other control voltages see voltage code table.




UA95, UA110

Main dimensions mm, inches

# UA... 3-pole contactors for capacitor switching

Peak current Î ≤ 100 times the rms current

### Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Available auxiliary contacts | Front-mounted accessories<br>Auxiliary contact blocks | | | Side-mounted accessories<br>Auxiliary contact blocks |
|---|---|---|---|---|---|---|
| |  |  | 1-pole CA5-.. | 4-pole CA5-.. | | 2-pole CAL... |
| UA16-30-10 | 3 0 | 1 0 | 1 to 4 x CA5-.. | **or** 1 x CA5-.. (4-pole) | + | 1 to 2 x CAL5-11 |
| UA26-30-10 | 3 0 | 1 0 | 1 to 4 x CA5-.. | **or** 1 x CA5-.. (4-pole) | + | 1 to 2 x CAL5-11 |
| UA30-30-10 | 3 0 | 1 0 | 1 to 5 x CA5-.. | **or** 1 x CA5-.. (4-pole)<br>+ 1 x 1-pole CA5-.. | + | 1 to 2 x CAL5-11 |
| UA50-30-00 | 3 0 | 0 0 | 1 to 6 x CA5-.. | **or** 1 x CA5-.. (4-pole)<br>+ 2 x 1-pole CA5-.. | + | 1 to 2 x CAL5-11 |
| UA63-30-00 | 3 0 | 0 0 | | | | |
| UA75-30-00 | 3 0 | 0 0 | | | | |
| UA95-30-00 | 3 0 | 0 0 | 1 to 6 x CA5-.. | **or** 1 x CA5-.. (4-pole)<br>+ 2 x 1-pole CA5-.. | + | 1 to 2 x CAL18-11 |
| UA110-30-00 | 3 0 | 0 0 | | | | |

# UA16 ... UA110 3-pole contactors for capacitor switching

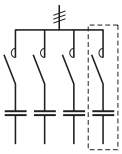
## Peak current Î ≤ 100 times the rms current

## Technical data

### Main pole - Utilization characteristics according to IEC

| Contactor types | | AC operated | UA16 | UA26 | UA30 | UA50 | UA63 | UA75 | UA95 | UA110 |
|---|---|---|---|---|---|---|---|---|---|---|
| Standards | | | IEC/EN 60947-1, IEC/EN 60947-4-1 | | | | | | | |
| Rated operational voltage Ue max. | | | 690 V | | | | | | | |
| Rated frequency (without derating) | | | 50 / 60 Hz | | | | | | | |
| Pollution degree | | | 3 | | | | | | | |
| AC-6b Utilization category | | | | | | | | | | |
| Rated operational power AC-6b (1) | | | | | | | | | | |
| For air temperature close to contactor | θ ≤ 40 °C | 230-240 V | 7.5 kvar | 12 kvar | 16 kvar | 20 kvar | 25 kvar | 30 kvar | 35 kvar | 40 kvar |
| | | 400-415 V | 12.5 kvar | 20 kvar | 27.5 kvar | 33 kvar | 45 kvar | 50 kvar | 65 kvar | 75 kvar |
| | | 440 V | 13.7 kvar | 22 kvar | 30 kvar | 36 kvar | 50 kvar | 55 kvar | 65 kvar | 75 kvar |
| | | 500-550 V | 15.5 kvar | 22 kvar | 34 kvar | 40 kvar | 50 kvar | 62 kvar | 70 kvar | 80 kvar |
| | | 690 V | 21.5 kvar | 30 kvar | 45 kvar | 55 kvar | 70 kvar | 75 kvar | 80 kvar | 90 kvar |
| | θ ≤ 55 °C | 230-240 V | 6.7 kvar | 11 kvar | 16 kvar | 20 kvar | 25 kvar | 30 kvar | 35 kvar | 40 kvar |
| | | 400-415 V | 11.7 kvar | 18.5 kvar | 27.5 kvar | 33 kvar | 43 kvar | 50 kvar | 65 kvar | 70 kvar |
| | | 440 V | 13 kvar | 20 kvar | 30 kvar | 36 kvar | 48 kvar | 53 kvar | 65 kvar | 75 kvar |
| | | 500-550 V | 14.7 kvar | 22 kvar | 34 kvar | 40 kvar | 50 kvar | 62 kvar | 70 kvar | 80 kvar |
| | | 690 V | 20 kvar | 30 kvar | 45 kvar | 55 kvar | 70 kvar | 75 kvar | 80 kvar | 90 kvar |
| | θ ≤ 70 °C | 230-240 V | 6 kvar | 8.5 kvar | 11 kvar | 19 kvar | 21 kvar | 22 kvar | 30 kvar | 35 kvar |
| | | 400-415 V | 10 kvar | 14.5 kvar | 19 kvar | 32 kvar | 37 kvar | 39 kvar | 55 kvar | 65 kvar |
| | | 440 V | 11 kvar | 16 kvar | 20 kvar | 35 kvar | 41 kvar | 43 kvar | 55 kvar | 70 kvar |
| | | 500-550 V | 12.5 kvar | 19.5 kvar | 23.5 kvar | 40 kvar | 45 kvar | 47.5 kvar | 60 kvar | 75 kvar |
| | | 690 V | 17 kvar | 25 kvar | 32 kvar | 52 kvar | 60 kvar | 65 kvar | 70 kvar | 85 kvar |
| Max. permissible peak current Î | | Ue ≤ 500 V | 1.8 kA | 3 kA | 3.5 kA | 5 kA | 6.5 kA | 7.5 kA | 9.3 kA | 10.5 kA |
| | | Ue > 500 V | 1.6 kA | 2.7 kA | 3.1 kA | 4.5 kA | 5.8 kA | 6.75 kA | 8 kA | 9 kA |
| Short-circuit protection device for contactors | | | | | | | | | | |
| gG type fuse | | | sized 1.5...1.8 In of the capacitor | | | | | | | |
| Max. electrical switching frequency | | | 240 cycles/h | | | | | | | |
| Electrical durability AC-6b | | Ue ≤ 690 V | 100 000 operating cycles | | | | | | | |

Multi-step capacitor bank scheme



(1) For 220 V and 380 V, multiply by 0.9 the rated values at 230 V and 400 V respectively.
Example: 50 kvar / 400 V corresponding to 0.9 x 50 = 45 kvar/380 V.
If, in an application, the current peak is greater than the maximum peak current Î specified in the tables above, select a higher rating, refer to the UA..RA contactors, or add inductances. (see application guide "Contactors for capacitor switching").

### Main pole - Utilization characteristics according to UL / CSA

| Contactor types | | AC operated | UA16 | UA26 | UA30 | UA50 | UA63 | UA75 | UA95 | UA110 |
|---|---|---|---|---|---|---|---|---|---|---|
| Power - 60 Hz | | | | | | | | | | |
| For air temperature close to contactor | θ ≤ 40 °C | 240 V | - | 12.5 kvar | 16 kvar | 20 kvar | - | 27.5 kvar | 35 kvar | 40 kvar |
| | | 480 V | - | 25 kvar | 32 kvar | 40 kvar | - | 55 kvar | 70 kvar | 80 kvar |
| | | 600 V | - | 30 kvar | 40 kvar | 50 kvar | - | 70 kvar | 75 kvar | 85 kvar |

If, in an application, the current peak is greater than the maximum peak current Î specified in the tables above, select a higher rating, refer to the UA..RA contactors, or add inductances. (see application guide "Contactors for capacitor switching").

# UA16 ... UA110 3-pole contactors for capacitor switching

Peak current Î ≤ 100 times the rms current

Technical data

## Connecting characteristics

| Contactor types | | | AC operated | UA16 | UA26 | UA30 | UA50<br>UA63<br>UA75 | UA95<br>UA110 |
|---|---|---|---|---|---|---|---|---|
| Connection capacity (min. ... max.) | | | | | | | | |
| Main conductors (poles) | | | | | | | | |
| Rigid | Solid (≤ 4 mm²) | | 1 x | 1...4 mm² | 1.5...6 mm² | 2.5...16 mm² | 6...50 mm² | 10...95 mm² |
| | Stranded (≥ 6 mm²) | | 2 x | 1...4 mm² | 1.5...6 mm² | 2.5...16 mm² | 6...25 mm² | 6...35 mm² |
| Flexible with ferrule | | | 1 x | 0.75...2.5 mm² | 0.75...4 mm² | 2.5...10 mm² | 6...35 mm² | 10...70 mm² |
| | | | 2 x | 0.75...2.5 mm² | 0.75...4 mm² | 2.5...10 mm² | 6...16 mm² | 6...35 mm² |
| Bars or lugs | | | L ≤ | 7.7 mm | 10 mm | - | - | - |
| | | | I > | 3.7 mm | 4.2 mm | - | - | - |
| Connection capacity acc. to UL/CSA | | | 1 or 2 x | AWG 18...10 | AWG 12...8 | AWG 8...4 | AWG 8...1 | AWG 6...2/0 |
| Tightening torque | Recommended | | | 1 Nm / 9 lb.in | 1.7 Nm / 15 lb.in | 2.3 Nm / 20 lb.in | 4 Nm / 35 lb.in | 8 Nm / 71 lb.in |
| | Max. | | | 1.2 Nm | 2.2 Nm | 2.6 Nm | 4.5 Nm | 9 Nm |
| Auxiliary conductors<br>(built-in auxiliary terminals + coil terminals) | | | | | | | | |
| Rigid Solid/Stranded | | | 1 x | 1...4 mm² | | | | 0.75...2.5 mm² |
| | | | 2 x | 1...4 mm² | | | | 0.75...2.5 mm² |
| Flexible with ferrule | | | 1 x | 0.75...2.5 mm² | | | 1...2.5 mm² | 0.75...2.5 mm² |
| | | | 2 x | 0.75...2.5 mm² | | | | |
| Lugs | Coil terminals | | L ≤ | 8 mm | | | | |
| | | | I > | 3.7 mm | | | | |
| | Built-in auxiliary terminals | | L ≤ | 7.7 mm | 10 mm | 8 mm | - | - |
| | | | I > | 3.7 mm | 4.2 mm | 3.7 mm | - | - |
| Connection capacity acc. to UL/CSA | | | | AWG 18...14 | | | | |
| Tightening torque | | | | | | | | |
| Coil terminals | Recommended | | | 1 Nm / 9 lb.in | | | | |
| | Max. | | | 1.2 Nm | | | | |
| Built-in auxiliary terminals | Recommended | | | 1 Nm / 9 lb.in | | | | |
| | Max. | | | 1.2 Nm | | | | |
| Degree of protection<br>acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | | | | | |
| Main terminals | | | | IP20 | | | IP10 | |
| Coil terminals | | | | IP20 | | | | |
| Built-in auxiliary terminals | | | | IP20 | | | - | - |
| Screw terminals | | | | Delivered in open position, screws of unused terminals must be tightened | | | | |
| Main terminals | | | | M3.5 | M4 | M5 | M6 | M8 |
| | | Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 | | Flat Ø 6.5 / Pozidriv 2 | | Hexagon socket<br>(s = 4 mm) |
| Coil terminals | | | | M3.5 | | | | |
| | | Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 | | | | |
| Built-in auxiliary terminals | | | | M3.5 | M4 | M3.5 | - | - |
| | | Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 | | | - | - |

Other technical characteristics are the same as those of standard A contactors.

# AF 3-pole contactors for capacitor switching

## Single step - Peak current Î ≤ 30 times the rms curent

The AF116 ... AF1650 3-pole contactors are suited for capacitor bank switching for the peak current and power values in the table below.

The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

In this conditions, electrical durability of contactors is equal to 100 000 operating cycles.

### AF116 ... AF370 3-pole contactors

| Contactor types | | | AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|---|---|---|---|---|---|---|---|---|---|
| AC-6b Utilization category | | | | | | | | | | |
| For air temperature close to contactor | | | | | | | | | | |
| Rated operational power AC-6b | | | | | | | | | | |
| | θ ≤ 40 °C | 230-240 V | 40 kvar | 45 kvar | 50 kvar | 60 kvar | 75 kvar | 85 kvar | 100 kvar | 110 kvar |
| | | 400-415 V | 75 kvar | 85 kvar | 90 kvar | 110 kvar | 130 kvar | 145 kvar | 165 kvar | 200 kvar |
| | | 440 V | 75 kvar | 90 kvar | 93 kvar | 115 kvar | 135 kvar | 155 kvar | 180 kvar | 200 kvar |
| | | 500-550 V | 83 kvar | 95 kvar | 110 kvar | 140 kvar | 160 kvar | 180 kvar | 210 kvar | 240 kvar |
| | | 690 V | 80 kvar | 95 kvar | 110 kvar | 135 kvar | 170 kvar | 200 kvar | 240 kvar | 280 kvar |
| | | 1000 V | - | - | 100 kvar | 140 kvar | 150 kvar | 155 kvar | 160 kvar | 170 kvar |
| | θ ≤ 55 °C | 230-240 V | 40 kvar | 45 kvar | 50 kvar | 60 kvar | 75 kvar | 85 kvar | 100 kvar | 110 kvar |
| | | 400-415 V | 70 kvar | 85 kvar | 90 kvar | 110 kvar | 130 kvar | 145 kvar | 165 kvar | 200 kvar |
| | | 440 V | 75 kvar | 90 kvar | 93 kvar | 115 kvar | 135 kvar | 155 kvar | 180 kvar | 200 kvar |
| | | 500-550 V | 83 kvar | 95 kvar | 110 kvar | 135 kvar | 160 kvar | 180 kvar | 210 kvar | 240 kvar |
| | | 690 V | 80 kvar | 95 kvar | 110 kvar | 135 kvar | 170 kvar | 200 kvar | 240 kvar | 280 kvar |
| | | 1000 V | - | - | 100 kvar | 140 kvar | 150 kvar | 155 kvar | 160 kvar | 170 kvar |
| | θ ≤ 70 °C | 230-240 V | 35 kvar | 40 kvar | 42 kvar | 45 kvar | 57 kvar | 70 kvar | 85 kvar | 100 kvar |
| | | 400-415 V | 65 kvar | 70 kvar | 74 kvar | 83 kvar | 105 kvar | 135 kvar | 155 kvar | 180 kvar |
| | | 440 V | 65 kvar | 75 kvar | 80 kvar | 85 kvar | 110 kvar | 140 kvar | 163 kvar | 180 kvar |
| | | 500-550 V | 78 kvar | 90 kvar | 96 kvar | 102 kvar | 130 kvar | 165 kvar | 196 kvar | 220 kvar |
| | | 690 V | 75 kvar | 90 kvar | 110 kvar | 135 kvar | 160 kvar | 200 kvar | 240 kvar | 260 kvar |
| | | 1000 V | - | - | 95 kvar | 120 kvar | 130 kvar | 140 kvar | 150 kvar | 160 kvar |
| Max. permissible peak current I | | Ue ≤ 500 V | 4 kA | 4 kA | 4 kA | 5 kA | 6.5 kA | 8 kA | 8 kA | 8 kA |



Single-step capacitor bank scheme

### AF400 ... AF1650 3-pole contactors

| Contactor types | | | AF400 | AF460 | AF580 | AF750 | AF1350 | AF1650 |
|---|---|---|---|---|---|---|---|---|
| AC-6b Utilization category | | | | | | | | |
| For air temperature close to contactor | | | | | | | | |
| Rated operational power AC-6b | | | | | | | | |
| | θ ≤ 40 °C | 230-240 V | 120 kvar | 140 kvar | 170 kvar | 220 kvar | 250 kvar | 300 kvar |
| | | 400-415 V | 210 kvar | 240 kvar | 285 kvar | 400 kvar | 450 kvar | 500 kvar |
| | | 440 V | 220 kvar | 260 kvar | 300 kvar | 410 kvar | 500 kvar | 550 kvar |
| | | 500-550 V | 260 kvar | 325 kvar | 350 kvar | 490 kvar | 550 kvar | 600 kvar |
| | | 690 V | 300 kvar | 325 kvar | 440 kvar | 600 kvar | 650 kvar | 800 kvar |
| | | 1000 V | 250 kvar | 300 kvar | 350 kvar | 450 kvar | - | - |
| | θ ≤ 55 °C | 230-240 V | 120 kvar | 140 kvar | 170 kvar | 220 kvar | 250 kvar | 300 kvar |
| | | 400-415 V | 210 kvar | 240 kvar | 285 kvar | 400 kvar | 450 kvar | 500 kvar |
| | | 440 V | 220 kvar | 260 kvar | 300 kvar | 410 kvar | 500 kvar | 550 kvar |
| | | 500-550 V | 260 kvar | 325 kvar | 350 kvar | 480 kvar | 550 kvar | 600 kvar |
| | | 690 V | 300 kvar | 325 kvar | 440 kvar | 600 kvar | 650 kvar | 800 kvar |
| | | 1000 V | 250 kvar | 300 kvar | 350 kvar | 450 kvar | - | - |
| | θ ≤ 70 °C | 230-240 V | 105 kvar | 120 kvar | 160 kvar | 190 kvar | 230 kvar | 280 kvar |
| | | 400-415 V | 195 kvar | 225 kvar | 275 kvar | 370 kvar | 430 kvar | 480 kvar |
| | | 440 V | 200 kvar | 230 kvar | 290 kvar | 380 kvar | 470 kvar | 520 kvar |
| | | 500-550 V | 241 kvar | 300 kvar | 340 kvar | 435 kvar | 530 kvar | 570 kvar |
| | | 690 V | 300 kvar | 325 kvar | 440 kvar | 600 kvar | 630 kvar | 750 kvar |
| | | 1000 V | 220 kvar | 270 kvar | 300 kvar | 400 kvar | - | - |
| Max. permissible peak current I | | Ue ≤ 500 V | 10 kA | 10 kA | 12 kA | 12 kA | 18 kA | 20 kA |



Single-step capacitor bank scheme

# Notes



**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**1SBH137005R1322**

# NF 4-pole and 8-pole contactor relays


**Ordering details 4-pole contactor relays**

**3/**278 NF AC / DC operated
**3/**279 NFZ 24 V DC operated designed for PLC
**3/**280 NFZ AC / DC operated for specific applications
**3/**281 Contactor relays and main accessories

**Ordering details 8-pole contactor relays**

**3/**282 NF AC / DC operated
**3/**283 NFZ 24 V DC operated designed for PLC
**3/**284 NFZ AC / DC operated for specific applications
**3/**285 Contactor relays and main accessories

**3/**286 **Technical data**

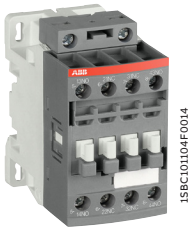
**Ordering details contactor relays with Push-in Spring terminals**

**3/**289 NF..K AC / DC operated
**3/**290 NFZ..K 24 V DC operated designed for PLC
**3/**291 NFZ..K AC / DC operated for specific applications
**3/**292 Contactor relays and main accessories

**3/**293 **Technical data**

# NF 4-pole contactor relays

## AC / DC operated

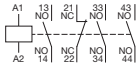



NF22E

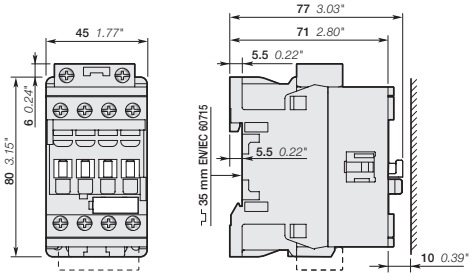
NF contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

- 4 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - reduced panel energy consumption
  - very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| Number of contacts | Rated control circuit voltage Uc min. ... Uc max. | | | Type | Order code | Weight Pkg (1 pce) |
|---|---|---|---|---|---|---|
| | V 50/60 Hz | V DC | | | | kg |
|  | 24...60 | 20...60 | (1) | NF22E-11 | 1SBH137001R1122 | 0.270 |
| | 48...130 | 48...130 | | NF22E-12 | 1SBH137001R1222 | 0.270 |
| | 100...250 | 100...250 | | NF22E-13 | 1SBH137001R1322 | 0.270 |
| | 250...500 | 250...500 | | NF22E-14 | 1SBH137001R1422 | 0.310 |
|  | 24...60 | 20...60 | (1) | NF31E-11 | 1SBH137001R1131 | 0.270 |
| | 48...130 | 48...130 | | NF31E-12 | 1SBH137001R1231 | 0.270 |
| | 100...250 | 100...250 | | NF31E-13 | 1SBH137001R1331 | 0.270 |
| | 250...500 | 250...500 | | NF31E-14 | 1SBH137001R1431 | 0.310 |
|  | 24...60 | 20...60 | (1) | NF40E-11 | 1SBH137001R1140 | 0.270 |
| | 48...130 | 48...130 | | NF40E-12 | 1SBH137001R1240 | 0.270 |
| | 100...250 | 100...250 | | NF40E-13 | 1SBH137001R1340 | 0.270 |
| | 250...500 | 250...500 | | NF40E-14 | 1SBH137001R1440 | 0.310 |

(1) NF..-11 not suitable for direct control by PLC-output.

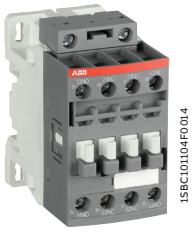



NF22E, NF31E, NF40E

Main dimensions mm, inches

# NFZ 4-pole contactor relays

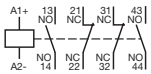
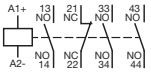
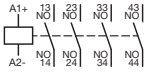
## 24 V DC operated designed for PLC



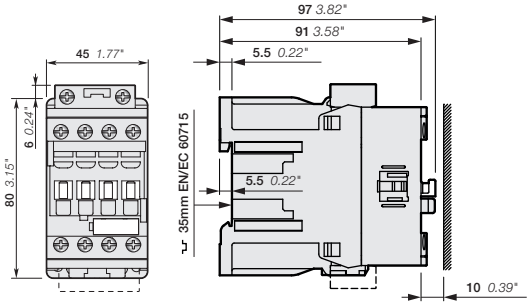

NFZ22E-30

NFZ contactor relays are used for switching auxiliary and control circuits. These contactor relays are of the block type design with:

- 4 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: 24 V DC operated with electronic coil interface allowing low holding consumption up to 1.7 W and reduced panel energy consumption
  - allow direct control by PLC-output ≥ 250 mA 24 V DC
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| Number of contacts | Rated control circuit voltage Uc<br>V DC | Type | Order code | Weight<br>Pkg (1 pce)<br>kg |
|---|---|---|---|---|
| **4-pole contactor relays** | | | | |
|  | 24 | NFZ22E-30 | 1SBH136001R3022 | 0.430 |
|  | 24 | NFZ31E-30 | 1SBH136001R3031 | 0.430 |
|  | 24 | NFZ40E-30 | 1SBH136001R3040 | 0.430 |

Note: NFZ contactor relays with DC control voltage 24 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

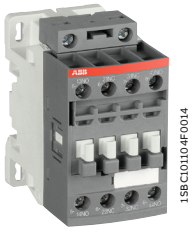



NFZ22E, NFZ31E, NFZ40E

Main dimensions mm, inches

# NFZ 4-pole contactor relays

## AC / DC operated for specific applications

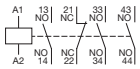



NFZ22E

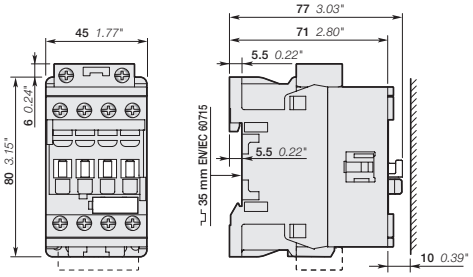
NFZ contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

- 4 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - allow direct control by PLC-output ≥ 24 V DC 500 mA
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| Number of contacts | Rated control circuit voltage Uc min. ... Uc max. | | Type | Order code | Weight Pkg (1 pce) |
|---|---|---|---|---|---|
| | V 50/60 Hz | V DC | | | kg |
|  | – | 12...20 | NFZ22E-20 | 1SBH136001R2022 | 0.310 |
| | 24...60 | 20...60 | NFZ22E-21 | 1SBH136001R2122 | 0.310 |
| | 48...130 | 48...130 | NFZ22E-22 | 1SBH136001R2222 | 0.310 |
| | 100...250 | 100...250 | NFZ22E-23 | 1SBH136001R2322 | 0.310 |
|  | – | 12...20 | NFZ31E-20 | 1SBH136001R2031 | 0.310 |
| | 24...60 | 20...60 | NFZ31E-21 | 1SBH136001R2131 | 0.310 |
| | 48...130 | 48...130 | NFZ31E-22 | 1SBH136001R2231 | 0.310 |
| | 100...250 | 100...250 | NFZ31E-23 | 1SBH136001R2331 | 0.310 |
|  | – | 12...20 | NFZ40E-20 | 1SBH136001R2040 | 0.310 |
| | 24...60 | 20...60 | NFZ40E-21 | 1SBH136001R2140 | 0.310 |
| | 48...130 | 48...130 | NFZ40E-22 | 1SBH136001R2240 | 0.310 |
| | 100...250 | 100...250 | NFZ40E-23 | 1SBH136001R2340 | 0.310 |

Note: Only NFZ contactor relays with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

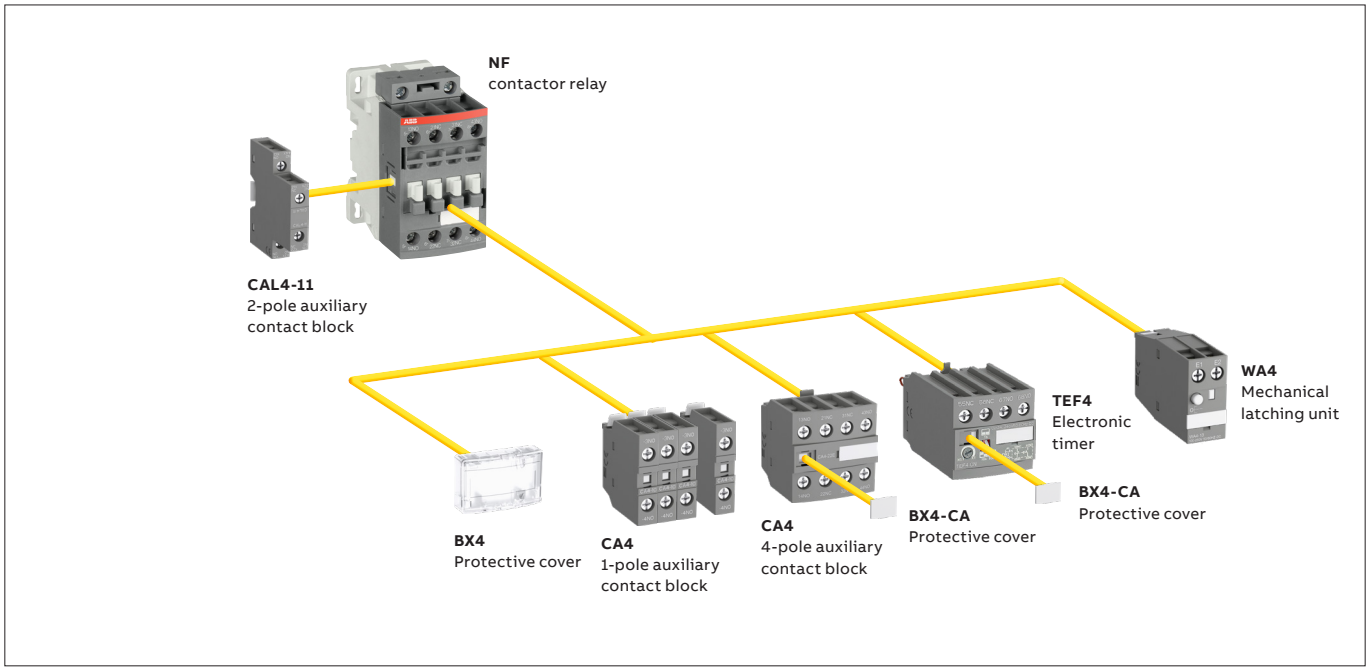



NFZ22E, NFZ31E, NFZ40E

Main dimensions mm, inches

# NF 4-pole contactor relays

## Contactor relays and main accessories




**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor relay types | Main poles | | Front-mounted accessories | | | | | Side-mounted accessories | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Auxiliary contact blocks | | Electronic timer | Mechanical latching unit | | Auxiliary contact blocks | |
| | | | | | | | | 2-pole CAL4-11 | |
| | | | 1-pole CA4 | 4-pole CA4 | TEF4 | WA4 (3) | | Left side | Right side |
| **NF(Z)** | | | | | | | | | |
| NF | 2 2 | E (1) | 4 max. | **or** 1 | **or** 1 | **or** 1 | + | 1 | – |
| | 3 1 | E (1) | 2 max. | – | **or** 1 | **or** 1 | + | 1 | + 1 |
| | 4 0 | E (2) | | | | | | | |
| **NFZ 24 V DC designed for PLC - coil 30** | | | | | | | | | |
| NFZ | 2 2 | E (1) | 4 max. | **or** 1 | **or** 1 | – | **or** | 1 | + 1 |
| | 3 1 | E (1) | 2 max. | – | **or** 1 | – | + | 1 | – |
| | 4 0 | E (2) | – | – | 1 | – | + | 1 | + 1 |

(1) Including add-on contacts: 3 N.C. auxiliary contacts max. on positions 1, 2, 3, 4 and 2 N.C. max. on positions 1 ±30°, 5.
(2) Including add-on contacts: 4 N.C. auxiliary contacts max. on positions 1, 2, 3, 4 and 3 N.C. max. on positions 1 ±30°, 5.
(3) Accept 1-pole CA4 auxiliary contacts (1 block on each side of the mechanical latch) in respect to the total number of additional N.C. auxiliary contacts.
For WA4, accessory use with contactor relays coil 30, please consult your ABB local sales organization.

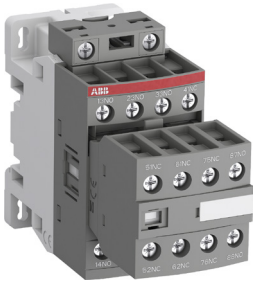
# NF 8-pole contactor relays

## AC / DC operated

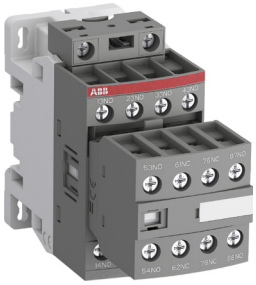





NF44E




NF33/11

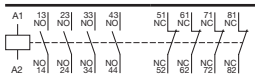
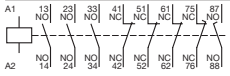



NF51/11

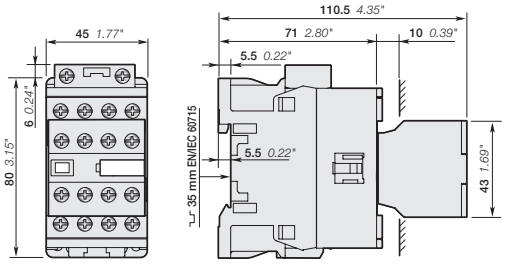
NF contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

- 8 poles with a permanently fixed 4-pole auxiliary contact block. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol) except for NF33/11 and NF51/11 variants
- overlapping of lagging / leading contacts for NF33/11 and NF51/11 variants
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
  - reduced panel energy consumption
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| Number of contacts 1st stack | 2nd stack | Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz | V DC | Type | Order code | Weight Pkg (1 pce) kg |
|---|---|---|---|---|---|---|
| **8-pole contactor relays** | | | | | | |
|  | | 24...60 | 20...60 (1) | NF44E-11 | 1SBH137001R1144 | 0.320 |
| | | 48...130 | 48...130 | NF44E-12 | 1SBH137001R1244 | 0.320 |
| | | 100...250 | 100...250 | NF44E-13 | 1SBH137001R1344 | 0.320 |
| | | 250...500 | 250...500 | NF44E-14 | 1SBH137001R1444 | 0.360 |
|  | | 24...60 | 20...60 (1) | NF53E-11 | 1SBH137001R1153 | 0.320 |
| | | 48...130 | 48...130 | NF53E-12 | 1SBH137001R1253 | 0.320 |
| | | 100...250 | 100...250 | NF53E-13 | 1SBH137001R1353 | 0.320 |
| | | 250...500 | 250...500 | NF53E-14 | 1SBH137001R1453 | 0.360 |
|  | | 24...60 | 20...60 (1) | NF62E-11 | 1SBH137001R1162 | 0.320 |
| | | 48...130 | 48...130 | NF62E-12 | 1SBH137001R1262 | 0.320 |
| | | 100...250 | 100...250 | NF62E-13 | 1SBH137001R1362 | 0.320 |
| | | 250...500 | 250...500 | NF62E-14 | 1SBH137001R1462 | 0.360 |
|  | | 24...60 | 20...60 (1) | NF71E-11 | 1SBH137001R1171 | 0.320 |
| | | 48...130 | 48...130 | NF71E-12 | 1SBH137001R1271 | 0.320 |
| | | 100...250 | 100...250 | NF71E-13 | 1SBH137001R1371 | 0.320 |
| | | 250...500 | 250...500 | NF71E-14 | 1SBH137001R1471 | 0.360 |
|  | | 24...60 | 20...60 (1) | NF80E-11 | 1SBH137001R1180 | 0.320 |
| | | 48...130 | 48...130 | NF80E-12 | 1SBH137001R1280 | 0.320 |
| | | 100...250 | 100...250 | NF80E-13 | 1SBH137001R1380 | 0.320 |
| | | 250...500 | 250...500 | NF80E-14 | 1SBH137001R1480 | 0.360 |
| **8-pole contactor relays with overlapping of lagging / leading contacts** | | | | | | |
|  | | 24...60 | 20...60 (1) | NF33/11-11 | 1SBH137001R1139 | 0.320 |
| | | 48...130 | 48...130 | NF33/11-12 | 1SBH137001R1239 | 0.320 |
| | | 100...250 | 100...250 | NF33/11-13 | 1SBH137001R1339 | 0.320 |
| | | 250...500 | 250...500 | NF33/11-14 | 1SBH137001R1439 | 0.320 |
|  | | 24...60 | 20...60 (1) | NF51/11-11 | 1SBH137001R1159 | 0.320 |
| | | 48...130 | 48...130 | NF51/11-12 | 1SBH137001R1259 | 0.320 |
| | | 100...250 | 100...250 | NF51/11-13 | 1SBH137001R1359 | 0.320 |
| | | 250...500 | 250...500 | NF51/11-14 | 1SBH137001R1459 | 0.320 |

(1) NF..-11 not suitable for direct control by PLC.




NF44E, NF53E, NF62E, NF71E, NF80E, NF33/11, NF51/11

Main dimensions mm, inches

# NFZ 8-pole contactor relays

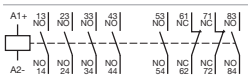
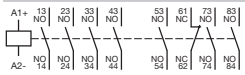
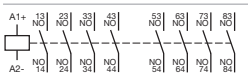
## 24 V DC operated designed for PLC



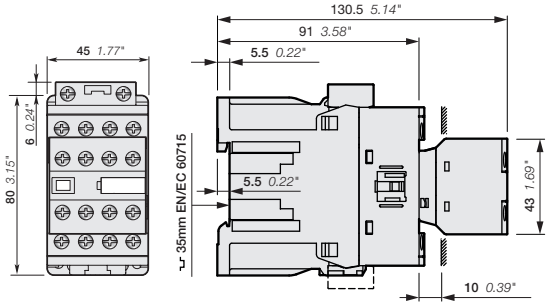

NFZ44E

NFZ contactor relays are used for switching auxiliary and control circuits. These contactor relays are of the block type design with:

- 8 poles with a permanently fixed 4-pole auxiliary contact block. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: 24 V DC operated with electronic coil interface allowing low holding consumption up to 1.7 W and reduced panel energy consumption
  - allow direct control by PLC-output ≥ 250 mA 24 V DC
  - very distinct closing and opening
- built-in surge suppression.

| Number of contacts | Rated control circuit voltage Uc<br>V DC | Type | Order code | Weight Pkg (1 pce)<br>kg |
|---|---|---|---|---|
| **8-pole contactor relays** | | | | |
|  | 24 | NFZ44E-30 | 1SBH136001R3044 | 0.490 |
|  | 24 | NFZ53E-30 | 1SBH136001R3053 | 0.490 |
|  | 24 | NFZ62E-30 | 1SBH136001R3062 | 0.490 |
|  | 24 | NFZ71E-30 | 1SBH136001R3071 | 0.490 |
|  | 24 | NFZ80E-30 | 1SBH136001R3080 | 0.490 |

Note: NFZ contactor relays with DC control voltage 24 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.




NFZ44E, NFZ53E, NFZ62E, NFZ71E, NFZ80E

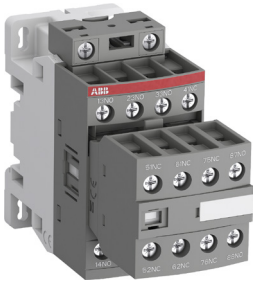
Main dimensions mm, inches

# NFZ 8-pole contactor relays

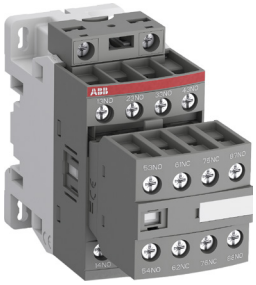
## AC / DC operated for specific applications




NFZ44E




NFZ33/11

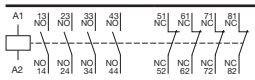
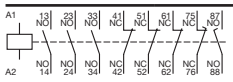
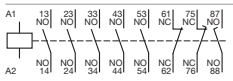



NFZ51/11

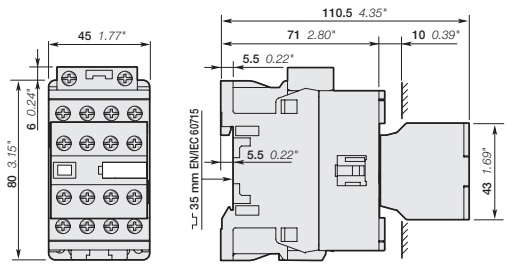
NFZ contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

- 8 poles with a permanently fixed 4-pole auxiliary contact block. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol) except for NFZ33/11 and NFZ51/11 variants
- overlapping of lagging / leading contacts for NFZ33/11 and NFZ51/11 variants
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 coils to cover control voltages between 24 ... 250 V 50/60 Hz and 12 ... 250 V DC
  - allow direct control by PLC-output ≥ 24 V DC 500 mA
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| Number of contacts 1st stack | 2nd stack | Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz | V DC | Type | Order code | Weight Pkg (1 pce) kg |
|---|---|---|---|---|---|---|
| **8-pole contactor relays** | | | | | | |
|  | | - | 12...20 | NFZ44E-20 | 1SBH136001R2044 | 0.360 |
| | | 24...60 | 20...60 | NFZ44E-21 | 1SBH136001R2144 | 0.360 |
| | | 48...130 | 48...130 | NFZ44E-22 | 1SBH136001R2244 | 0.360 |
| | | 100...250 | 100...250 | NFZ44E-23 | 1SBH136001R2344 | 0.360 |
|  | | - | 12...20 | NFZ53E-20 | 1SBH136001R2053 | 0.360 |
| | | 24...60 | 20...60 | NFZ53E-21 | 1SBH136001R2153 | 0.360 |
| | | 48...130 | 48...130 | NFZ53E-22 | 1SBH136001R2253 | 0.360 |
| | | 100...250 | 100...250 | NFZ53E-23 | 1SBH136001R2353 | 0.360 |
|  | | - | 12...20 | NFZ62E-20 | 1SBH136001R2062 | 0.360 |
| | | 24...60 | 20...60 | NFZ62E-21 | 1SBH136001R2162 | 0.360 |
| | | 48...130 | 48...130 | NFZ62E-22 | 1SBH136001R2262 | 0.360 |
| | | 100...250 | 100...250 | NFZ62E-23 | 1SBH136001R2362 | 0.360 |
|  | | - | 12...20 | NFZ71E-20 | 1SBH136001R2071 | 0.360 |
| | | 24...60 | 20...60 | NFZ71E-21 | 1SBH136001R2171 | 0.360 |
| | | 48...130 | 48...130 | NFZ71E-22 | 1SBH136001R2271 | 0.360 |
| | | 100...250 | 100...250 | NFZ71E-23 | 1SBH136001R2371 | 0.360 |
|  | | - | 12...20 | NFZ80E-20 | 1SBH136001R2080 | 0.360 |
| | | 24...60 | 20...60 | NFZ80E-21 | 1SBH136001R2180 | 0.360 |
| | | 48...130 | 48...130 | NFZ80E-22 | 1SBH136001R2280 | 0.360 |
| | | 100...250 | 100...250 | NFZ80E-23 | 1SBH136001R2380 | 0.360 |
| **8-pole contactor relays with overlapping of lagging / leading contacts** | | | | | | |
|  | | - | 12...20 | NFZ33/11-20 | 1SBH136001R2039 | 0.360 |
| | | 24...60 | 20...60 | NFZ33/11-21 | 1SBH136001R2139 | 0.360 |
| | | 48...130 | 48...130 | NFZ33/11-22 | 1SBH136001R2239 | 0.360 |
| | | 100...250 | 100...250 | NFZ33/11-23 | 1SBH136001R2339 | 0.360 |
|  | | - | 12...20 | NFZ51/11-20 | 1SBH136001R2059 | 0.360 |
| | | 24...60 | 20...60 | NFZ51/11-21 | 1SBH136001R2159 | 0.360 |
| | | 48...130 | 48...130 | NFZ51/11-22 | 1SBH136001R2259 | 0.360 |
| | | 100...250 | 100...250 | NFZ51/11-23 | 1SBH136001R2359 | 0.360 |

Note: Only NFZ contactor relays with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole

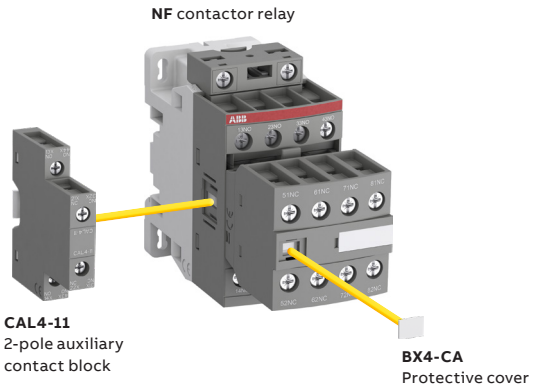



NFZ44E, NFZ53E, NFZ62E, NFZ71E, NFZ80E, NFZ33/11, NFZ51/11

Main dimensions mm, inches

# NF 8-pole contactor relays

## Contactor relays and main accessories




**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

| Contactor relay types | Main poles | | | | Side-mounted accessories Auxiliary contact blocks 2-pole CAL4-11 (1) | |
|---|---|---|---|---|---|---|
| | | | | | Left side | Right side |
| NF | 4 | 4 | E | | 1 | – |
| | 5 | 3 | E | | | |
| | 6 | 2 | E | | | |
| | 7 | 1 | E | | | |
| | 8 | 0 | E | | | |
| | 3 | 3 | / | 1 1 | | |
| | 5 | 1 | / | 1 1 | | |

(1) not allowed for 24 V DC operated contactor relay (coil 30).

# NF contactor relays
## Technical data



### Contact utilization characteristics according to IEC

| Contactor relay types | AC / DC operated | **NF** |
|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-5-1 |
| Rated operational voltage Ue max. | | 690 V |
| Rated frequency (without derating) | | 50 / 60 Hz |
| Conventional free-air thermal current Ith θ ≤ 40 °C | | 16 A |
| Ie / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A |
| | 220-240 V 50/60 Hz | 4 A |
| | 400-440 V 50/60 Hz | 3 A |
| | 500 V 50/60 Hz | 2 A |
| | 690 V 50/60 Hz | 2 A |
| Rated making capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 |
| Rated breaking capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 |
| Ie / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W |
| | 48 V DC | 2.8 A / 134 W |
| | 72 V DC | 1 A / 72 W |
| | 110 V DC | 0.55 A / 60 W |
| | 125 V DC | 0.55 A / 69 W |
| | 220 V DC | 0.27 A / 60 W |
| | 250 V DC | 0.27 A / 68 W |
| | 400 V DC | 0.15 A / 60 W |
| | 500 V DC | 0.13 A / 65 W |
| | 600 V DC | 0.1 A / 60 W |
| Short-circuit protection device gG type fuse | | 10 A |
| Conditional short-circuit current | | 1 kA |
| Rated short-time withstand current Icw | for 1.0 s | 100 A |
| | for 0.1 s | 140 A |
| Minimum switching capacity | | 12 V / 3 mA |
| with failure rate acc. to IEC 60947-5-4 | | $10^{-7}$ |
| Non-overlapping time between N.O. and N.C. contacts | | ≥ 2 ms |
| Power dissipation per pole at 6 A | | 0.1 W |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h |
| | DC-13 | 900 cycles/h |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA4, CAL4 aux. contact blocks) are mechanically linked contacts. |

### Contact utilization characteristics according to UL / CSA

| Contactor relay types | AC / DC operated | **NF** |
|---|---|---|
| Standards | | UL 508, CSA C22.2 No. 14-13 |
| Max. operational voltage | | 600 V AC, 600 V DC |
| Pilot duty | | A600, Q600 |
| AC thermal rated current | | 10 A |
| AC maximum volt-ampere making | | 7200 VA |
| AC maximum volt-ampere breaking | | 720 VA |
| DC thermal rated current | | 2.5 A |
| DC maximum volt-ampere making-breaking | | 69 VA |

# NF contactor relays
## Technical data



### Magnet System Characteristics - NF contactor relays AC / DC operated

| | | |
|---|---|---|
| Contactor relay types | AC / DC operated | **NF** |
| Coil operating limits acc. to IEC 60947-5-1 | AC supply | At θ ≤ 60 °C 0.85 x Uc min...1.1 x Uc max.<br>At θ ≤ 70 °C 0.85 x Uc min...Uc max. |
| | DC supply | At θ ≤ 60 °C 0.85 x Uc min ... 1.1 x Uc max<br>At θ ≤ 70 °C 0.85 x Uc min ... Uc max |
| AC control voltage 50/60 Hz | | |
| Rated control circuit voltage Uc | | 24...500 V AC |
| Coil consumption | Average pull-in value | 50 VA |
| | Average holding value | 2.2 VA / 2 W |
| DC control voltage | | |
| Rated control circuit voltage Uc | | 20...500 V DC |
| Coil consumption | Average pull-in value | 50 W |
| | Average holding value | 2 W |
| PLC-output control | | Not suitable for direct control by PLC-output |
| Drop-out voltage | | ≤ 60 % of Uc min. |
| Voltage sag immunity acc. to SEMI F47-0706 | | – |
| Dips withstand -20 °C ≤ θ ≤ +60 °C | | – |
| Operating time | | |
| Between coil energization and: | N.O. contact closing | 40...95 ms |
| | N.C. contact opening | 38...90 ms |
| Between coil de-energization and: | N.O. contact opening | 11...95 ms |
| | N.C. contact closing | 13...98 ms |

### Magnet System Characteristics - NFZ contactor relays 24V DC operated - designed for PLC - coil 30

| | | |
|---|---|---|
| Contactor relay types | DC operated | **NFZ** |
| Coil operating limits acc. to IEC 60947-5-1 | DC supply | At θ ≤ 60 °C 0.85 ... 1.1x Uc<br>At θ ≤ 70 °C Uc |
| DC control voltage | | |
| Rated control circuit voltage Uc | | 24 V DC |
| Coil consumption | Average pull-in value | 6 W |
| | Average holding value | 1.7 W |
| PLC-output control | | ≥ 250 mA 24 V DC for PLCs and safety PLCs using broken wire detection |
| Drop-out voltage | | ≤ 60 % of Uc min. |
| Operating time | | |
| Between coil energization and: | N.O. contact closing | 27 ... 53 ms |
| | N.C. contact opening | 20 ... 35 ms |
| Between coil de-energization and: | N.O. contact opening | 17 ... 29 ms |
| | N.C. contact closing | 22 ... 57 ms |

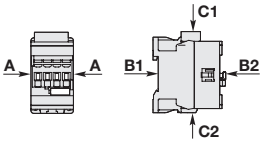
### Magnet System Characteristics - NFZ... contactor relays - for specific applications - coils 20, 21, 22, 23

| | | |
|---|---|---|
| Contactor relay types | AC / DC operated | **NFZ** |
| Coil operating limits acc. to IEC 60947-5-1 | AC supply | At θ ≤ 60 °C 0.85 x Uc min ... 1.1 x Uc max<br>At θ ≤ 70 °C 0.85 x Uc min ... Uc max |
| | DC supply | At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max |
| AC control voltage 50/60 Hz | | |
| Rated control circuit voltage Uc | | 24...250 V AC |
| Coil consumption | Average pull-in value | 16 VA |
| | Average holding value | 1.7 VA / 1.5 W |
| DC control voltage | | |
| Rated control circuit voltage Uc | | 12...250 V DC |
| Coil consumption | Average pull-in value | 12 ... 16 W |
| | Average holding value | 1.7 W |
| PLC-output control | | (NFZ coil 21) ≥ 500 mA 24 V DC for PLCs - Not suitable for safety PLCs |
| Drop-out voltage | | ≤ 60 % of Uc min. |
| Voltage sag immunity acc. to SEMI F47-0706 | | Conditions of use on request |
| Dips withstand -20 °C ≤ θ ≤ +60 °C | | (NFZ coil 21, 22, 23) 20 ms average for Uc ≥ 24 V 50/60 Hz or Uc ≥ 20 V DC |
| Operating time | | |
| Between coil energization and: | N.O. contact closing | 40...95 ms |
| | N.C. contact opening | 38...90 ms |
| Between coil de-energization and: | N.O. contact opening | 11...95 ms |
| | N.C. contact closing | 13...98 ms |

# NF contactor relays
## Technical data

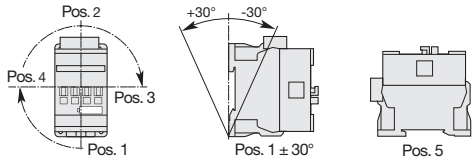


### General technical data

| Contactor relay types | AC / DC operated | **NF** |
|---|---|---|
| Rated insulation voltage Ui | | |
| acc. to IEC 60947-5-1 | | 690 V |
| acc. to UL / CSA | | 600 V |
| Rated impulse withstand voltage Uimp. | | 6 kV |
| Electromagnetic compatibility | | Devices complying with IEC/EN 60947-1 - Environment A and B (1) |
| Pollution degree | | 3 |
| Ambient air temperature close to contactor relay | | |
| Operation in free air | | -40...+70 °C |
| Storage | | -60...+80 °C |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q |
| Maximum operating altitude (without derating) | | 3000 m |
| Mechanical durability | | |
| Number of operating cycles | | 20 millions operating cycles |
| Max. switching frequency | | 6000 cycles/h |
| Shock withstand<br>acc. to IEC/EN 60068-2-27<br>Mounting position 1 | | |
|  | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position |
| | A | 30 g |
| | B1 | 25 g closed position / 5 g open position |
| | B2 | 15 g |
| | C1 | 25 g |
| | C2 | 25 g |
| Vibration withstand<br>acc. to IEC 60068-2-6 | | 5...300 Hz<br>4 g closed position / 2 g open position |

(1) Environment B: all NF contactor relays produced since week 08-2013.
NF..E-12 (48...130 V 50/60 Hz-DC) compliant to environment A only: for environment B, select NFZ..E-22.

### Mounting characteristics

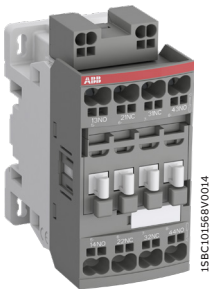
| Contactor relay types | AC / DC operated | **NF** |
|---|---|---|
| Mounting positions | |  |
| | | Max. add-on N.C. auxiliary contacts:<br>see accessory fitting details for a NF contactor relay |
| Mounting distances | | The contactor relays can be assembled side by side. |
| Fixing | | |
| On rail according to IEC/EN 60715 | | 35 x 7.5 mm or 35 x 15 mm |
| By screws (not supplied) | | 2 x M4 screws placed diagonally |

### Connecting characteristics

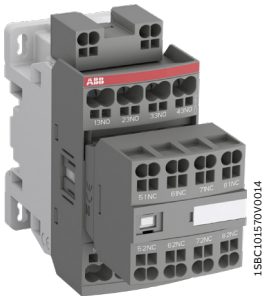
| Contactor relay types | AC / DC operated | **NF** |
|---|---|---|
| Main terminals | | <br>Screw terminals with cable clamp |
| Connection capacity (min. ... max.) | | |
| Pole and coil terminals | | |
| Rigid Solid/Stranded | 1 x | 1...2.5 mm² |
| | 2 x | 1...2.5 mm² |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² |
| | 2 x | 0.75...2.5 mm² |
| Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² |
| | 2 x | 0.75...1.5 mm² |
| Lugs | L < | 8 mm |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 18...14 |
| Stripping length | | 10 mm |
| Tightening torque | | |
| Pole terminals | | 1.2 Nm / 11 lb.in |
| Coil terminals | | 1.2 Nm / 11 lb.in |
| Degree of protection<br>acc. to IEC/EN 60947-1 and IEC/EN 60529 | | |
| All terminals | | IP20 |
| Screw terminals | | Delivered in open position, screws of unused terminals must be tightened |
| All terminals | | M3.5 |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 |

# NF..K contactor relays - with Push-in Spring terminals

## AC / DC operated



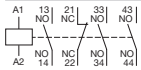
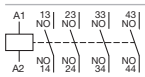
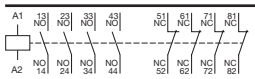
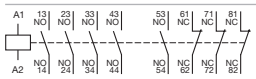
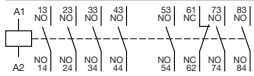
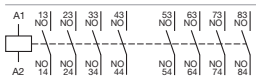

NF22EK



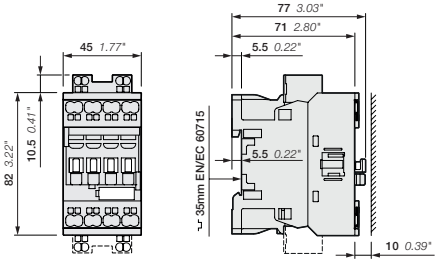

NF44EK

NF..K contactor relays are used for switching auxiliary and control circuits.
These contactor relays are of the block type design with:

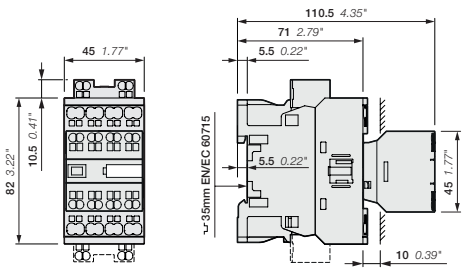
- 4 poles and 8 poles with a permanently fixed 4-pole auxiliary contact block.
  Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
  - reduced panel energy consumption
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| Number of contacts | Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz | V DC | Type | Order code | Weight Pkg (1 pce) kg |
|---|---|---|---|---|---|
| **4-pole contactor relays** | | | | | |
|  | 24 ... 60 | 20 ... 60 (1) | NF22EK-11 | 1SBH137005R1122 | 0.285 |
| | 48 ... 130 | 48 ... 130 | NF22EK-12 | 1SBH137005R1222 | 0.285 |
| | 100 ... 250 | 100 ... 250 | NF22EK-13 | 1SBH137005R1322 | 0.285 |
| | 250 ... 500 | 250 ... 500 | NF22EK-14 | 1SBH137005R1422 | 0.325 |
|  | 24 ... 60 | 20 ... 60 (1) | NF31EK-11 | 1SBH137005R1131 | 0.285 |
| | 48 ... 130 | 48 ... 130 | NF31EK-12 | 1SBH137005R1231 | 0.285 |
| | 100 ... 250 | 100 ... 250 | NF31EK-13 | 1SBH137005R1331 | 0.285 |
| | 250 ... 500 | 250 ... 500 | NF31EK-14 | 1SBH137005R1431 | 0.325 |
|  | 24 ... 60 | 20 ... 60 (1) | NF40EK-11 | 1SBH137005R1140 | 0.285 |
| | 48 ... 130 | 48 ... 130 | NF40EK-12 | 1SBH137005R1240 | 0.285 |
| | 100 ... 250 | 100 ... 250 | NF40EK-13 | 1SBH137005R1340 | 0.285 |
| | 250 ... 500 | 250 ... 500 | NF40EK-14 | 1SBH137005R1440 | 0.325 |
| **8-pole contactor relays** | | | | | |
|  | 24 ... 60 | 20 ... 60 (1) | NF44EK-11 | 1SBH137005R1144 | 0.330 |
| | 48 ... 130 | 48 ... 130 | NF44EK-12 | 1SBH137005R1244 | 0.330 |
| | 100 ... 250 | 100 ... 250 | NF44EK-13 | 1SBH137005R1344 | 0.330 |
| | 250 ... 500 | 250 ... 500 | NF44EK-14 | 1SBH137005R1444 | 0.370 |
|  | 24 ... 60 | 20 ... 60 (1) | NF53EK-11 | 1SBH137005R1153 | 0.330 |
| | 48 ... 130 | 48 ... 130 | NF53EK-12 | 1SBH137005R1253 | 0.330 |
| | 100 ... 250 | 100 ... 250 | NF53EK-13 | 1SBH137005R1353 | 0.330 |
| | 250 ... 500 | 250 ... 500 | NF53EK-14 | 1SBH137005R1453 | 0.370 |
|  | 24 ... 60 | 20 ... 60 (1) | NF62EK-11 | 1SBH137005R1162 | 0.330 |
| | 48 ... 130 | 48 ... 130 | NF62EK-12 | 1SBH137005R1262 | 0.330 |
| | 100 ... 250 | 100 ... 250 | NF62EK-13 | 1SBH137005R1362 | 0.330 |
| | 250 ... 500 | 250 ... 500 | NF62EK-14 | 1SBH137005R1462 | 0.370 |
|  | 24 ... 60 | 20 ... 60 (1) | NF71EK-11 | 1SBH137005R1171 | 0.330 |
| | 48 ... 130 | 48 ... 130 | NF71EK-12 | 1SBH137005R1271 | 0.330 |
| | 100 ... 250 | 100 ... 250 | NF71EK-13 | 1SBH137005R1371 | 0.330 |
| | 250 ... 500 | 250 ... 500 | NF71EK-14 | 1SBH137005R1471 | 0.370 |
|  | 24 ... 60 | 20 ... 60 (1) | NF80EK-11 | 1SBH137005R1180 | 0.330 |
| | 48 ... 130 | 48 ... 130 | NF80EK-12 | 1SBH137005R1280 | 0.330 |
| | 100 ... 250 | 100 ... 250 | NF80EK-13 | 1SBH137005R1380 | 0.330 |
| | 250 ... 500 | 250 ... 500 | NF80EK-14 | 1SBH137005R1480 | 0.370 |

(1) NF..K-11 not suitable for direct control by PLC-output.




NF22EK, NF31EK, NF40EK




NF44EK, NF53EK, NF62EK, NF71EK, NF80EK

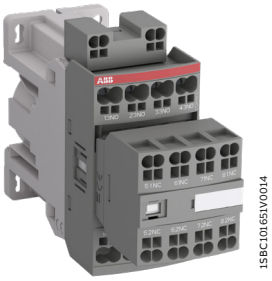
Main dimensions mm, inches

# NFZ..K contactor relays - with Push-in Spring terminals

## 24 V DC operated designed for PLC




NFZ22EK-30

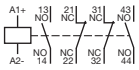
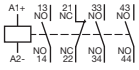
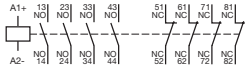
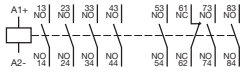
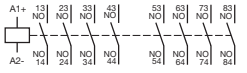



NFZ44EK-30

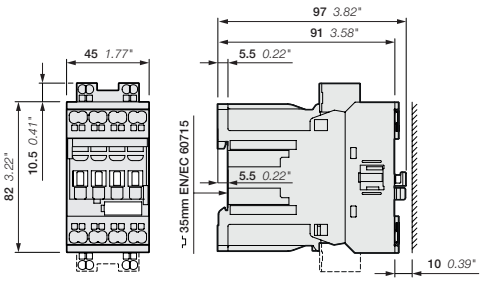
NFZ contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with 4 poles or 8 poles (with a permanently fixed 4-pole auxiliary contact block).

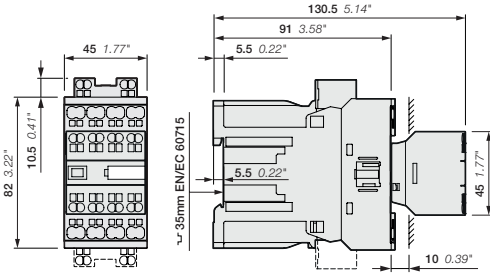
- contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: 24 V DC operated with electronic coil interface allowing low holding consumption up to 1.7 W and reduced panel energy consumption
  - allow direct control by PLC-output ≥ 250 mA 24 V DC
  - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| Number of contacts | Rated control circuit voltage Uc min. ... Uc max. V DC | Type | Order code | Weight Pkg (1 pce) kg |
|---|---|---|---|---|
| **4-pole contactor relays** | | | | |
|  | 24 | NFZ22EK-30 | 1SBH136005R3022 | 0.435 |
|  | 24 | NFZ31EK-30 | 1SBH136005R3031 | 0.435 |
|  | 24 | NFZ40EK-30 | 1SBH136005R3040 | 0.435 |
| **8-pole contactor relays** | | | | |
|  | 24 | NFZ44EK-30 | 1SBH136005R3044 | 0.490 |
|  | 24 | NFZ53EK-30 | 1SBH136005R3053 | 0.490 |
|  | 24 | NFZ62EK-30 | 1SBH136005R3062 | 0.490 |
|  | 24 | NFZ71EK-30 | 1SBH136005R3071 | 0.490 |
|  | 24 | NFZ80EK-30 | 1SBH136005R3080 | 0.490 |

Note: NFZ contactor relays with 24 V DC control voltage need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.
For product availability, please consult your ABB local sales organization.




NFZ22EK, NFZ31EK, NFZ40EK

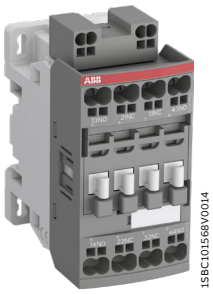



NFZ44EK, NFZ53EK, NFZ62EK, NFZ71EK, NFZ80EK

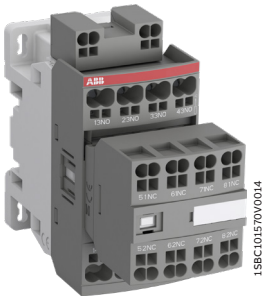
Main dimensions mm, inches

# NFZ..K contactor relays - with Push-in Spring terminals

## AC / DC operated for specific applications



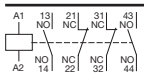
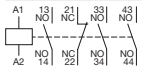
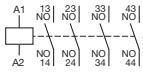
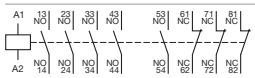

NFZ22EK



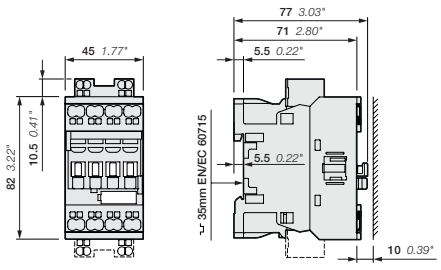

NFZ44EK

NFZ..K contactor relays are used for switching auxiliary and control circuits.
These contactor relays are of the block type design with:

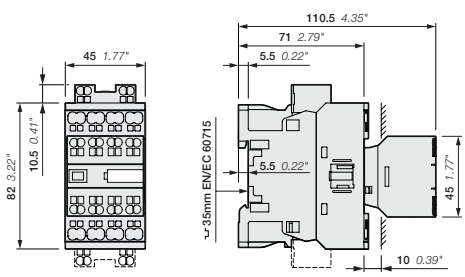
- 4 poles and 8 poles with a permanently fixed 4-pole auxiliary contact block.
  Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
  - can manage large control voltage variations
  - only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
  - allow direct control by PLC-output ≥ 24 V DC 500 mA
  - reduced panel energy consumption
  - very distinct closing and opening
  - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| Number of contacts | Rated control circuit voltage Uc min. ... Uc max. V 50/60 Hz | V DC | Type | Order code | Weight Pkg (1 pce) kg |
|---|---|---|---|---|---|
| **4-pole contactor relays** | | | | | |
|  | – | 12 ... 20 | NFZ22EK-20 | 1SBH136005R2022 | 0.315 |
| | 24 ... 60 | 20 ... 60 | NFZ22EK-21 | 1SBH136005R2122 | 0.315 |
| | 48 ... 130 | 48 ... 130 | NFZ22EK-22 | 1SBH136005R2222 | 0.315 |
| | 100 ... 250 | 100 ... 250 | NFZ22EK-23 | 1SBH136005R2322 | 0.315 |
|  | – | 12 ... 20 | NFZ31EK-20 | 1SBH136005R2031 | 0.315 |
| | 24 ... 60 | 20 ... 60 | NFZ31EK-21 | 1SBH136005R2131 | 0.315 |
| | 48 ... 130 | 48 ... 130 | NFZ31EK-22 | 1SBH136005R2231 | 0.315 |
| | 100 ... 250 | 100 ... 250 | NFZ31EK-23 | 1SBH136005R2331 | 0.315 |
|  | – | 12 ... 20 | NFZ40EK-20 | 1SBH136005R2040 | 0.315 |
| | 24 ... 60 | 20 ... 60 | NFZ40EK-21 | 1SBH136005R2140 | 0.315 |
| | 48 ... 130 | 48 ... 130 | NFZ40EK-22 | 1SBH136005R2240 | 0.315 |
| | 100 ... 250 | 100 ... 250 | NFZ40EK-23 | 1SBH136005R2340 | 0.315 |
| **8-pole contactor relays** | | | | | |
|  | – | 12 ... 20 | NFZ44EK-20 | 1SBH136005R2044 | 0.360 |
| | 24 ... 60 | 20 ... 60 | NFZ44EK-21 | 1SBH136005R2144 | 0.360 |
| | 48 ... 130 | 48 ... 130 | NFZ44EK-22 | 1SBH136005R2244 | 0.360 |
| | 100 ... 250 | 100 ... 250 | NFZ44EK-23 | 1SBH136005R2344 | 0.360 |
|  | – | 12 ... 20 | NFZ53EK-20 | 1SBH136005R2053 | 0.360 |
| | 24 ... 60 | 20 ... 60 | NFZ53EK-21 | 1SBH136005R2153 | 0.360 |
| | 48 ... 130 | 48 ... 130 | NFZ53EK-22 | 1SBH136005R2253 | 0.360 |
| | 100 ... 250 | 100 ... 250 | NFZ53EK-23 | 1SBH136005R2353 | 0.360 |
|  | – | 12 ... 20 | NFZ62EK-20 | 1SBH136005R2062 | 0.360 |
| | 24 ... 60 | 20 ... 60 | NFZ62EK-21 | 1SBH136005R2162 | 0.360 |
| | 48 ... 130 | 48 ... 130 | NFZ62EK-22 | 1SBH136005R2262 | 0.360 |
| | 100 ... 250 | 100 ... 250 | NFZ62EK-23 | 1SBH136005R2362 | 0.360 |
|  | – | 12 ... 20 | NFZ71EK-20 | 1SBH136005R2071 | 0.360 |
| | 24 ... 60 | 20 ... 60 | NFZ71EK-21 | 1SBH136005R2171 | 0.360 |
| | 48 ... 130 | 48 ... 130 | NFZ71EK-22 | 1SBH136005R2271 | 0.360 |
| | 100 ... 250 | 100 ... 250 | NFZ71EK-23 | 1SBH136005R2371 | 0.360 |
|  | – | 12 ... 20 | NFZ80EK-20 | 1SBH136005R2080 | 0.360 |
| | 24 ... 60 | 20 ... 60 | NFZ80EK-21 | 1SBH136005R2180 | 0.360 |
| | 48 ... 130 | 48 ... 130 | NFZ80EK-22 | 1SBH136005R2280 | 0.360 |
| | 100 ... 250 | 100 ... 250 | NFZ80EK-23 | 1SBH136005R2380 | 0.360 |

Note: NFZ contactor relays with 12...20 V DC control voltage need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.




NFZ22EK, NFZ31EK, NFZ40EK



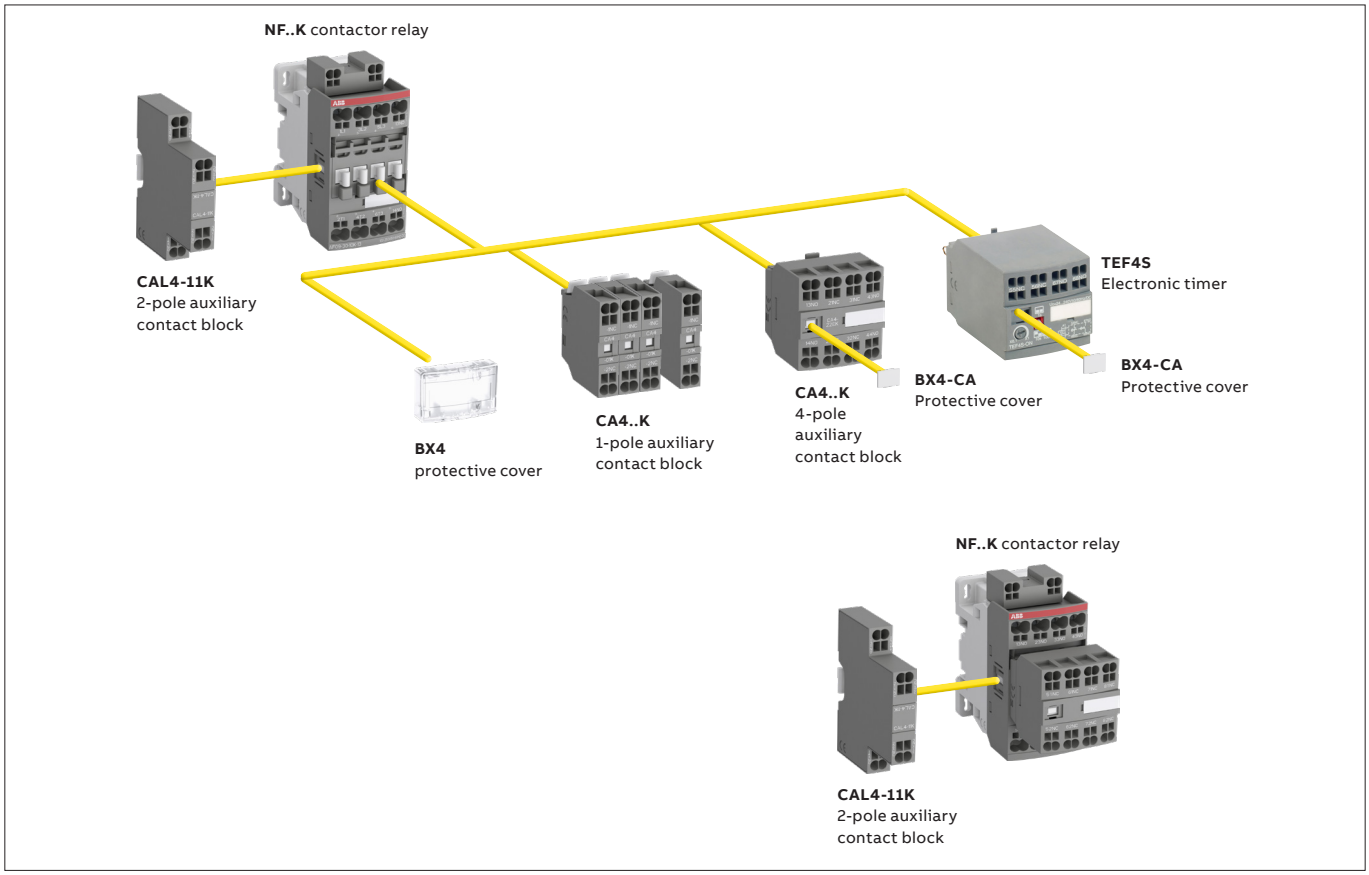

NFZ44EK, NFZ53EK, NFZ62EK, NFZ71EK, NFZ80EK

Main dimensions mm, inches

03

# NF..K contactor relays - with Push-in Spring terminals

## Contactor relays and main accessories




**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories
Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor relay types | Main poles | | | Front-mounted accessories | | | | | Side-mounted accessories | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Auxiliary contact blocks | | Electronic timer | | | Auxiliary contact blocks 2-pole CAL4-11K | |
| | | | | 1-pole CA4..K | 4-pole CA4..K | TEF4S | | | Left side | Right side |
| **NF(Z)** | | | | | | | | | | |
| NF | 2 2 | EK (1) | | 4 max. | or 1 | or 1 | | + | 1 | - |
| | 3 1 | EK (1) | | 2 max. | - | or 1 | | + | 1 | + 1 |
| | 4 0 | EK (2) | | | | | | | | |
| NF | 4 4 | EK | | - | - | - | - | + | 1 | - |
| | 5 3 | EK | | | | | | | | |
| | 6 2 | EK | | | | | | | | |
| | 7 1 | EK | | | | | | | | |
| | 8 0 | EK | | | | | | | | |
| **NFZ 24 V DC designed for PLC - coil 30** | | | | | | | | | | |
| NFZ | 2 2 | EK (1) | | 4 max. | **or** 1 | **or** 1 | | or | 1 | + 1 |
| | 3 1 | EK (1) | | 2 max. | - | **or** 1 | | + | 1 | |
| | 4 0 | EK (2) | | | | 1 | | + | 1 | + 1 |
| NFZ | 4 4 | EK | | - | - | - | | | - | - |
| | 5 3 | EK | | | | | | | | |
| | 6 2 | EK | | | | | | | | |
| | 7 1 | EK | | | | | | | | |
| | 8 0 | EK | | | | | | | | |

(1) Including add-on contacts: 3 N.C. max. on positions 1, 2, 3, 4 and 2 N.C. max. on positions 1 ±30°, 5
(2) Including add-on contacts: 4 N.C. max. on positions 1, 2, 3, 4 and 3 N.C. max. on positions 1 ±30°, 5

# NF..K contactor relays - with Push-in Spring terminals

## Technical data



### Contact utilization characteristics according to IEC

| Contactor relay types | AC / DC operated | NF..K |
|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-5-1 |
| Rated operational voltage Ue max. | | 690 V |
| Rated frequency (without derating) | | 50 / 60 Hz |
| Conventional free air thermal current Ith - θ ≤ 40 °C | | 16 A |
| Ie / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A |
| | 220-240 V 50/60 Hz | 4 A |
| | 400-440 V 50/60 Hz | 3 A |
| | 500 V 50/60 Hz | 2 A |
| | 690 V 50/60 Hz | 2 A |
| Making capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 |
| Breaking capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 |
| Ie / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W |
| | 48 V DC | 2.8 A / 134 W |
| | 72 V DC | 1 A / 72 W |
| | 110 V DC | 0.55 A / 60 W |
| | 125 V DC | 0.55 A / 69 W |
| | 220 V DC | 0.27 A / 60 W |
| | 250 V DC | 0.27 A / 68 W |
| | 400 V DC | 0.15 A / 60 W |
| | 500 V DC | 0.13 A / 65 W |
| | 600 V DC | 0.1 A / 60 W |
| Short-circuit protection device gG type fuse | | 10 A |
| Conditional short-circuit current | | 1 kA |
| Rated short-time withstand current Icw | for 1.0 s | 100 A |
| | for 0.1 s | 140 A |
| Minimum switching capacity | | 12 V / 3 mA |
| with failure rate acc. to IEC 60947-5-4 | | $10^{-7}$ |
| Non-overlapping time between N.O. and N.C. contacts | | ≥ 2 ms |
| Power dissipation per pole at 6 A | | 0.1 W |
| Maximum electrical switching frequency | AC-15 | 1200 cycles/h |
| | DC-13 | 900 cycles/h |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA4, CAL4 aux. contact blocks) are mechanically linked contacts |

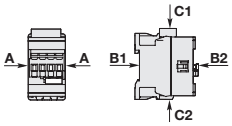
### Contact utilization characteristics according to UL / CSA

| Contactor relay types | NF..K |
|---|---|
| Standards | UL 508, CSA C22.2 No. 14-13 |
| Maximum operational voltage | 600 V AC, 600 V DC |
| Pilot duty | A600, Q600 |
| AC thermal rated current | 10 A |
| AC maximum volt-ampere making | 7200 VA |
| AC maximum volt-ampere breaking | 720 VA |
| DC thermal rated current | 2.5 A |
| DC maximum volt-ampere making-breaking | 69 VA |

# NF..K contactor relays - with Push-in Spring terminals

## Technical data

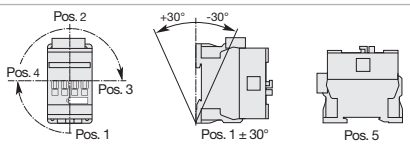
### General technical data

| Contactor relay types | AC / DC operated | **NF..K** |
|---|---|---|
| Rated insulation voltage Ui | | |
| acc. to IEC 60947-5-1 | | 690 V |
| acc. to UL / CSA | | 600 V |
| Rated impulse withstand voltage Uimp. | | 6 kV |
| Electromagnetic compatibility | | Devices complying with IEC/EN 60947-1 - Environment A and B (1) |
| Pollution degree | | 3 |
| Ambient air temperature close to contactor relay | | |
| Operation in free air | | -40 ... +70 °C |
| Storage | | -60 ... +80 °C |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q |
| Maximum operating altitude (without derating) | | 3000 m |
| Mechanical durability | | |
| Number of operating cycles | | 20 million operating cycles |
| Maximum switching frequency | | 6000 cycles/h |
| Shock withstand | | |
| acc. to IEC/EN 60068-2-27 | | |
| Mounting position 1 | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position |
|  | A | 30 g |
| | B1 | 25 g closed position / 5 g open position |
| | B2 | 15 g |
| | C1 | 25 g |
| | C2 | 25 g |
| Vibration withstand | | 5 ... 300 Hz |
| acc. to IEC 60068-2-6 | | 4 g closed position / 2 g open position |



(1) NF..-12 (48...130 V 50/60 Hz-DC) compliant to environment A only. For environment B: select NFZ..-22.

### Mounting characteristics

| Contactor relay types | AC / DC operated | **NF..K** |
|---|---|---|
| Mounting positions | |  |
| | | Max. add-on N.C. auxiliary contacts: see accessory fitting details for a NF contactor relay |
| Mounting distances | | The contactor relays can be assembled side by side |
| Fixing | | |
| On rail according to IEC/EN 60715 | | 35 x 7.5 mm or 35 x 15 mm |
| By screws (not supplied) | | 2 x M4 screws placed diagonally |



### Connecting characteristics

| Contactor relay types | AC / DC operated | | **NF..K** |
|---|---|---|---|
| Main terminals | | |  |
| | | | Push-in Spring terminals |
| Connection capacity (min. ... max.) | | | |
| Pole and coil terminals | | | |
| Rigid Solid | | 1 x | 1 ... 2.5 mm² |
| | | 2 x | 1 ... 2.5 mm² |
| Flexible with non insulated | | 1 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm² |
| ferrule | | 2 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm² |
| Flexible with insulated ferrule | | 1 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm² |
| | | 2 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm² |
| Flexible without ferrule | | 1 x | (spring) 0.5 ... 2.5 mm² |
| | | 2 x | (spring) 0.5 ... 2.5 mm² |
| Connection capacity acc. to UL/CSA | | 1 or 2 x | AWG 18 ... 14 |
| Stripping length | | | 10 mm |
| Degree of protection | | | |
| acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | IP20 |
| Screwdriver type | | All terminals | Flat Ø 3 mm x 0.5 mm |

# NF..K contactor relays - with Push-in Spring terminals

## Technical data



### Magnet System Characteristics for NF..K contactor relays - AC / DC operated

| Contactor relay types | AC / DC operated | NF..K |
|---|---|---|
| Coil operating limits acc. to IEC 60947-5-1 | AC supply | At θ ≤ 60 °C 0.85 x Uc min ... 1.1 x Uc max<br>At θ ≤ 70 °C 0.85 x Uc min ... Uc max |
| | DC supply | At θ ≤ 60 °C 0.85 x Uc min ... 1.1 x Uc max<br>At θ ≤ 70 °C 0.85 x Uc min ... Uc max |
| AC control voltage 50/60 Hz | | |
| Rated control circuit voltage Uc | | 24 ... 500 V AC |
| Coil consumption | Average pull-in value | 50 VA |
| | Average holding value | 2.2 VA / 2 W |
| DC control voltage | | |
| Rated control circuit voltage Uc | | 20 ... 500 V DC |
| Coil consumption | Average pull-in value | 50 W |
| | Average holding value | 2 W |
| PLC-output control | | Not suitable for direct control by PLC-output |
| Drop-out voltage | | ≤ 60 % of Uc min. |
| Voltage sag immunity according to SEMI F47-0706 | | – |
| Dips withstand -20 °C ≤ θ ≤ +60°C | | – |
| Operating time | | |
| Between coil energization and: | | |
| | N.O. contact closing | 40 ... 95 ms |
| | N.C. contact opening | 38 ... 90 ms |
| Between coil de-energization and: | | |
| | N.O. contact opening | 11 ... 95 ms |
| | N.C. contact closing | 13 ... 98 ms |

### Magnet System Characteristics for NFZ..K contactor relays 24V DC operated - designed for PLC - coil 30

| Contactor relay types | AC / DC operated | NFZ..K |
|---|---|---|
| Coil operating limits acc. to IEC 60947-5-1 | DC supply | At θ ≤ 60 °C 0.85 ... 1.1 x Uc<br>At θ ≤ 70 °C Uc |
| DC control voltage | | |
| Rated control circuit voltage Uc | | 24 V DC |
| Coil consumption | Average pull-in value | 6 W |
| | Average holding value | 1.7 W |
| PLC-output control | | ≥ 250 mA 24 V DC for PLCs and safety PLCs using broken wire detection |
| Drop-out voltage | | ≤ 60 % of Uc min. |
| Operating time | | |
| Between coil energization and: | | |
| | N.O. contact closing | 27 ... 53 ms |
| | N.C. contact opening | 20 ... 35 ms |
| Between coil de-energization and: | | |
| | N.O. contact opening | 17 ... 29 ms |
| | N.C. contact closing | 22 ... 57 ms |

### Magnet System Characteristics for NFZ..K contactor relays - for specific applications - coils 20, 21, 22, 23

| Contactor relay types | AC / DC operated | NFZ..K |
|---|---|---|
| Coil operating limits acc. to IEC 60947-5-1 | AC supply | At θ ≤ 60 °C 0.85 x Uc min ... 1.1 x Uc max<br>At θ ≤ 70 °C 0.85 x Uc min ... Uc max |
| | DC supply | At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max |
| AC control voltage 50/60 Hz | | |
| Rated control circuit voltage Uc | | 24 ... 250 V AC |
| Coil consumption | Average pull-in value | 16 VA |
| | Average holding value | 1.7 VA / 1.5 W |
| DC control voltage | | |
| Rated control circuit voltage Uc | | 12 ... 250 V DC |
| Coil consumption | Average pull-in value | 12 ... 16 W |
| | Average holding value | 1.7 W |
| PLC-output control | | (AF..Z coil 21) ≥ 500 mA 24 V DC for PLCs - Not suitable for safety PLCs |
| Drop-out voltage | | ≤ 60 % of Uc min. |
| Voltage sag immunity according to SEMI F47-0706 | | (NFZ coil 21, 22, 23) conditions of use on request |
| Dips withstand -20 °C ≤ θ ≤ +60°C | | (NFZ coil 21, 22, 23) 20 ms average for Uc ≥ 24 V 50/60 Hz or Uc ≥ 20 V DC |
| Operating time | | |
| Between coil energization and: | | |
| | N.O. contact closing | 40 ... 95 ms |
| | N.C. contact opening | 38 ... 90 ms |
| Between coil de-energization and: | | |
| | N.O. contact opening | 11 ... 95 ms |
| | N.C. contact closing | 13 ... 98 ms |

**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**1SBN010110R1010**

# Accessories



**Accessories for AF09 ... AF2850 3-pole contactors, AF09 ... AF370 4-pole contactors and NF contactor relays**

**3/**300 Auxiliary contact blocks
**3/**314 Electronic timers
**3/**317 Interlocks
**3/**319 Impulse contact blocks
**3/**321 Interface relays
**3/**322 Mechanical latching units
**3/**324 Additional coil terminal blocks, protective covers and function markers
**3/**325 Mounting pieces and test blocks
**3/**326 Terminal shrouds
**3/**327 Additional terminal blocks
**3/**328 Terminals for control lead connections
**3/**329 Terminal enlargement and connection sockets
**3/**330 Terminal connecting strips and shorting bars
**3/**331 Connection accessories for starting solutions
**3/**333 Connection accessories for starting solutions with Push-in Spring terminals
**3/**335 Connection bars
**3/**336 Adapter plates
**3/**337 Low Voltage Ride Through (LVRT) modules
**3/**338 Spare parts contactors

**Accessories for UA, UA..RA, GAF contactors**

**3/**346 Auxiliary contact blocks
**3/**352 Electronic timers
**3/**355 CA5, CE5, CAL, CEL18 and TEF5 fitting details
**3/**356 Function markers
**3/**357 Surge suppressors for contactor coils
**3/**359 Interface relays
**3/**361 Mechanical latching units
**3/**363 Terminal blocks and terminal enlargements
**3/**364 Terminals for control lead connections
**3/**365 Connection bars for contactors
**3/**366 Contactor coils and main contact sets

**Accessories for EK550, EK1000 4-pole contactors**

**3/**370 Auxiliary contact blocks
**3/**374 Mechanical interlock units, terminal shrouds and connection sets
**3/**375 Surge suppressors for contactor coils
**3/**377 Main contact sets and arc chutes
**3/**378 Contactor coils




**For direct product details information, use product type or order code, ex:**

www.abb.com/productdetails/**1SBN010110R1010**

# Accessories for AF09 ... AF2850 3-pole contactors, AF09 ... AF370 4-pole contactors and NF contactor relays


**3/**300 **Auxiliary contact blocks**

**3/**314 **Electronic timers**

**3/**317 **Interlocks**

**3/**319 **Impulse contact blocks**

**3/**321 **Interface relays**

**3/**322 **Mechanical latching unit**

**3/**324 **Additional coil terminal blocks and function markers**

**3/**325 **Mounting pieces and test blocks**

**3/**326 **Terminal shrouds**

**3/**327 **Additional terminal blocks**

**3/**328 **Terminals for control lead connections**

**3/**329 **Terminal enlargements and connection sockets**

**3/**330 **Terminal connecting strips and shorting bars**

**3/**331 **Connection accessories for starting solutions**

**3/**333 **Connection accessories for starting solutions with Push-in Spring terminals**

**3/**335 **Connection bars**

**3/**336 **Adapter plates**

**3/**337 **Low Voltage Ride Through (LVRT) modules**

**3/**338 **Spare parts contactors**

# Auxiliary contact blocks for AF09 ... AF96 contactors and NF contactor relays




CA4-10




CAL4-11




CA4-22E




CAT4-11E

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits for standard industrial environments.

Types of auxiliary contact blocks for front mounting:

- CA4 1 or 4-pole block, with instantaneous N.O., N.C. contacts
- CC4 1-pole block, with N.O. leading contact or N.C. lagging contact
- CAT4 2-pole block, with instantaneous N.O. + N.C. contacts and A1 / A2 coil terminal connection on front face.

Select the 4-pole auxiliary contact blocks CA4-..E, CA4-..M, CA4-..U or CA4-..N type, according to the contactor or contactor relay type for compliance with the standard requirements (see "Terminal marking and positioning").

Types of auxiliary contact blocks for side mounting:

- CAL4 2-pole block, with instantaneous N.O. + N.C. contacts.

For clipping onto the right- and/or left-hand side of the contactors.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

| For contactors | Auxiliary contacts | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|---|
| **Front-mounted instantaneous auxiliary contact blocks** | | | | | | |
| AF09 ... AF96 | 1 | 0 | – – | CA4-10 | 1SBN010110R1010 | 1 | 0.014 |
| 4-pole NF | 1 | 0 | – – | CA4-10-T | 1SBN010110T1010 | 10 | 0.014 |
| | 0 | 1 | – – | CA4-01 | 1SBN010110R1001 | 1 | 0.014 |
| | 0 | 1 | – – | CA4-01-T | 1SBN010110T1001 | 10 | 0.014 |
| AF09 ... AF16..-30-10 | 2 | 2 | – – | CA4-22M | 1SBN010140R1122 | 1 | 0.055 |
| | 3 | 1 | – – | CA4-31M | 1SBN010140R1131 | 1 | 0.055 |
| | 1 | 3 | – – | CA4-13M | 1SBN010140R1113 | 1 | 0.055 |
| | 0 | 4 | – – | CA4-04M | 1SBN010140R1104 | 1 | 0.055 |
| AF26 ... AF96..-30-00 | 2 | 2 | – – | CA4-22E | 1SBN010140R1022 | 1 | 0.055 |
| AF09 ... AF80..-40-00 | 3 | 1 | – – | CA4-31E | 1SBN010140R1031 | 1 | 0.055 |
| AF09 ... AF80..-22-00 | 4 | 0 | – – | CA4-40E | 1SBN010140R1040 | 1 | 0.055 |
| AF26 ... AF96..-30-00<br>AF09 ... AF16..-40-00<br>AF40 ... AF80..-40-00 | 0 | 4 | – – | CA4-04E | 1SBN010140R1004 | 1 | 0.055 |
| AF09 ... AF16..-30-01 | 2 | 2 | – – | CA4-22U | 1SBN010140R1322 | 1 | 0.055 |
| | 3 | 1 | – – | CA4-31U | 1SBN010140R1331 | 1 | 0.055 |
| | 4 | 0 | – – | CA4-40U | 1SBN010140R1340 | 1 | 0.055 |
| 4-pole NF | 2 | 2 | – – | CA4-22N | 1SBN010140R1222 | 1 | 0.055 |
| | 3 | 1 | – – | CA4-31N | 1SBN010140R1231 | 1 | 0.055 |
| | 4 | 0 | – – | CA4-40N | 1SBN010140R1240 | 1 | 0.055 |
| | 1 | 3 | – – | CA4-13N | 1SBN010140R1213 | 1 | 0.055 |
| NF..40E | 0 | 4 | – – | CA4-04N | 1SBN010140R1204 | 1 | 0.055 |
| **Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact** | | | | | | |
| AF09 ... AF96 | – | – | 1 | 0 | CC4-10 | 1SBN010111R1010 | 1 | 0.014 |
| 4-pole NF | – | – | 0 | 1 | CC4-01 | 1SBN010111R1001 | 1 | 0.014 |
| **Side-mounted instantaneous auxiliary contact blocks** | | | | | | |
| AF09 ... AF96 | 1 | 1 | – – | CAL4-11 | 1SBN010120R1011 | 1 | 0.040 |
| NF | 1 | 1 | – – | CAL4-11-T | 1SBN010120T1011 | 10 | 0.040 |
| **Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks** | | | | | | |
| AF09 ... AF16..-30-10 | 1 | 1 | – – | CAT4-11M | 1SBN010151R1111 | 1 | 0.040 |
| AF26 ... AF65..-30-00<br>AF09 ... AF52..-40-00<br>AF09 ... AF40..-22-00 | 1 | 1 | – – | CAT4-11E | 1SBN010151R1011 | 1 | 0.040 |
| AF09 ... AF16..-30-01 | 1 | 1 | – – | CAT4-11U | 1SBN010151R1311 | 1 | 0.040 |

Note: 1 max CC4-10 and 1 max CC4-01.
CC4-01 use: on each "Accessory fitting details" table, the allowed number of N.C. add-on and built-in contacts including CC4-01, is decreased by one.

For each contactor or contactor relay type, refer to "Accessory fitting details" table.
Note: CAT4 not suitable for AF..Z contactors with DC control voltage 12…20 V DC (coil 20) and 24 V DC (coil 30).

# Auxiliary contact blocks for AF09 ... AF96 contactors and NF contactor relays

Technical data

## Contact utilization characteristics according to IEC

| Types | | | 1-pole CA4, 1-pole CC4, 4-pole CA4, 2-pole CAT4, 2-pole CAL4 |
|---|---|---|---|
| Standards | | | IEC/EN 60947-5-1 |
| Rated insulation voltage Ui acc. to IEC 60947-5-1 | | | 690 V |
| Rated impulse withstand voltage Uimp. | | | 6 kV |
| Pollution degree | | | 3 |
| Rated operational voltage Ue max. | | | 24...690 V |
| Conventional thermal current Ith - θ ≤ 40 °C | | | 16 A |
| Rated frequency (without derating) | | | 50/60 Hz |
| Ie / Rated operational current AC-15 | | 24-127 V 50/60 Hz | 6 A |
| acc. to IEC 60947-5-1 | | 220-240 V 50/60 Hz | 4 A |
| | | 400-440 V 50/60 Hz | 3 A |
| | | 500 V 50/60 Hz | 2 A |
| | | 690 V 50/60 Hz | 2 A |
| Making capacity acc. to IEC 60947-5-1 | | | 10 x Ie AC-15 |
| Breaking capacity acc. to IEC 60947-5-1 | | | 10 x Ie AC-15 |
| Ie / Rated operational current DC-13 | | | |
| acc. to IEC 60947-5-1 | | 24 V DC | 6 A / 144 W |
| | | 48 V DC | 2.8 A / 134 W |
| | | 72 V DC | 1 A / 72 W |
| | | 110 V DC | 0.55 A / 60 W |
| | | 125 V DC | 0.55 A / 69 W |
| | | 220 V DC | 0.27 A / 60 W |
| | | 250 V DC | 0.27 A / 68 W |
| | | 400 V DC | 0.15 A / 60 W |
| | | 500 V DC | 0.13 A / 65 W |
| | | 600 V DC | 0.1 A / 60 W |
| Short-circuit protection device gG type fuse | | | 10 A |
| Conditional short-circuit current | | | 1 kA |
| Rated short-time withstand current Icw | | for 1.0 s | 100 A |
| θ = 40 °C | | for 0.1 s | 140 A |
| Minimum switching capacity | | | 12 V / 3 mA |
| with failure rate acc. to IEC 60947-5-4 | | | $10^{-7}$ |
| Power dissipation per pole at 6 A | | | 0.1 W |
| Mechanical durability | Number of operating cycles | | 10 millions operating cycles |
| | Max. switching frequency | | 3600 cycles/h |
| Max. electrical switching frequency | | AC-15 | 1200 cycles/h |
| | | DC-13 | 900 cycles/h |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | | Additional N.O. or N.C. auxiliary contacts (CA4, CAL4, CAT4) are mechanically linked contacts |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | | Additional N.C. auxiliary contacts (CA4, CAL4, CAT4) are mirror contacts |

## Contact utilization characteristics according to UL / CSA

| Types | 1-pole CA4, 1-pole CC4, 4-pole CA4, 2-pole CAT4, 2-pole CAL4 |
|---|---|
| Standards | UL 60947-1, UL 60947-5-1, CSA C22.2 No. 60947-5-1-14 |
| Max. operational voltage | 600 V AC, 600 V DC |
| Pilot duty | A600, Q600 |
| AC thermal rated current | 10 A |
| AC maximum volt-ampere making | 7200 VA |
| AC maximum volt-ampere breaking | 720 VA |
| DC thermal rated current | 2.5 A |
| DC maximum volt-ampere making-breaking | 69 VA |

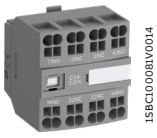
## Connecting characteristics

| Types | | | 1-pole CA4, 1-pole CC4, 4-pole CA4, 2-pole CAT4, 2-pole CAL4 |
|---|---|---|---|
| Connection capacity (min. ... max.) | | | |
|  | Rigid Solid/Stranded | 1 x | 1...2.5 mm² |
|  | | 2 x | 1...2.5 mm² |
|  | Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² |
|  | | 2 x | 0.75...2.5 mm² |
|  | Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² |
|  | | 2 x | 0.75...1.5 mm² |
|  | Lugs | L < | 8 mm |
| Connection capacity acc. to UL/CSA | | 1 or 2 x | AWG 18...14 |
| Stripping length | | | 10 mm |
| Tightening torque | | | 1.2 Nm / 11 lb.in |
| Degree of protection | | | |
| acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | IP20 |
| Screw terminals | | | Delivered in open position, screws of unused terminals must be tightened |
| All terminals | | | M3.5 |
| Screwdriver type | | | Flat Ø 5.5 / Pozidriv 2 |

# Auxiliary contact blocks with Push-in Spring terminals




CA4-10K




CA4-22EK




CAL4-11K

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits for standard industrial environments.

Types of auxiliary contact blocks for front mounting:

- CA4..K 1 or 4-pole block, with instantaneous N.O., N.C. contacts

Select the 4-pole auxiliary contact blocks CA4-..EK, CA4-..MK or CA4-..NK type, according to the contactor or contactor relay type for compliance with the standard requirements (see "Terminal marking and positioning").

Types of auxiliary contact blocks for side mounting:

- CAL4..K 2-pole block, with instantaneous N.O. + N.C. contacts.

For clipping onto the right- and/or left-hand side of the contactors.

The auxiliary contact blocks are equipped with push-in spring terminals protected against accidental direct contact and bear the corresponding function marking.

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| **Front-mounted instantaneous auxiliary contact blocks** | | | | | |
| AF09 ... AF96<br>NF | 1 0 | CA4-10K | 1SBN010160R1010 | 1 | 0.012 |
| | 1 0 | CA4-10K-T | 1SBN010160T1010 | 10 | 0.012 |
| | 0 1 | CA4-01K | 1SBN010160R1001 | 1 | 0.012 |
| | 0 1 | CA4-01K-T | 1SBN010160T1001 | 10 | 0.012 |
| AF09 ... AF16..-30-10 | 2 2 | CA4-22MK | 1SBN010146R1122 | 1 | 0.050 |
| | 3 1 | CA4-31MK | 1SBN010146R1131 | 1 | 0.050 |
| | 1 3 | CA4-13MK | 1SBN010146R1113 | 1 | 0.050 |
| | 0 4 | CA4-04MK | 1SBN010146R1104 | 1 | 0.050 |
| AF26 ... AF96..-30-00<br>AF09 ... AF80..-40-00<br>AF09 ... AF80..-22-00 | 2 2 | CA4-22EK | 1SBN010146R1022 | 1 | 0.050 |
| | 3 1 | CA4-31EK | 1SBN010146R1031 | 1 | 0.050 |
| | 4 0 | CA4-40EK | 1SBN010146R1040 | 1 | 0.050 |
| 4-pole NF | 1 3 | CA4-13NK | 1SBN010146R1213 | 1 | 0.050 |
| | 2 2 | CA4-22NK | 1SBN010146R1222 | 1 | 0.050 |
| | 3 1 | CA4-31NK | 1SBN010146R1231 | 1 | 0.050 |
| | 4 0 | CA4-40NK | 1SBN010146R1240 | 1 | 0.050 |
| NF40E | 0 4 | CA4-04NK | 1SBN010146R1204 | 1 | 0.050 |
| **Side-mounted instantaneous auxiliary contact blocks** | | | | | |
| **3-pole** | | | | | |
| AF09 ... AF96<br>NF | 1 1 | CAL4-11K | 1SBN010134R1011 | 1 | 0.030 |

Note: for each contactor or contactor relay type, refer to "Accessory fitting details" table.

# Auxiliary contact blocks for AF09 ... AF96 contactors and NF contactor relays with Push-in Spring terminals

Technical data

## Contact utilization characteristics according to IEC

| Types | | | 1-pole CA4..K, 4-pole CA4..K, 2-pole CAL4..K |
|---|---|---|---|
| Standards | | | IEC/EN 60947-1, IEC/EN 60947-4-1 |
| Rated insulation voltage Ui acc. to IEC 60947-5-1 | | | 690 V |
| Rated impulse withstand voltage Uimp. | | | 6 kV |
| Pollution degree | | | 3 |
| Rated operational voltage Ue max. | | | 690 V |
| Conventional thermal current Ith - θ ≤ 40 °C | | | 16 A |
| Rated frequency (without derating) | | | 50 / 60 Hz |
| Ie / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | | 6 A |
| | 220-240 V 50/60 Hz | | 4 A |
| | 400-440 V 50/60 Hz | | 3 A |
| | 500 V 50/60 Hz | | 2 A |
| | 690 V 50/60 Hz | | 2 A |
| Making capacity acc. to IEC 60947-5-1 | | | 10 x Ie AC-15 |
| Breaking capacity acc. to IEC 60947-5-1 | | | 10 x Ie AC-15 |
| Ie / Rated operational current DC-13 acc. to IEC 60947-5-1 | | 24 V DC | 6 A / 144 W |
| | | 48 V DC | 2.8 A / 134 W |
| | | 72 V DC | 1 A / 72 W |
| | | 110 V DC | 0.55 A / 60 W |
| | | 125 V DC | 0.55 A / 69 W |
| | | 220 V DC | 0.27 A / 60 W |
| | | 250 V DC | 0.27 A / 68 W |
| | | 400 V DC | 0.15 A / 60 W |
| | | 500 V DC | 0.13 A / 65 W |
| | | 600 V DC | 0.1 A / 60 W |
| Short-circuit protection device gG type fuse | | | 10 A |
| Conditional short-circuit current | | | 1 kA |
| Rated short-time withstand current Icw θ = 40 °C | | for 1.0 s | 100 A |
| | | for 0.1 s | 140 A |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | | | 12 V / 3 mA<br>$10^{-7}$ |
| Power dissipation per pole at 6 A | | | 0.1 W |
| Mechanical durability | Number of operating cycles | | 10 million operating cycles |
| | Max. switching frequency | | 3600 cycles/h |
| Max. electrical switching frequency | | AC-15 | 1200 cycles/h |
| | | DC-13 | 900 cycles/h |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | | Additional N.O. or N.C. auxiliary contacts (CA4, CAL4) are mechanically linked contacts. |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | | Additional N.C. auxiliary contacts (CA4, CAL4) are mirror contacts. |

## Contact utilization characteristics according to UL / CSA

| Types | 1-pole CA4..K, 4-pole CA4..K, 2-pole CAL4..K |
|---|---|
| Standards | UL 60947-1, UL 60947-5-1, CSA C22.2 No. 14-13 |
| Max. operational voltage | 600 V AC, 600 V DC |
| Pilot duty | A600, Q600 |
| AC thermal rated current | 10 A |
| AC maximum volt-ampere making | 7200 VA |
| AC maximum volt-ampere breaking | 720 VA |
| DC thermal rated current | 2.5 A |
| DC maximum volt-ampere making-breaking | 69 VA |

## Connecting characteristics

| Types | | | 1-pole CA4..K, 4-pole CA4..K, 2-pole CAL4..K |
|---|---|---|---|
| Connection capacity (min. ... max.) | | | |
|  | Rigid solid | 1 x | 1 ... 2.5 mm² |
|  | | 2 x | 1 ... 2.5 mm² |
|  | Flexible with ferrule | 1 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm² |
|  | | 2 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm² |
|  | Flexible with insulated ferrule | 1 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm² |
|  | | 2 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm² |
|  | Flexible without ferrule | 1 x | (spring) 0.5 ... 2.5 mm² |
|  | | 2 x | (spring) 0.5 ... 2.5 mm² |
| Connection capacity acc. to UL/CSA | | 1 or 2 x | AWG 18 ... 14 |
| Stripping length | | | 10 mm |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | IP20 |
| Screwdriver type | | | Flat Ø 3 mm x 0.5 mm |

# Auxiliary contact blocks for severe industrial environments

## for AF09 ... AF96 contactors and NF contactor relays




CE5-10W

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits for severe industrial environments.

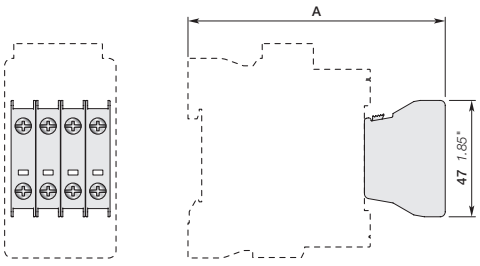
Types of auxiliary contact blocks for front mounting:

- CE5 1-pole block, instantaneous with N.O. contact or N.C. contact, available in 2 IP degrees
  - CE5 D with built-in microswitch IP40, degree of protection (IP20 on terminals)
  - CE5 W with built-in microswitch IP67, degree of protection (IP20 on terminals).

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

| For contactors | Auxiliary contacts | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|---|
| AF09 ... AF96 | 1 0 | – – | CE5-10D0.1 | 1SBN010015R1010 | 1 | 0.020 |
| NF | 0 1 | – – | CE5-01D0.1 | 1SBN010015R1001 | 1 | 0.020 |
| | 1 0 | – – | CE5-10D2 | 1SBN010017R1010 | 1 | 0.020 |
| | 0 1 | – – | CE5-01D2 | 1SBN010017R1001 | 1 | 0.020 |
| | 1 0 | – – | CE5-10W0.1 | 1SBN010016R1010 | 1 | 0.020 |
| | 0 1 | – – | CE5-01W0.1 | 1SBN010016R1001 | 1 | 0.020 |
| | 1 0 | – – | CE5-10W2 | 1SBN010018R1010 | 1 | 0.020 |
| | 0 1 | – – | CE5-01W2 | 1SBN010018R1001 | 1 | 0.020 |

(1) For each contactor type, refer to "Accessory fitting details" table.
Note: For use with 24 V DC operated AF..Z contactor and NFZ contactor relay (coil 30), please consult your ABB local sales organization.




Main dimensions mm, inches

| 1-pole CE5 on | A |
|---|---|
| AF09 ... AF16..-30-xx 1 stack<br>AF09, AF16..-40/22-00<br>NF..E 1-stack | 103.5 mm / 4.07" |
| AF26 ... AF38..-30-00 | 112.5 mm / 4.43" |
| AF26, AF38..-40/22-00 | 127.5 mm / 5.02" |
| AF40 ... AF65-30-00 | 137 mm / 5.39" |
| AF40 ... AF65-40/22-00 | 140 mm / 5.51" |
| AF80 ... AF96-30-00 | 142 mm / 5.59" |
| AF80-40/22-00 | 142 mm / 5.59" |

# Auxiliary contact blocks for severe industrial environments

Technical data



## Contact utilization characteristics according to IEC

| Types | | 1-pole CE5-..0.1 | 1-pole CE5-..2 |
|---|---|---|---|
| Standards | | IEC/EN 60947-5-1 | |
| Rated insulation voltage Ui | | | |
| acc. to IEC 60947-5-1 | | 250 V | |
| Pollution degree | | 3 | |
| Rated operational voltage Ue max. | | 125 V | 250 V |
| Conventional thermal current Ith - θ ≤ 40 °C | | 0.1 A | 2 A |
| Rated frequency (without derating) | | 50 / 60 Hz | |
| Ie / Rated operational current | | AC-14 | AC-15 |
| acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 0.1 A | 2 A |
| | 220-240 V 50/60 Hz | – | 2 A |
| Making capacity | | 6 x Ie AC-14 acc. to IEC 60947-5-1 | 10 x Ie AC-15 acc. to IEC 60947-5-1 |
| Breaking capacity | | 6 x Ie AC-14 acc. to IEC 60947-5-1 | 10 x Ie AC-15 acc. to IEC 60947-5-1 |
| Ie / Rated operational current DC-12 | | | |
| acc. to IEC 60947-5-1 | 24 V DC | 0.1 A | 2 A |
| | 48 V DC | 0.1 A | 1 A |
| | 72 V DC | 0.1 A | 0.3 A |
| | 110 V DC | 0.1 A | 0.2 A |
| | 125 V DC | – | 0.2 A |
| | 220 V DC | – | 0.1 A |
| Short-circuit protection device FF type fuse (1) | | 0.1 A | 10 A |
| Conditional short-circuit current | | 1 kA | 1 kA |
| Minimum switching capacity | | | |
| AF09 ... AF38 contactors | | 3 V / 1 mA | 17 V / 1 mA |
| with failure rate acc. to IEC 60947-5-4 | | – | ≤ $10^{-7}$ |
| Mechanical durability | | | |
| Number of operating cycles | | 5 millions for CE5-..D0.1 | 5 millions for CE5-..D2 |
| | | 2.5 millions for CE5-..W0.1 | 2.5 millions for CE5-..W2 |
| Max. switching frequency | | 3600 cycles/h | |
| Electrical durability | | | |
| Number of operating cycles | | 2.5 millions for CE5-..D0.1 | 1 million for CE5-..D2 |
| | | 0.7 millions for CE5-..W0.1 | 0.3 millions for CE5-..W2 |
| Max. electrical switching frequency | | | |
| | AC-14 | 1200 cycles/h | |
| | AC-15 | 1200 cycles/h | |
| | DC-12 | 900 cycles/h | |

## Contact utilization characteristics according to UL / CSA

| Types | 1-pole CE5-..0.1 | 1-pole CE5-..2 |
|---|---|---|
| Standards | UL 508, CSA C22.2 No. 14 | |
| Max. operational voltage | 125 V AC / 110 V DC | 250 V AC / 220 V DC |
| Pilot duty | | |
| AC thermal rated current | 0.1 A | 2 A |

## Connecting characteristics

| Types | | 1-pole CE5-..0.1 | 1-pole CE5-..2 |
|---|---|---|---|
| Connection capacity (min. ... max.) | | | |
| Rigid Solid/Stranded | 1 x | 1...4 mm² | |
| | 2 x | 1...4 mm² | |
| Flexible with ferrule | 1 x | 0.75...2.5 mm² | |
| | 2 x | 0.75...2.5 mm² | |
| Lugs | L ≤ | 7.7 mm | |
| | l > | 3.7 mm | |
| Connecting capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 | |
| Stripping length | | 10 mm | |
| Tightening torque | | 1 Nm | |
| Degree of protection | Terminals | IP20 | |
| acc. to EC/EN 60947-1 and IEC/EN 60529 | Microswitches | IP40 for CE5-..D0.1 | IP40 for CE5-..D2 |
| | | IP67 for CE5-..W0.1 | IP67 for CE5-..W2 |
| Screw terminals | | Delivered in open position, screws of unused terminals must be tightened | |
| All terminals | | M3.5 | |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 | |

(1) HRC fuses for very fast action (6.3 x 32 mm size).

# Auxiliary contact blocks for severe industrial environments

For AF09 ... AF96 3-pole contactors and AF09 ... AF80 4-pole contactors



## For AF contactors

**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories: Auxiliary contact blocks 1-pole CE5 | | Front-mounted accessories: Auxiliary contact blocks 1-pole CA4 | | Front-mounted accessories: Electrical and mechanical interlock set (Between 2 contactors) VEM4 | | Side-mounted accessories: Auxiliary contact blocks Left side 2-pole CAL4-11 | Side-mounted accessories: Auxiliary contact blocks Right side |
|---|---|---|---|---|---|---|---|---|---|---|
| **3-pole contactors AF09 ... AF96** | | | | | | | | | | |
| On positions 1, 2, 3, 4 ; Max. N.C. built-in and add-on N.C. auxiliary contacts (CA4, CAL4, VEM4): 2 max. with 1 CE5, none with 2 CE5 | | | | | | | | | | |
| AF09 ... AF16 | 3 | 0 1 | 1 | | + 3 max. | | – | + | 1 | – |
| AF09 ... AF16 | 3 | 1 0 | 2 | | + 2 max. | | – | | – | – |
| AF26 ... AF38 | 3 | 0 0 | 1 | | + 3 max. | | – | + | 1 | – |
| | | | 1 | | + 1 max. | | – | + | 1 | + 1 |
| | | | 1 | | + 2 max. | | + 1 | + | 1 | – |
| On positions 1 ±30°, 5 ; Max. N.C. built-in or add-on N.C. auxiliary contacts (CA4, CAL4, VEM4): 1 max. with 1 CE5 | | | | | | | | | | |
| AF09 ... AF16 | 3 | 0 1 | 1 | | + 3 max. | | – | | – | – |
| AF09 ... AF16 | 3 | 1 0 | 1 | | + 3 max. | | – | + | 1 | – |
| AF26 ... AF38 | 3 | 0 0 | 1 | | + 2 max. | | + 1 | | – | – |
| On positions 1, 1 ±30°, 2, 3, 4, 5 ; Max. add-on N.C. auxiliary contacts (CA4, CAL4): 4 max. with 1 CE5, 2 max. with 2 CE5 | | | | | | | | | | |
| AF40 ... AF96 | 3 | 0 0 | 2 | | + 2 max. | | – | + | 1 | + 1 |
| | | | 1 | | + 3 max. | | – | + | 1 | + 1 |
| **4-pole contactors AF09 ... AF80** | | | | | | | | | | |
| On positions 1, 2, 3, 4 ; Max. add-on N.C. auxiliary contacts (CA4, CAL4, VEM4): 2 max. with 1 CE5, none with 2 CE5 | | | | | | | | | | |
| AF09, AF16 | 4 | 0 0 | 2 | | + 2 max. | | – | | – | – |
| | | | 1 | | + 3 max. | | – | + | 1 | – |
| | | | 1 | | + 1 max. | | – | + | 1 | + 1 |
| | | | 1 | | + 2 max. | | + 1 | + | 1 | – |
| On positions 1, 2, 3, 4 ; Max. add-on N.C. auxiliary contacts (CA4, CAL4, VEM4): 1 max. with 1 CE5 | | | | | | | | | | |
| AF26, AF38 | 4 | 0 0 | 1 | | + 3 max. | | – | + | 1 | – |
| | | | 1 | | + 2 max. | | + 1 | | – | – |
| AF09 ... AF38 | 2 | 2 0 0 | 1 | | + 3 max. | | – | + | 1 | – |
| On positions 1 ±30°, 5 ; Max. add-on N.C. auxiliary contacts (CA4, CAL4, VEM4): 1 max. with 1 CE5 | | | | | | | | | | |
| AF09, AF16 | 4 | 0 0 | 1 | | + 3 max. | | – | + | 1 | – |
| | | | 1 | | + 2 max. | | + 1 | | – | – |
| On positions 1 ±30°, 5 ; No add-on N.C. auxiliary contacts | | | | | | | | | | |
| AF26, AF38 | 4 | 0 0 | 1 | | + 3 max. | | – | | – | – |
| AF09 ... AF38 | 2 | 2 0 0 | | | | | | | | |
| On positions 1, 1 ±30°, 2, 3, 4, 5 ; Max. add-on N.C. auxiliary contacts (CA4, CAL4): 4 max. with 1 CE5, 2 max. with 2 CE5 | | | | | | | | | | |
| AF40 ... AF80 | 4 | 0 0 | 2 | | + 2 max. | | – | + | 1 | + 1 |
| | | | 1 | | + 3 max. | | – | + | 1 | + 1 |
| On positions 1, 1 ±30°, 2, 3, 4, 5 ; No add-on N.C. auxiliary contacts | | | | | | | | | | |
| AF40, AF80 | 2 | 2 0 0 | 1 | | + 3 max. | | – | | – | – |

# Auxiliary contact blocks for severe industrial environments

## For NF contactor relays

**Main accessory fitting details** - for ordering details, technical data and other accessories: see section accessories

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor relay types | Main poles | | Front-mounted accessories Auxiliary contact blocks 1-pole CE5 | 1-pole CA4 | | | Side-mounted accessories Auxiliary contact blocks Left side 2-pole CAL4-11 | Right side |
|---|---|---|---|---|---|---|---|---|
| On positions 1, 2, 3, 4 ; Max. add-on N.C. auxiliary contacts (CA4, CAL4): 1 max. with 1 CE5 | | | | | | | | |
| NF | 2 2<br>3 1 | E<br>E | 1 | + 3 max. | – | + | 1 | – |
| On positions 1, 2, 3, 4 ; Max. add-on N.C. auxiliary contacts (CA4, CAL4): 2 max. with 1 CE5, none with 2 CE5 | | | | | | | | |
| NF | 4 0 | E | 2 | + 2 max. | – | | – | – |
| | | | 1 | + 3 max. | – | + | 1 | – |
| | | | 1 | + 1 max. | – | + | 1 | + 1 |
| On positions 1 ±30°, 5 ; Max. add-on N.C. auxiliary contacts (CA4): none with 1 CE5 | | | | | | | | |
| NF | 2 2<br>3 1 | E<br>E | 1 | + 3 max. | – | | – | – |
| On positions 1 ±30°, 5 ; Max. add-on N.C. auxiliary contacts (CA4, CAL4): 1 max. with 1 CE5 | | | | | | | | |
| NF | 4 0 | E | 1 | + 3 max. | – | + | 1 | – |

# Auxiliary contact blocks for AF116 ... AF2850 contactors




CAL19-11




CAL18-11

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits for standard industrial environments.

Types of auxiliary contact blocks for side mounting:

- CAL 2-pole block, with instantaneous N.O. + N.C. contacts.

For clipping onto the right- and/or left-hand side of the contactors.

The CAL ...-11B is a second block for mounting in addition to a first CAL ...-11 block, right- and/or left-hand of the AF116 ... AF2850 contactors.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| **Side-mounted instantaneous auxiliary contact blocks** | | | | | |
| AF116 ... AF370 | 1 1 | CAL19-11 | 1SFN010820R1011 | 1 | 0.040 |
| | 1 1 | CAL19-11B | 1SFN010820R3311 | 1 | 0.040 |
| AF400 ... AF2850 | 1 1 | CAL18-11 | 1SFN010720R1011 | 2 | 0.050 |
| | 1 1 | CAL18-11B | 1SFN010720R3311 | 2 | 0.050 |

For each contactor type, refer to "Accessory fitting details" table.

# Auxiliary contact blocks for AF116 ... AF2850 contactors

## Technical data



### Contact utilization characteristics according to IEC

| Types | | | CAL18 | CAL19 |
|---|---|---|---|---|
| Standards | | | IEC/EN 60947-5-1 | |
| Rated insulation voltage Ui acc. to IEC 60947-5-1 | | | 690 V | |
| Rated impulse withstand voltage Uimp. | | | 6 kV | |
| Pollution degree | | | 3 | |
| Rated operational voltage Ue max. | | | 24...690 V AC | |
| Conventional thermal current Ith - θ ≤ 40 °C | | | 16 A | |
| Rated frequency (without derating) | | | 50/60 Hz | |
| Ie / Rated operational current AC-15 | | | | |
| acc. to IEC 60947-5-1 | | 24-127 V 50/60 Hz | 6 A | |
| | | 220-240 V 50/60 Hz | 4 A | |
| | | 380-440 V 50/60 Hz | 3 A | |
| | | 500-690 V 50/60 Hz | 2 A | |
| Making capacity acc. to IEC 60947-5-1 | | | 10 x Ie AC-15 | |
| Breaking capacity acc. to IEC 60947-5-1 | | | 10 x Ie AC-15 | |
| Ie / Rated operational current DC-13 | | | | |
| acc. to IEC 60947-5-1 | | 24 V DC | 6 A / 144 W | 3 A / 72 W |
| | | 48 V DC | 2.8 A / 134 W | 1.5 A / 72 W |
| | | 72 V DC | 1 A / 72 W | 1 A / 72 W |
| | | 110 V DC | 0.55 A / 60 W | 0.55 A / 60 W |
| | | 125 V DC | 0.55 A / 69 W | 0.55 A / 69 W |
| | | 220 V DC | 0.3 A / 66 W | 0.3 A / 69 W |
| | | 250 V DC | 0.3 A / 75 W | 0.3 A / 75 W |
| Short-circuit protection device gG type fuse | | | 10 A | |
| Rated short-time withstand current Icw | | for 1.0 s | 100 A | |
| θ = 40 °C | | for 0.1 s | 140 A | |
| Minimum switching capacity | | | 24 V / 50 mA (0.5 million of operating cycles) | 24 V / 50 mA |
| with failure rate acc. to IEC 60947-5-4 | | | ≤ $10^{-6}$ | |
| Power dissipation per pole at 6 A | | | 0.15 W | |
| Mechanical durability | Number of operating cycles | | 3 millions (A/AF400 ... AF750) | |
| | | | 0.5 million (AF1250 ... AF2050) | 5 millions operating cycles |
| | Max. switching frequency | | 3600 cycles/h | 300 cycles/h |
| Max. electrical switching frequency | | AC-15 | 1200 cycles/h | 300 cycles/h |
| | | DC-13 | 900 cycles/h | 300 cycles/h |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | | N.C. auxiliary contacts are mirror contacts (1) | |

(1) CAL19: for 3-pole contactors only.

### Contact utilization characteristics according to UL / CSA

| Types | CAL18 | CAL19 |
|---|---|---|
| Standards | UL 508, CSA C22.2 No. 14 | |
| Max. operational voltage | 600 V AC, 250 V DC | |
| Pilot duty | A600, Q300 | |
| AC thermal rated current | 10 A | |
| AC maximum volt-ampere making | 7200 V A | |
| AC maximum volt-ampere breaking | 720 V A | |
| DC thermal rated current | 2.5 A | |
| DC maximum volt-ampere making-breaking | 69 V A | |

### Connecting characteristics

| Types | | | CAL18 | CAL19 |
|---|---|---|---|---|
| Connection capacity (min. ... max.) | | | | |
|  | Rigid Solid/Stranded | 1 x | 1...4 mm² | |
|  | | 2 x | 1...4 mm² | |
|  | Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² | |
|  | | 2 x | 0.75...2.5 mm² | |
|  | Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² | |
|  | | 2 x | 0.75...2.5 mm² | |
|  | Lugs | L ≤ | 8 mm | |
| | | I > | 3.7 mm | |
| Connection capacity acc. to UL/CSA | | 1 or 2 x | AWG18...14 | |
| Stripping length | | | 9 mm | |
| Tightening torque | | | 1 Nm | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | IP20 | |
| Screw terminals | | | Delivered in open position, screws of unused terminals must be tightened | |
| All terminals | | | M3.5 | |
| Screwdriver type | | | Flat Ø 5.5 / Pozidriv 2 | |

# Auxiliary contact blocks for AF116 ... AF2850 contactors for severe industrial environments





1SFC101214V0001

CEL19



1SFC101083V0001

CEL18

The auxiliary contact blocks are used for the operation of auxiliary and control circuits for severe industrial environments.

Types of auxiliary contact blocks for side mounting:

- CEL 1-pole block, with built-in microswitch IP67 degree of protection (IP20 on terminals). Instantaneous N.O. or N.C. contact.

For clipping onto the right- and/or left-hand side of the contactors.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|
| |  | | | | kg |
| **Side-mounting instantaneous auxiliary contact blocks** | | | | | |
| AF116 ... AF370 | 1 0 | CEL19-10 | 1SFN010832R1010 | 1 | 0.040 |
| | 0 1 | CEL19-01 | 1SFN010832R1001 | 1 | 0.040 |
| AF400 ... AF2850 | 1 0 | CEL18-10 | 1SFN010716R1010 | 1 | 0.050 |
| | 0 1 | CEL18-01 | 1SFN010716R1001 | 1 | 0.050 |

For each contactor type, refer to "Accessory fitting details" table.

# Auxiliary contact blocks for AF116 ... AF2850 contactors for severe industrial environments

## Technical data

### Contact utilization characteristics according to IEC

| Types | | | CEL18, CEL19 |
|---|---|---|---|
| Standards | | | IEC/EN 60947-5-1 |
| Rated insulation voltage Ui acc. to IEC 60947-5-1 | | | 250 V |
| Pollution degree | | | 3 |
| Rated operational voltage Ue max. | | | 125 V |
| Conventional thermal current Ith - θ ≤ 40 °C | | | 0.1 A |
| Ie / Rated operational current AC-14 | | | |
| acc. to IEC 60947-5-1 | | 24-127 V 50/60 Hz | 0.1 A |
| Making capacity acc. to IEC 60947-5-1 | | | 6 x Ie AC-14 |
| Breaking capacity acc. to IEC 60947-5-1 | | | 6 x Ie AC-14 |
| Ie / Rated operational current DC-12 | | | |
| acc. to IEC 60947-5-1 | | 24 V DC | 0.1 A |
| | | 48 V DC | 0.1 A |
| | | 72 V DC | 0.1 A |
| | | 110 V DC | 0.1 A |
| | | 220 V DC | – |
| Short-circuit protection device | | | 0.1 A (FF type fuses) (1) |
| Minimum switching capacity | | | |
| with failure rate acc. to IEC 60947-5-4 | | | 3 V / 1 mA |
| Mechanical durability | Number of operating cycles | | 1 million (2) |
| | Max. switching frequency | | 1200 cycles/h (2) |
| Electrical durability | Number of operating cycles | | 0.7 millions (2) |
| | Max. switching frequency | AC-14, AC15 | 1200 cycles/h (2) |
| | | DC-12 | 900 cycles/h (2) |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | | N.C. auxiliary contacts are mirror contacts |

### Contact utilization characteristics according to UL / CSA

| Types | CEL18, CEL19 |
|---|---|
| Standards | UL 508, CSA C22.2 No. 14 |
| Max. operational voltage | 125 V |
| Pilot duty | |
| AC thermal rated current | 0.1 A |

### Connecting characteristics

| Types | | | CEL18, CEL19 |
|---|---|---|---|
| Connection capacity (min. ... max.) | | | |
|  | Rigid Solid/Stranded | 1 x | 1...4 mm² |
|  | | 2 x | 1...4 mm² |
|  | Flexible with ferrule | 1 x | 0.75...2.5 mm² |
|  | | 2 x | 0.75...2.5 mm² |
|  | Lugs | L ≤ | 7.7 mm |
| | | l > | 3.7 mm |
| Connection capacity acc. to UL/CSA | | 1 or 2 x | AWG 18...14 |
| Tightening torque | | | 1 Nm |
| Degree of protection | | Terminals | IP20 |
| acc. to IEC/EN 60947-1 and IEC/EN 60529 | | Microswitches | IP20 |
| Screw terminals | | | Delivered in open position, screws of unused terminals must be tightened |
| All terminals | | | M3.5 |
| Screwdriver type | | | Flat Ø 5.5 / Pozidriv 2 |

(1) or HRC fuses for very fast action (6.3 x 32 mm size).
(2) For CEL19, please consult us.

# Auxiliary contacts for AF09 ... AF96 contactors and NF contactor relays

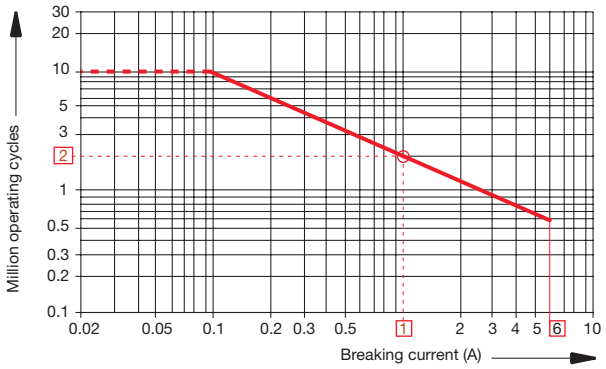
## Electrical durability

### Electrical durability for AC-15 utilization category

AC-15 utilization category according to IEC/EN 60947-5-1:
- making current: 10 x Ie with cos ϕ = 0.7 and Ue
- breaking current: Ie with cos ϕ = 0.4 and Ue.

These curves represent the electrical durability of the built-in or add-on auxiliary contacts in relation to the breaking current.

The curves have been drawn for resistive and inductive loads up to 690 V, 40...60 Hz.

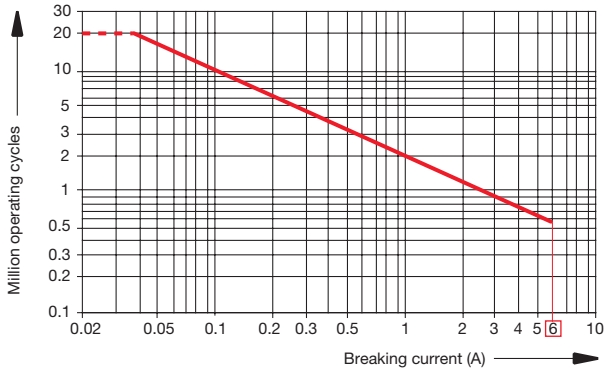



- AF09 ... AF96 contactor built-in auxiliary contacts
- 1-pole and 4-pole CA4, 2-pole CAT4,
  1-pole CC4,
  2-pole CAL4 add-on auxiliary contacts.

Example:

Breaking current = 1 A

On the opposite curve at intersection "O" 1 A the corresponding value for the electrical durability is approximately 2 millions operating cycles.

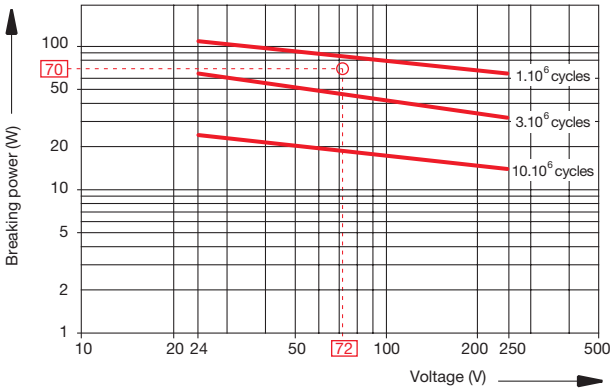



NF contactor relays.

(For add on auxiliary contacts see curve above).

### Electrical durability for DC-13 utilization category

DC-13 utilization category according to IEC/EN 60947-5-1: making and breaking current Ie and Ue.




- AF09 ... AF96 contactor built-in auxiliary contacts 1-pole and 4-pole CA4, 2-pole CAT4, 1-pole CC4,
- 2-pole CAL4 add-on auxiliary contacts,
- NF contactor relays.

Example:

Control of DC electro-magnet:
Ue voltage = 72 V DC and breaking power = 70 W.

On the opposite curve at intersection "O" 72 V / 70 W the corresponding value for the electrical durability is approximately 2 millions operating cycles.

# Auxiliary contact blocks for AF116 ... AF2850 contactors

## Electrical durability



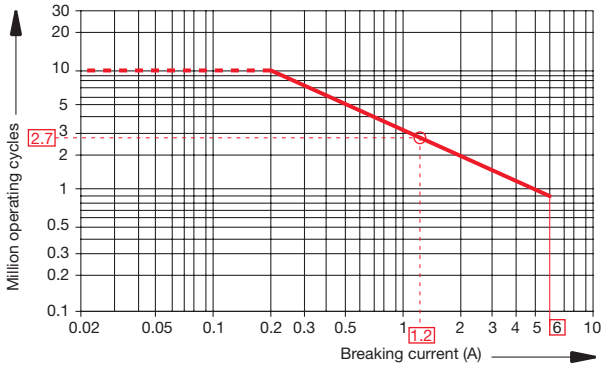
### Electrical durability for AC-15 utilization category

AC-15 utilization category according to IEC/EN 60947-5-1:

- making current: 10 x Ie with cos ϕ = 0.7 and Ue
- breaking current: Ie with cos ϕ = 0.4 and Ue.

This curves represent the electrical durability of the add-on auxiliary contacts, in relation to the breaking current.

The curves have been drawn for resistive and inductive loads up to 690 V, 40...60 Hz.




- AF116 ... AF2850 contactors auxiliary contacts
- 2-pole CAL18 and CAL19 add-on auxiliary contacts

Example:

Breaking current = 1.2 A

On the opposite curve at intersection "O" 1.2 A the corresponding value for the electrical durability is approximately 2.7 millions operating cycles.

# Electronic timers




TEF4-ON




TEF4-OFF




TEF4S-ON




TEF4S-OFF

TEF4 frontal electronic timers are used for realizing timing function and are available in ON-delay and OFF-delay versions.

**Compact solution in cabinet compared to separate timers**

TEF4 electronic timers are front-mounted and locked on AF contactors or NF contactor relays. A mechanical indicator allows to show the state of the contactor.

**Safe and cost-reduced wiring**

TEF4 electronic timers are supplied by a direct plug-in parallel connection to the coil terminals A1 - A2 of the contactor or contactor relay. A varistor is integrated on the timer to offer a built-in protection against surges in the contactor coil.

**Available for a wide control voltage range 24...240 V AC/DC**

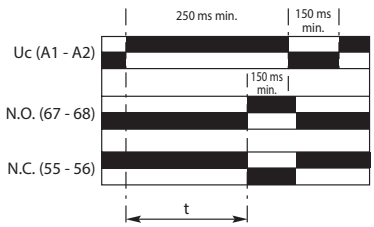
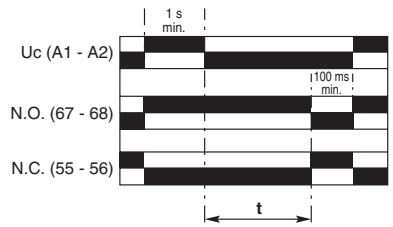
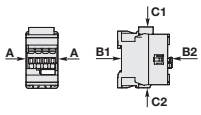
TEF4-ON or TEF4-OFF allow time-delayed functions up to 100 s in 3 distinct time ranges, independently of the control system. The time delay ranges are selected by a switch and the time delay can be adjusted by means of a rotary switch. The timing function is activated by closing or opening the device on which the timer is mounted. The OFF-delay version operates without additional control supply.

| For contactors, contactor relays | Time delay range selected by switch | Delay type | Rated control circuit voltage Uc<br>V 50/60 Hz or DC | Auxiliary contacts | Type | Order code | | Weight Pkg (1 pce)<br>kg |
|---|---|---|---|---|---|---|---|---|
| **With screw terminals** | | | | | | | | |
| AF09 ... AF96<br>NF 4-pole | 0.1...1 s<br>1...10 s<br>10...100 s | ON-delay<br>OFF-delay | 24...240<br>24...240 | 1 1<br>1 1 | TEF4-ON<br>TEF4-OFF | 1SBN020112R1000<br>1SBN020114R1000 | | 0.065<br>0.065 |
| **With spring terminals** | | | | | | | | |
| AF09 ... AF96<br>NF..K 4-pole | 0.1...1 s<br>1...10 s<br>10...100 s | ON-delay<br>OFF-delay | 24...240<br>24...240 | 1 1<br>1 1 | TEF4S-ON<br>TEF4S-OFF | 1SBN020113R1000<br>1SBN020115R1000 | | 0.065<br>0.065 |

# Electronic timers
## Technical data



### Contact utilization characteristics according to IEC

| Types | | | TEF4-ON | TEF4-OFF |
|---|---|---|---|---|
| Standards | | | IEC/EN 60947-5-1 | |
| Rated insulation voltage Ui acc. to IEC 60947-5-1 | | | 400 V | |
| Rated impulse withstand voltage Uimp | | | 4 kV | |
| Pollution degree | | | 3 | |
| Rated operational voltage Ue max. | | | 240 V AC / 24 V DC | |
| Rated frequency (without derating) | | | 50 / 60 Hz | |
| Conventional thermal current Ith - θ ≤ 40 °C | | | 5 A | |
| Ie / Rated operational current AC-15 | | | | |
| acc. to IEC 60947-5-1 | | 24-127 V 50/60 Hz | 3 A | |
| | | 220-240 V 50/60 Hz | 1.5 A | |
| Making capacity acc. to IEC 60947-5-1 | | | 10 x Ie AC-15 | |
| Breaking capacity acc. to IEC 60947-5-1 | | | 10 x Ie AC-15 | |
| Ie / Rated operational current DC-13 | | | | |
| acc. to IEC 60947-5-1 | | 24 V DC | 1 A / 24 W | |
| Short-circuit protection device gG type fuse | | | 10 A | |
| Conditional short-circuit current | | | 1 kA | |
| Rated short-time withstand current Icw | | for 1.0 s | 8 A | |
| θ = 40 °C | | for 0.1 s | 8 A | |
| Minimum switching capacity | | | 12 V / 3 mA | |
| with failure rate acc. to IEC 60947-5-4 | | 24 V DC | $10^{-7}$ | |
| Power dissipation per pole at 3 A | | | 0.1 W | |
| Function diagram | | | ON-delay   | OFF-delay   |
| | | | Bistable relay inside.<br>Before use, once apply Uc then switch it off in order to initialize position of the contacts. | |
| Control circuit voltage | | | | |
| AC control voltage | Rated control circuit voltage Uc | | 24...240 V AC | |
| 50/60 Hz | Average consumption | | 1.5 mA RMS | 1 mA RMS |
| DC control voltage | Rated control circuit voltage Uc | | 24...240 V DC | |
| | Average consumption | | 1.5 mA | 1 mA |
| Rated frequency limits | | | 50 / 60 Hz | |
| Supply voltage range | | | 0.85...1.1 x Uc (at θ ≤ 70 °C) | |
| Overvoltage protection | | | Varistor included | |
| Time delay range (t) selected by switch | | 0.1...1 s |  | |
| | | 1...10 s |  | |
| | | 10...100 s |  | |
| On-load reiteration accuracy under constant conditions | | | ≤ 1 % | |
| Minimum ON period | | | 0.15 s | 1 s |
| Recovery time | | | 0.15 s | 0.1 s |
| Ambient air temperature | Operation | | -25 °C ... +70 °C | |
| | Storage | | -40 °C ... +80 °C | |
| Climatic withstand | | | Category B according to IEC 60947-1 Annex Q | |
| Maximum operating altitude | | | 2000 m | |
| Mounting positions | | | Mounting positions 1, 1 +/- 30°, 2, 3, 4, 5 | |
| Shock withstand acc. to IEC/EN 60068-2-27 | | | 1/2 sinusoidal shock for 11 ms: no change in contact position | |
| (Mounting position 1)   | | | For use with AF09(Z) ... AF38(Z) 1-stack contactors or NF(Z) 4-pole contactor relays<br>- shock direction A: 25g<br>- other shock directions B1, B2, C1, C2: same as contactors or contactor relays.<br><br>For use with AF40 ... AF96: same as contactors. | |
| Vibration withstand | | | 5...300 Hz | |
| acc. to IEC 60068-2-6 | | | 3 g closed position / 2 g open position | |
| Mechanical durability | | | | |
| | Number of operating cycles | | 5 millions operating cycles | |
| | Max. switching frequency | | 3600 cycles/h | 1800 cycles/h |
| Max. electrical switching frequency | | | | |
| | | AC-15 | 1200 cycles/h | |
| | | DC-13 | 900 cycles/h | |

# Electronic timers

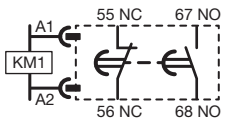
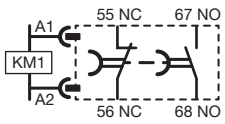
## Technical data



### Contact utilization characteristics according to UL / CSA

| Types | TEF4-ON | TEF4-OFF |
|---|---|---|
| Standards | UL 508, CSA C22.2 No. 14-18 | |
| Rated insulation voltage Ui acc. to UL / CSA | 300 V | |
| Max. operational voltage | 240 V | |
| Pilot duty | B300, R300 | |
| AC thermal rated current | 5 A | |
| AC maximum volt-ampere making | 3600 VA | |
| AC maximum volt-ampere breaking | 360 VA | |
| DC thermal rated current | 1 A | |
| DC maximum volt-ampere making-breaking | 28 VA | |

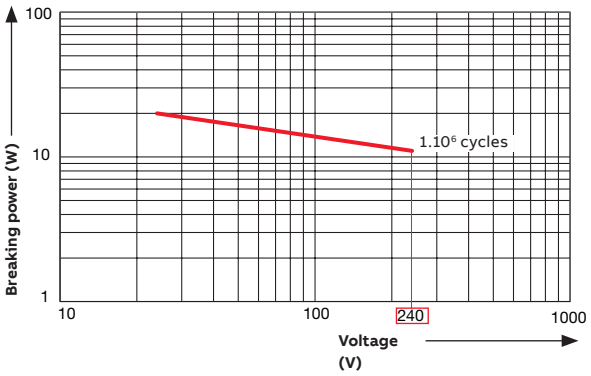
### Connecting characteristics

| | | | |
|---|---|---|---|
| Connection capacity (min. ... max.) | | | |
|  | Rigid Solid/Stranded | 1 x | 1...2.5 mm² |
|  | | 2 x | 1...2.5 mm² |
|  | Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² |
|  | | 2 x | 0.75...2.5 mm² |
|  | Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² (0.75 ... 1.5 mm² with spring terminals) |
|  | | 2 x | 0.75...1.5 mm² (0.75 ... 1.5 mm² with spring terminals) |
|  | Lugs | L ≤ | 8 mm (1) |
| | | l > | 3.7 mm (1) |
| Connection capacity acc. to UL / CSA | | 1 or 2 x | AWG 18...14 |
| Stripping length | | | 10 mm |
| Tightening torque | | | 1.2 N.m / 11 lb.in (1) |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | IP20 |
| Screw terminals | | | Delivered in open position, screws of unused terminals should be tightened |
| All terminals | | | M3.5 |
| Screwdriver type | | | Flat Ø 5.5 / Pozidriv 2 |
| Spring terminals | | | |
| Screwdriver type | | | Ø 3.5 |
| Terminal Marking | | |     |

(1) Not applicable for TEF4S-ON and TEF4S-OFF with spring terminals.

### Electrical durability for DC-13 utilization category

DC-13 utilization category according to IEC/EN 60947-5-1: making and breaking current Ie and Ue.



# Interlocks

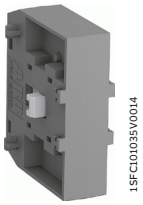





VM4

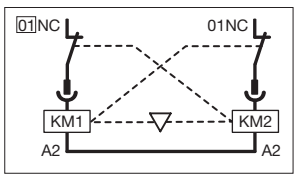
## Mechanical interlock units

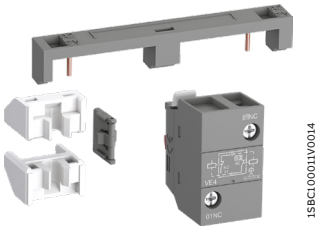
The VM mechanical interlock units are designed for the interlocking of two AF contactors.
When mounted between two contactors, the VM mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed.
The mechanical interlock units VM4 and VM96-4 include 2 fixing clips (BB4).



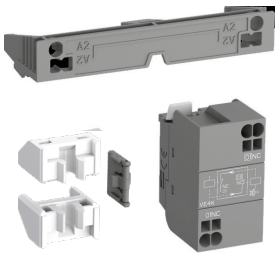

VM19

| For contactors | Mounting | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| **Mechanical interlock units for two contactors mounted side by side** | | | | | |
| AF09 ... AF38..-30-..<br>AF09 ... AF38..-40-00 | | VM4 | 1SBN030105T1000 | 10 | 0.005 |
| AF40 ... AF96-30-..<br>AF40 ... AF80-40-00 | | VM96-4 | 1SBN033405T1000 | 10 | 0.006 |
| For same size contactors:<br>AF116 ... AF146<br>AF190, AF205<br>AF265 ... AF370 | | VM19 | 1SFN030300R1000 | 1 | 0.054 |
| AF116 ... AF146 and<br>AF190, AF205 | | VM140/190 | 1SFN034403R1000 | 1 | 0.088 |
| AF190, AF205 and<br>AF265 ... AF370 | | VM205/265 | 1SFN035203R1000 | 1 | 0.090 |
| AF265 ... AF370 and<br>AF400 ... AF460 | | VM370/400H | 1SFN035403R1000 | 1 | 0.100 |
| AF400 ... AF1250 | | VM750H | 1SFN035700R1000 | 1 | 0.200 |
| AF1350 ... AF2650 | Plate included | VM1650H | 1SFN036503R1001 | 1 | 6.000 |
| **Mechanical interlock units for two contactors mounted one above the other** | | | | | |
| AF400 ... AF1250 | Additional plate (not supplied) | VM750V | 1SFN035701R1000 | 1 | 0.200 |




VEM4



VEM4K




BB4

## Mechanical and electrical interlock sets

VEM4 and VEM4K mechanical and electrical interlock sets for the respective interlocking of two AF and AF..K contactors.
VEM4(K) set includes a mechanical interlock unit VM4 with 2 fixing clips (BB4) and a VE4(K) electrical interlock block with A2-A2 connection.
Fixing the electrical interlock block to the contactor front face connects the 2 built-in N.C. interlocking contacts with the two coils. VE4(K) block must be used with A2-A2 connection to respect the electrical connection diagram.

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| **Mechanical and electrical interlock set for AF with screw terminals** | | | | | |
| For same size contactors:<br>AF09 ... AF16..-30-..<br>AF26 ... AF38..-30-00<br>AF09, AF16..-40-00<br>AF26, AF38..-40-00 | 0 2 | VEM4 | 1SBN030111R1000 | 1 | 0.035 |
| **Mechanical and electrical interlock set for AF..K with Push-in Spring terminals** | | | | | |
| For same size contactors:<br>AF09..K ... AF16..K<br>AF26..K ... AF38..K<br>AF09, AF16..-40-00K | 0 2 | VEM4K | 1SBN030113R1000 | 1 | 0.030 |

Note: VEM4(K) not suitable for AF..Z..(K) contactors with DC control voltage 12...20 V DC (coil 20) and 24 V DC (coil 30).

## Fixing clips

| | | | | |
|---|---|---|---|---|
| AF09 ... AF96 | BB4 | 1SBN110120W1000 | 50 | 0.002 |

# Interlocks
## Technical data



### Mechanical interlock unit

| Types | | VM4, VM96-4 | VM19 ... VM750 | VM1650H |
|---|---|---|---|---|
| Mechanical durability | Number of operating cycles | 5 millions operating cycles | 1 million operating cycles | 500 000 operating cycles |
| | Max. mechanical switching frequency | 1800 cycles/h | 300 cycles/h | |

### Mechanical and electrical interlock set

### Contact utilization characteristics according to IEC

| Types | | VEM4, VEM4K |
|---|---|---|
| Standards | | IEC/EN 60947-5-1 |
| Rated insulation voltage Ui acc. to IEC 60947-5-1 | | 690 V |
| Rated impulse withstand voltage Uimp. | | 6 kV |
| Pollution degree | | 3 |
| Rated control circuit voltage Uc | | |
| | AC 50/60 Hz control voltage | 24...500 V AC |
| | DC control voltage | 20...500 V DC |
| Conventional thermal current Ith - θ ≤ 40 °C | | 16 A |
| Mechanical durability | Number of operating cycles | 5 millions operating cycles |
| | Max. mechanical switching frequency | 1800 cycles/h |
| Electrical durability | Max. electrical switching frequency | 1200 cycles/h |

### Contact utilization characteristics according to UL / CSA

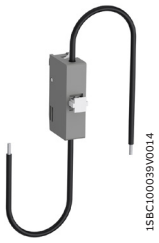
| Types | VEM4, VEM4K |
|---|---|
| Standards | UL 60947-1, UL 60947-4-1, CSA C22.2 No. 60947-1-13, CSA C22.2 No. 60947-4-1 |
| Max. operational voltage | 500 V AC, 500 V DC |

### Connecting characteristics

| Types | | | VEM4 |
|---|---|---|---|
| Connection capacity (min. ... max.) | | | |
| | Rigid Solid/Stranded | 1 x | 1...2.5 mm² |
| | | 2 x | 1...2.5 mm² |
| | Flexible with ferrule | 1 x | 0.75...2.5 mm² |
| | | 2 x | 0.75...2.5 mm² |
| | Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² |
| | | 2 x | 0.75...1.5 mm² |
| L | Lugs | L < | 8 mm |
| Connection capacity acc. to UL / CSA | | 1 or 2 x | AWG 18...14 |
| Stripping length | | | 10 mm |
| Tightening torque | | | 1.2 Nm / 11 lb.in |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | IP20 |
| Screw terminals | | | Delivered in open position, screws of unused terminals must be tightened |
| All terminals | | | M3.5 |
| Screwdriver type | | | Flat Ø 5.5 / Pozidriv 2 |

| Types | | | VEM4K |
|---|---|---|---|
| Connection capacity (min. ... max.) | | | |
| | Rigid solid | 1 x | 1 ... 2.5 mm² |
| | | 2 x | 1 ... 2.5 mm² |
| | Flexible with ferrule | 1 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm² |
| | | 2 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm² |
| | Flexible with insulated ferrule | 1 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm² |
| | | 2 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm² |
| | Flexible without ferrule | 1 x | (spring) 0.5 ... 2.5 mm² |
| | | 2 x | (spring) 0.5 ... 2.5 mm² |
| Connection capacity acc. to UL/CSA | | 1 or 2 x | AWG 18 ... 14 |
| Stripping length | | | 10 mm |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | IP20 |
| Screwdriver type | | | Flat Ø 3 mm x 0.5 mm |

# Impulse contact blocks




CB5

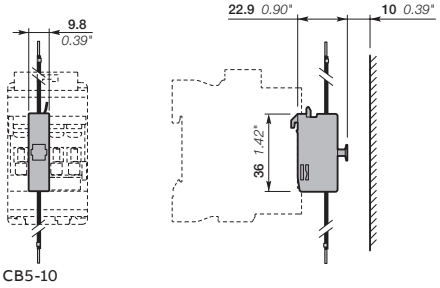
Impulse contact blocks are designed for use in enclosures, in association with an adjustable mechanical pushbutton. Two types are available:

- CB5-10: N.O. contact with a black actuator ("ON" function)
- CB5-01: N.C. contact with a light grey actuator ("OFF" function).

These blocks are equipped with 2 connecting leads 0.5 mm² with end, approximately 18 cm long.

Mounting: Clipped onto the front face of the contactors.

| For contactors | Contacts | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|
| | | | | | | kg |
| AF09 ... AF96 | 1 | – | CB5-10 | 1SBN010013R1010 | 1 | 0.012 |
| | – | 1 | CB5-01 | 1SBN010013R1001 | 1 | 0.012 |




Main dimensions mm, inches

# Interface relays






RA4

RA4 interface relay is designed to receive 24 V DC signals delivered by PLC's or other sources with a low output power and to restore them with sufficient power to operate the coils of the relevant AF09 ... AF96 contactors or the NF contactor relays. RA4 interface relay is made up of a miniature electromechanical relay equipped with a N.O. contact and with a low consumption 24 V DC coil.

The interface relay coil is controlled by the PLC while the N.O. contact ensures switching of the power contactor.

Coil switching gives rise to overvoltages which have adverse effects on the electronic devices, insulators and, more generally, on component lifetime. The RA4 is protected from surge thanks to the built-in surge protection of AF09 ... AF96. Furthermore, the RA4 is protected against relay pole reversal by a diode inserted between the E1 and E2 input terminals.

### Connection

The "E1+" and "E2–" input terminals must be connected, according to their polarity, to the PLC-output.

The RA4 is equipped with two terminal pads for connection to the A1 and A2 terminals of the contactor coil.

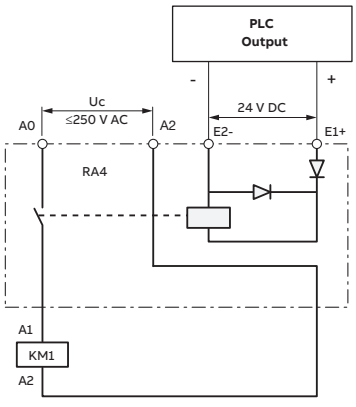
This coil is supplied between the A0 and A2 terminals of the RA4.

### Mounting

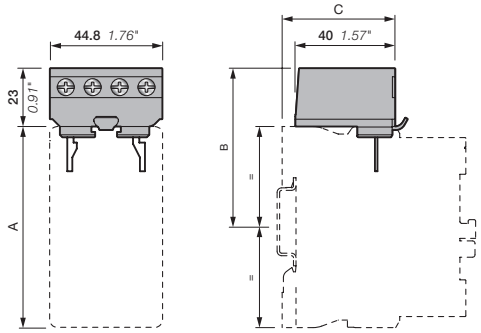
Remove the coil terminal block from the contactor and clip the interface relay without any screwing operation.

| For contactors (1) | Coil voltages (2)<br>V AC 50/60 Hz (4) | Rated control circuit voltage Uc<br>V DC | Type | Order code | Pkg qty | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|---|
| AF09 ... AF96<br>NF | 24 ... 250 | 24 | RA4 | 1SBN060100R1000 | 1 | 0.040 |

(1) LDC4 additional terminal blocks and CAT4 auxiliary contact blocks not suitable with RA4.
(2) Main use with contactor coils 41, 11, 12, 13.




Wiring diagram




| RA4 mounted on | AF09 ... AF38 | AF40 ... AF96 |
|---|---|---|
| A | 80 mm / 3.15" | 119.5 mm / 4.70" |
| B | 63 mm / 2.48" | 83 mm / 3.27" |
| C | 45 mm / 1.77" | 40 mm / 1.57" |

Main dimensions mm, inches

# Interface relays
## Technical data



### Utilization characteristics according to IEC

| Type | | | RA4 |
|---|---|---|---|
| Standards | | | IEC/EN 60947-5-1 |
| Rated insulation voltage Ui acc. to IEC 60947 5-1 | | | 250 V AC 50/60 Hz |
| Pollution degree | | | 3 |
| Ambient air temperature | | | |
| In free air operation | at Uc = 24 V DC (between E1 and E2) | | -25 ... +70 °C |
| | from 0.85 to 1.1 x Uc | | -25 ... +60 °C |
| Storage | | | -40 ... +70 °C |
| Climatic withstand | | | Category B according to IEC 60947-1 Annex Q |
| Maximum operating altitude | | | ≤3000 m |
| Mounting positions | | | Mounting positions 1, 1 ±30°, 2, 3, 4, 5 |

### Connecting characteristics

| Connection capacity (min. ... max.) | | | |
|---|---|---|---|
|  | Rigid Solid/Stranded | 1 x | 1 ... 2.5 mm² |
|  | | 2 x | 1 ... 2.5 mm² |
|  | Flexible with non insulated ferrule | 1 x | 0.75 ... 2.5 mm² |
|  | | 2 x | 0.75 ... 2.5 mm² |
|  | Flexible with insulated ferrule | 1 x | 0.75 ... 2.5 mm² |
|  | | 2 x | 0.75 ... 1.5 mm² |
|  | Lugs | L < | 8 mm |
| Connection capacity acc. to UL/CSA | | 1 or 2 x | AWG 18 ... 14 |
| Stripping length | | | 10 mm |
| Tightening torque | | | 1.2 Nm / 11 lb.in |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | IP20 protection against direct contact in acc. with EN 50274<br>RA4 wired and mounted on the associated contactor |
| Screw terminals | | | Delivered in open position |
| All terminals | | | M3.5 |
| Screwdriver type | | | Flat Ø 5.5 / Pozidriv 2 |

### Working data

| Surge suppression | | |
|---|---|---|
| For interface relay coil | | Included inside AF built-in surge protection |
| Protection against polarity reversal between terminals E1 and E2 | | Diode |
| Interface relay operating time | | Closing and drop-out ≤10 ms |
| Total operating time interface relay + contactor (1) | | |
| Between energization and: | N.O. contact closing | 42 ... 95 ms (AF09 ... AF38, NF)<br>44 ... 105 ms (AF40 ... AF96) |
| | N.C. contact opening | 40 ... 90 ms (AF09 ... AF38, NF)<br>40 ... 100 ms (AF40 ... AF96) |
| Between de-energization and: | N.O. contact opening | 15 ... 57 ms (AF09 ... AF38, NF)<br>21 ... 107 ms (AF40 ... AF96) |
| | N.C. contact closing | 17 ... 60 ms (AF09 ... AF38, NF)<br>23 ... 112 ms (AF40 ... AF96) |

(1) For contactor coils 41, 11, 12, 13.

### Electrical input data

| Control voltage (E1 and E2 terminals) Uc | | |
|---|---|---|
| Rated value | | 24 V DC |
| Max. range at ambient temperature 20 °C | | 19 ... 30 V DC |
| Max. consumption for Uc = 24 V DC, θ = 20 °C | | 0.3 W |
| "0" status (relay open) | for Uc | ≤2.4 V DC |
| | for Ic | <1 mA |
| "1" status (relay closed) | for Uc | ≥19 V DC |
| Max. short supply interruption immunity time | | 2 ms |
| Short-circuit protection device gG fuse rating | | 10 A |

### Electrical output data

| Switching voltage (A0 and A2 terminals) | ≤250 V AC |
|---|---|
| Electrical durability | |
| Switching frequency | 600 cycles/h |
| Number of operating cycles | 2 million operating cycles |

# Mechanical latching units






WA4

The WA4 mechanical latching unit for AF09 ... AF96 contactors and NF contactor relays ensures that the contactor or contactor relay remains switched on even if there is a lack or a failure of voltage. Standard contactors can be easily converted into compact latched contactors.

The WA4 block contains a mechanical latching device with electromagnetic impulse unlatching (AC or DC) or manual unlatching.

## Operation

After closing, the contactor continues to be held in the closed position by the latching mechanism should the supply voltage fail at the contactor coil terminals.

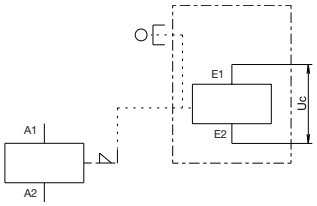
Contactor opening can be controlled:

- electrically by an impulse (AC or DC) on the WA4 block coil (the coil is not designed to be permanently energized)
- manually by pressing the pushbutton on the front face of the WA4 block.

## Mounting

The WA4 block is clipped onto the front face of the 1-stack contactor where it takes up two slots in central position (see fig. below).
The two other slots may accept CA4 single pole auxiliary contacts (1 block on each side of the mechanical latch).

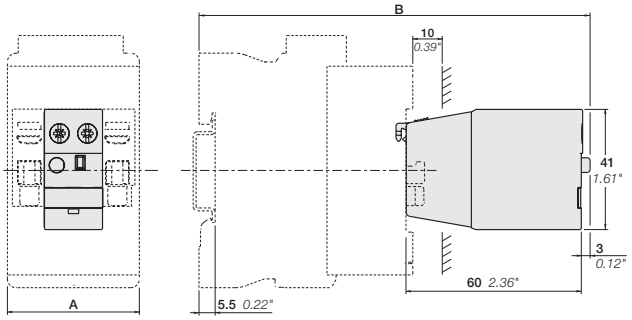
Additional CAL4 can be fitted on the side of the contactor in respect to the total number of built-in or additional N.O. and N.C. auxiliary contacts as described in the accessory fitting details part of each contactor type.




Wiring diagram

| For contactors and contactor relays | Rated control circuit voltage Uc | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|
| | V AC 50/60 Hz | V DC | | | | kg |
| AF09 ... AF65, 4-pole NF | 24...60 | 24...60 | WA4-11 | 1SBN040100R1011 | 1 | 0.080 |
| | 48...130 | 48...130 | WA4-12 | 1SBN040100R1012 | 1 | 0.080 |
| | 100...250 | 100...250 | WA4-13 | 1SBN040100R1013 | 1 | 0.080 |
| | 250...500 | 250...500 | WA4-14 | 1SBN040100R1014 | 1 | 0.080 |
| AF80, AF96 | 24...60 | 24...60 | WA4-96-11 | 1SBN040200R1011 | 1 | 0.080 |
| | 48...130 | 48...130 | WA4-96-12 | 1SBN040200R1012 | 1 | 0.080 |
| | 100...250 | 100...250 | WA4-96-13 | 1SBN040200R1013 | 1 | 0.080 |
| | 250...500 | 250...500 | WA4-96-14 | 1SBN040200R1014 | 1 | 0.080 |
| **Mechanical latching unit for 24 V DC - 500 mA PLC control** | | | | | | |
| AF09 ... AF38, 4-pole NF | – | 24 | WA4-10 | 1SBN040100R1010 | 1 | 0.080 |

Note: For WA4 accessory use with contactor or contactor relay coil 30, please consult your ABB local sales organization.




WA4 + AF09 ... AF96, NF 1-stack

Main dimensions mm, inches

# Mechanical latching units

## Technical data

| Types | | | WA4, WA4-96 | WA4 |
|---|---|---|---|---|
| Coil voltage code | | | 11, 12, 13, 14 | 10 |
| Standards | | | IEC/EN 60947-4-1 | |
| Rated insulation voltage Ui | | | | |
| acc. to IEC 60947-1 | | | 690 V AC | |
| Pollution degree 3 | | | 3 | |
| Coil operating limits | | AC supply | At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max | – |
| acc. to IEC 60947-4-1 | | DC supply | At θ ≤ 70 °C 0.85 x Uc min ... 1.1 x Uc max | At θ ≤ 70 °C 0.85 x Uc ... 1.1 x Uc |
| Control circuit voltage | | | | |
| AC control voltage 50/60 Hz | | | | |
| Rated control circuit voltage Uc | | | 24 ... 500 V AC 50/60 Hz | – |
| Coil consumption | | Average pull-in value | 15 ... 100 VA | – |
| DC control voltage 50/60 Hz | | | | |
| Rated control circuit voltage Uc | | | 24 ... 500 V DC | 24 V DC |
| Coil consumption | | Average pull-in value | 15 ... 100 W | 12 W |
| Max. electrical impulse time | | | | |
| On AC control supply (with load factor 1.6%) | | | 4 s | – |
| On DC control supply (with load factor 1.6%) | | | 4 s | |
| Min. electrical impulse time | | | | |
| For latching, energizing of the contactor coil | | | 120 ms | |
| For unlatching, energizing of the mechanical latching unit coil | | | 50 ms | |
| Operating time | | | | |
| On contactor closing (latching) between coil energization and: | | | | |
| N.O. contact closing | | | No difference with the operation of a contactor without mechanical latching unit | |
| N.C. contact opening | | | No difference with the operation of a contactor without mechanical latching unit | |
| On contactor opening (unlatching) between mechanical latching unit coil energization and: | | | | |
| N.O. contact opening | | | 8 ... 15 ms | |
| N.C. contact closing | | | 10 ... 17 ms | |
| Ambient air temperature | | | | |
| Operation | | | -25 ... +70 °C | |
| Storage | | | -60 ... +80 °C | |
| Climatic withstand | | | Category B according to IEC 60947-1 Annex Q | |
| Max. operating altitude | | | ≤ 3000 m | |
| Mounting positions | | | Mounting positions 1, 1+/- 30°, 2, 3, 4, 5 | |
| Mechanical durability | | | AF09 ... AF38, NF: 1 million operating cycles | |
| | | | AF40 ... AF65: 0.5 million operating cycles | |
| | | | AF80, AF96: 0.2 million operating cycles | |
| Max. switching frequency | | | | |
| with on-load factor of 1.6% | | cycles/h | 600 | |

### Connecting characteristics

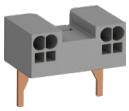
| | | | |
|---|---|---|---|
| Connection capacity (min. ... max.) | | | |
|  | Rigid Solid/Stranded | 1 x | 1 ... 2.5 mm² |
|  | | 2 x | 1 ... 2.5 mm² |
|  | Flexible with non insulated ferrule | 1 x | 0.75 ... 2.5 mm² |
|  | | 2 x | 0.75 ... 2.5 mm² |
|  | Flexible with insulated ferrule | 1 x | 0.75 ... 2.5 mm² |
|  | | 2 x | 0.75 ... 1.5 mm² |
|  | Lugs | L < | 8 mm |
| Connection capacity acc. to UL / CSA | | 1 or 2 x | AWG 18 ... 14 |
| Stripping length | | | 10 mm |
| Tightening torque | | | 1.2 Nm / 11 lb.in |
| Degree of protection | | | |
| acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | IP20 |
| Screw terminals | | | Delivered in open position |
| All terminals | | | M3.5 |
| Screwdriver type | | | Flat Ø 5.5 / Pozidriv 2 |

# Additional coil terminal blocks, protective covers and fonction markers






LDC4




LDC4K




BX4




BX4-CA



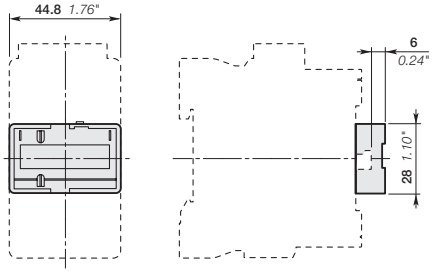

BA4




BA5-50

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| **Additional coil terminal blocks** | | | | |
| Additional coil terminal blocks for a top and/or bottom access to the coil terminals of contactors or contactor relays. | | | | |
| **With screw terminals** | | | | |
| AF09 ... AF96, NF | LDC4 | 1SBN070156T1000 | 10 | 0.010 |
| **With Push-in Spring terminals** | | | | |
| AF09 ... AF96, NF | LDC4K | 1SBN070159T1000 | 10 | 0.010 |
| **Protective covers** | | | | |
| Sealable and transparent protective covers BX4 and non-removable BX4-CA to protect the devices against accidental contact. | | | | |
| AF09 ... AF96 1-stack contactors and NF contactor relays | BX4 | 1SBN110108T1000 | 10 | 0.006 |
| 4-pole CA4, 2-pole CAT4 auxiliary contact blocks and TEF4 electronic timer | BX4-CA | 1SBN110109W1000 | 50 | 0.001 |
| **Function markers AF09 ... AF2850** | | | | |
| Function markers designed to be clipped onto the front face of the contactor, manual motor starter or overload relays to identify them. Details can be added to these markers using a ball point pen, indelible felt-tip pen or pentel white.<br>Self-adhesive labels (not supplied) can also be added to them.<br>- BA4 : box with 16 blank cards (16 markers by card). Marker dimensions: 7 x 20 mm (.276" x .787").<br>- BA5 : set of 50 pieces. Marker dimensions: 7 x 19 mm (.276" x .748"). | | | | |
| AF09 ... AF370 contactors, TF thermal overload relays, EF electronic overload relays and MS116, MS132 manual motor starters | BA4 | 1SNA235156R2700 | 16 | 0.011 |
| AF400 ... AF2850 and accessories | BA5-50 | 1SBN110000R1000 | 1 | 0.017 |

Note: BX4 produced since 13045 (day 045 - year 2013) are suitable for AF40 ... AF96.



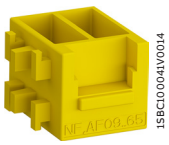

BX4

Main dimensions mm, inches

# Mounting pieces and test blocks




BP38-4

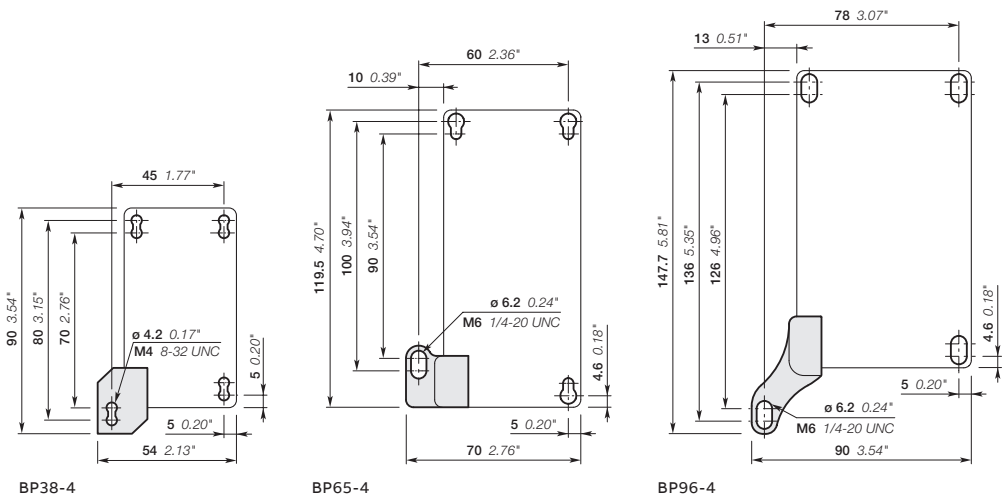



BDT4
For AF09 ... AF65, NF




BDT4
For AF80 ... AF96

| For contactors | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| **Mounting pieces for replacing installed contactors fixed by screws by AF contactors** | | | | | |
| **From contactor** | **To contactor** | | | | |
| A26 ... A40, AL26 ... AL40 | AF09 ... AF38 | BP38-4 | 1SBN112303T1000 | 10 | 0.003 |
| A50 ... A75, AE50 ... AE75, AF50 ... AF75 | AF40 ... AF65 | BP65-4 | 1SBN113403T1000 | 10 | 0.004 |
| A95, A110, AE95, AE110, AF95, AF110 | AF80 ... AF96 | BP96-4 | 1SBN113903T1000 | 10 | 0.005 |
| **Test block** | | | | | |
| BDT4 test block is suitable for switching on contactor off-load.<br>Marking on the block indicates the contactor type to fit with. | | | | | |
| AF09...AF96, NF | | BDT4 | 1SBN110122T1000 | 10 | 0.007 |



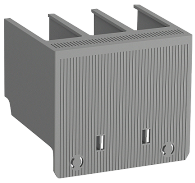

Main dimensions mm, inches

# Terminal shrouds

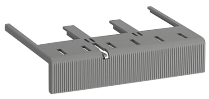



1SBC100073V0014

LT65-30


1SFC101038V0001

LT140-30L


1SFC101041V0001

LT370-30C


1SFC101089V0001

LT460-AC


1SBC100075V0014

LT80-40


1SFC101199V0001

LT205-40

Main terminal protection for AF40 ... AF1250 contactors.

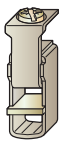
The auxiliary contact blocks and coils are designed to provide an IP 20 degree of protection.

The main terminals, equipped with compression lugs or cable clamps, can be protected against accidental direct contact after wiring (EN 50274) by the addition of terminal shrouds (see table below).

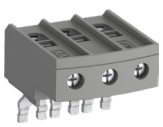
| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| **3-pole contactors** | | | | |
| AF40 ... AF65 | LT65-30 | 1SBN123401R1000 | 1 | 0.015 |
| AF80, AF96 | LT96-30 | 1SBN123901R1000 | 1 | 0.020 |
| AF116 ... AF146, with compression lugs | LT140-30L | 1SFN124203R1000 | 2 | 0.070 |
| AF190, AF205, with cable clamps | LT205-30C | 1SFN124801R1000 | 2 | 0.050 |
| AF190, AF205, with compression lugs | LT205-30L | 1SFN124803R1000 | 2 | 0.220 |
| AF190, AF205, with shorting bar or between contactor and TOL/EOL in DOL starters | LT205-30Y | 1SFN124804R1000 | 1 | 0.050 |
| AF265 ... AF370, with cable clamps | LT370-30C | 1SFN125401R1000 | 2 | 0.035 |
| AF265 ... AF370, with compression lugs | LT370-30L | 1SFN125403R1000 | 2 | 0.280 |
| AF265 ... AF370, with shorting bar or between contactor and TOL/EOL in DOL starters | LT370-30Y | 1SFN125404R1000 | 1 | 0.075 |
| AF265 ... AF370, for use with extending cable clamps, ATK300/2 and OZXB4 | LT370-30D | 1SFN125406R1000 | 1 | 0.15 |
| AF400, AF460 with cable clamps | LT460-AC | 1SFN125701R1000 | 2 | 0.100 |
| AF400, AF460 with compression lugs | LT460-AL | 1SFN125703R1000 | 2 | 0.800 |
| AF580, AF750 with cable clamps | LT750-AC | 1SFN126101R1000 | 2 | 0.120 |
| AF580, AF1250 with compression lugs | LT750-AL | 1SFN126103R1000 | 2 | 0.825 |
| **4-pole contactors** | | | | |
| AF40, AF52 | LT52-40 | 1SBN123402R1000 | 1 | 0.020 |
| AF80 | LT80-40 | 1SBN123902R1000 | 1 | 0.025 |
| AF116 ... AF140, with compression lugs | LT140-40L | 1SFN124203R2000 | 2 | 0.090 |
| AF190 ... AF205, with cable clamps | LT205-40C | 1SFN124801R2000 | 2 | 0.035 |
| AF190 ... AF205, with compression lugs | LT205-40L | 1SFN124803R2000 | 2 | 0.140 |
| AF265 ... AF370, with cable clamps | LT370-40C | 1SFN125401R2000 | 2 | 0.040 |
| AF265 ... AF370, with compression lugs | LT370-40L | 1SFN125403R2000 | 2 | 0.165 |

Note: With LT65-30, LT96-30, LT52-40, LT80-40, use rigid cables or flexible cables with insulated ferrules including a stripping length ≥ 18 mm.

## Connecting characteristics with LT ... terminal shrouds

| Contactor types | AC / DC operated | AF40 ... AF65 + LT65-30<br>AF40, AF52 + LT52-40 | AF80, AF96 + LT96-30<br>AF80 + LT80-40 |
|---|---|---|---|
| | |  | |
| | | Screw terminals<br>with double connector<br>2 x (9.3 width x 7.9/10.3 depth) | Screw terminals<br>with double connector<br>2 x (12.4 width x 9.3/11.1 depth) |
| Connection capacity (min. ... max.)<br>Main contactor (poles) | | | |
| Rigid Solid/Stranded | 1 x | 6...16 mm² or 25 ...35 mm² | 6...16 mm² or 25 ...70 mm² |
| | 2 x | 6...16 mm² or 25 ...35 mm² | 6...16 mm² or 35 ... 50 mm² |
| Flexible with insulated ferrule | 1 x | 4...16 mm² or 25 ...35 mm² | 6...16 mm² or 25 ...50 mm² |
| | 2 x | 4...16 mm² or 25 ...35 mm² | 6...16 mm² or 35 ...50 mm² |
| Bars or Lugs | L < | 9.2 mm | 12.2 mm |
| Connection capacity acc. to UL / CSA | 1 x | AWG 10...6 or AWG 4..2 | AWG 6 or AWG 4..1 |
| | 2 x | AWG 10...6 or AWG 4..2 | AWG 6 or AWG 2..1 |
| Stripping length | | 18 mm | 18 mm |
| Tightening torque<br>Recommended | | 4 Nm / 35 lb.in | 6 Nm / 53 lb.in |
| Degree of protection<br>acc. to IEC/EN 60947-1 and IEC/EN 60529<br>Main terminals equipped with LT | | IP20 | |
| Screw terminals<br>Main terminals | | M6 | M8 |
| Screwdriver type | | Flat Ø 6.5 / Pozidriv 2 | hexagon socket (s = 4 mm) |

# Additional terminal blocks

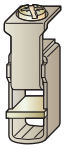



LD38-4

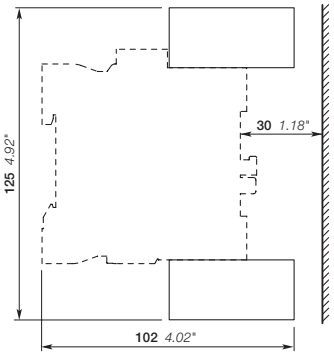
The LD terminal block is designed to increase the connecting capacity of 3-pole AF26 ... AF38 contactors on which it is fitted and for preparation of the wiring before final connection to the contactor. LD38-4 blocks are 3-pole terminal blocks with tunnel terminals.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| AF26 ... AF38 | LD38-4 | 1SBN072308R1000 | 2 | 0.070 |

## Technical data

| Types | LD38-4 |
|---|---|
| Rated insulation voltage Ui | |
| acc. to IEC 60947-4-1 | 690 V |
| acc. to UL / CSA | 600 V |
| Pollution degree | 3 |
| Main terminals |  |
| | Screw terminals with double connector<br>2 x (7 width x 5.8/9.2 depth) |
| Connection capacity (min. ... max.) | |
| Rigid Solid (≤ 4 mm²) | 1x 2.5...25 mm² |
| Stranded (≥ 6 mm²) | 1x 2.5...25 mm² + 1x 2.5...16mm² |
| Flexible with non insulated ferrule | 1x 2.5...16 mm² |
| | 1x 2.5...16mm² + 1x 2.5...10mm² |
| Flexible with insulated ferrule | 1x 2.5...16mm² |
| | 1x 2.5...16mm² + 1x 2.5...10mm² |
| Connection capacity acc. to UL / CSA | 1x AWG 8-4 |
| | 2x AWG 8-6 |
| Stripping length | 14 mm |
| Tightening torque | 2.5 Nm / 22 lb.in |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | IP20 |
| Screw terminals | Delivered in closed position, screws of unused terminals must be tightened |
| Main terminals | M5 |
| Screwdriver type | Flat Ø 6.5 / Pozidriv 2 |

Note: The utilization of LD38-4 additional terminal blocks does not allow the use of BER and BEY connection sets.




Main dimensions mm, inches

# Terminals for control lead connections




LK96-4F

Terminal designed to connect the control conductors to the main poles of the AF40 ... AF96 contactors and derivative versions.

Accessory clipped into the slots placed above each power terminal connector.

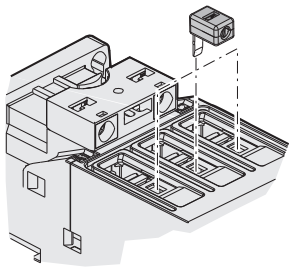
The LK96-4F is fitted with a pin designed to hold them in place until the connector has been fully clamped with its power cable.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| AF40 ... AF96 | LK96-4F | 1SBN073452R2000 | 2 | 0.005 |

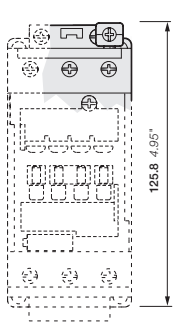
Note : LK96-4F not compatible with LT Terminal shrouds

## Technical data

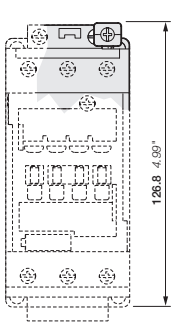
| Types | | LK96-4.. |
|---|---|---|
| Connection capacity (min. ... max.) | | |
| Rigid | 1 x | 1...2.5 mm² |
| | 2 x | 1...2.5 mm² |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² |
| | 2 x | 0.75...2.5 mm² |
| Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² |
| | 2 x | 0.75...1.5 mm² |
| Lugs | L ≤ | 8 mm |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 |
| Stripping length | | 10 mm |
| Tightening torque | | 1.2 N.m / 11 lb.in |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | IP20 |
| Screw terminals | | Delivered in open position, screws of unused terminals should be tightened |
| All terminals | | M3.5 |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 |



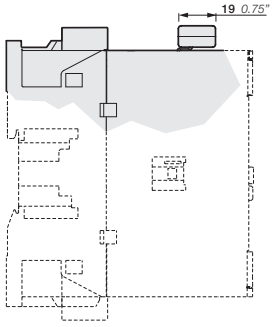
LK positioning




AF40, AF52, AF65 + LK96-4F

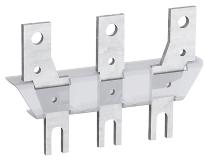



AF80, AF96 + LK96-4F




Main dimensions mm, inches

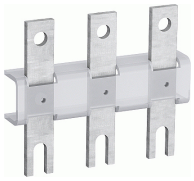
# Terminal enlargments and connection sockets




LW140




LW205-40




LX140




LL146-30




LD146-30

## Terminal enlargements

Enlargement pieces designed to increase the width of the contactor terminal pads in order to allow larger connections to be mounted.

| For contactors | Dimensions | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|
| | hole Ø mm | bar mm | | | | kg |
| **3-pole contactors** | | | | | | |
| AF116 ... AF146 | 6.5 | 13 x 3 | LW140 | 1SFN074207R1000 | 1 | 0.115 |
| AF190, AF205 | 10.5 | 17.5 x 5 | LW205 | 1SFN074807R1000 | 1 | 0.260 |
| AF265 ... AF370 | 10.5 | 25 x 5 | LW370 | 1SFN075407R1000 | 1 | 0.340 |
| AF400, AF460 | 10.5 | 25 x 5 | LW460 | 1SFN075707R1000 | 1 | 0.730 |
| AF580, AF750 | 13 | 40 x 6 | LW750 | 1SFN076107R1000 | 1 | 1.230 |
| AF1250 | 13 | 50 x 10 | LW1250 | 1SFN076407R1000 | 1 | 2.000 |
| **4-pole contactors** | | | | | | |
| AF190 ... AF205 | 10.5 | 20 x 5 | LW205-40 | 1SFN074807R2000 | 1 | 0.306 |
| AF265 ... AF370 | 10.5 | 25 x 5 | LW370-40 | 1SFN075407R2000 | 1 | 0.540 |

## Terminal extension

Extension pieces designed to extend the main terminals of contactors for combined mounting of contactors and connection sets.

| For 3-pole contactors | Dimensions | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|
| | hole Ø mm | bar mm | | | | kg |
| AF116 ... AF146 | 6.5 | 13 x3 | LX140 | 1SFN074210R1000 | 1 | 0.072 |
| AF190, AF205 | 8.5 | 17.5 x 5 | LX205 | 1SFN074810R1000 | 1 | 0.180 |
| AF265 ... AF370 | 10.5 | 20 x 5 | LX370 | 1SFN075410R1000 | 1 | 0.234 |
| AF400, AF460 | 10.5 | 25 x 5 | LX460 | 1SFN075710R1000 | 1 | 0.500 |
| AF580, AF750 | 13 | 40 x 6 | LX750 | 1SFN076110R1000 | 1 | 0.850 |

## Connection sockets

Connection socket can be used to replace built-in cable clamps in AF116 ... AF146.

| For contactor | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|
| | | | | kg |
| **3-pole contactors** | | | | |
| AF116 ... AF146 | LL146-30 | 1SFN074211R1000 | 6 | 0.102 |
| AF190 ... AF205 | LL205-30 | 1SFN074811R1000 | 1 | 0.166 |
| AF265 ... AF370 | LL370-30 | 1SFN075411R1000 | 1 | 0.173 |
| AF400 ... AF460 | LE460 | 1SFN075716R1000 | 6 | 0.600 |
| AF580 ... AF750 | LE750 | 1SFN076116R1000 | 6 | 0.750 |
| **4-pole contactors** | | | | |
| AF116 ... AF140 | LL146-40 | 1SFN074211R2000 | 8 | 0.132 |
| AF190 ... AF205 | LL205-40 | 1SFN074811R2000 | 2 | 0.216 |
| AF265 ... AF370 | LL370-40 | 1SFN075411R2000 | 2 | 0.224 |

## Connection module

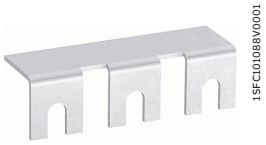
Connection module can be fixed on AF116 ... AF146 delivered with bar terminals.

| For contactor | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|
| | | | | kg |
| **3-pole contactors** | | | | |
| AF116 ... AF146 | LD146-30 | 1SFN074208R1000 | 2 | 0.165 |
| **4-pole contactors** | | | | |
| AF116 ... AF140 | LD146-40 | 1SFN074208R2000 | 2 | 0.225 |

# Terminal connecting strips and shorting bars




LY16-4




LY185




LH38-4




LF16-4




LG16-4

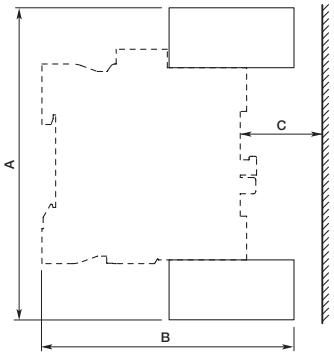
Parallel and series connection of 3-pole contactors:

- To obtain a star point (3 parallel-connected poles)
- To connect poles in parallel and thus increase the AC load passing through the flow path made up of the parallel-connected poles: LP, LY, LH, LF, LG.
  The relevant cable cross-sectional area may limit the maximum permissible current. Consult information in table below
- To connect poles in series and thus increase the DC voltage controlled by the poles: LP, LY (only LY16-4 and LY38-4 secable strips).

| Types | for connection of "n" poles | with terminal | insulated |
|---|---|---|---|
| LP | n = 2 | no | no (1) |
| LY | n = 2 (secable LY16-4, LY38-4 connecting strips) | no | yes |
| | n = 3 | no | yes (1) |
| LH | n = 2 | yes | no |
| LF | n = 3 | yes | yes |
| LG | n = 4 | yes | yes |

(1) LP460 ... LP750, LY185 ... LY750 not insulated. Use terminal shrouds.

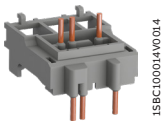
| For contactors | max. nominal continuous current with "n" poles | | | | Cable cross-sectional area | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|
| | in parallel | | | in series | | | | | |
| | 2 poles | 3 poles | 4 poles | 2 poles | | | | | |
| | A | | | | $mm^2$ | | | | kg |
| AF09 | 30 | 33 | – | 25 | 6 | LY16-4 | 1SBN071303T1000 | 10 | 0.006 |
| AF12 | 32 | 36 | – | 27 | | | | | |
| AF16 | 34 | 40 | – | 30 | | | | | |
| AF26 | 50 | 60 | – | 45 | 10 | LY38-4 | 1SBN072303T1000 | 10 | 0.012 |
| AF116 ... AF146 | – | 240 | – | | – | LY140 | 1SFN074203R1000 | 1 | 0.055 |
| AF190, AF205 | – | 400 | – | | – | LY185 | 1SFN074703R1000 | 1 | 0.200 |
| AF265 ... AF370 | – | 670 | – | | – | LY300 | 1SFN075103R1000 | 1 | 0.300 |
| AF400, AF460 | – | 1000 | – | | – | LY460 | 1SFN075703R1000 | 1 | 0.450 |
| AF580, AF750 | – | 1650 | – | | – | LY750 | 1SFN076103R1000 | 1 | 0.800 |
| AF190, AF205 | 300 | – | – | | – | LP185 | 1SFN074712R1000 | 2 | 0.300 |
| AF265 ... AF370 | 475 | – | – | | – | LP300 | 1SFN075112R1000 | 2 | 0.400 |
| AF400, AF460 | 725 | – | – | | – | LP460 | 1SFN075712R1000 | 2 | 0.550 |
| AF580, AF750 | 1200 | – | – | | – | LP750 | 1SFN076112R1000 | 2 | 0.950 |
| AF09 | 45 | | – | – | 10 | LH38-4 | 1SBN072304R1000 | 2 | 0.012 |
| AF12 | 50 | | – | – | 10 | | | | |
| AF16 | 54 | | – | – | 16 | | | | |
| AF26 | 81 | | – | – | 25 | | | | |
| AF30, AF38 | 90 | | – | – | 25 | | | | |
| AF09 | | 62 | – | | 16 | LF16-4 | 1SBN071305R1000 | 2 | 0.020 |
| AF12 | | 70 | – | | 25 | | | | |
| AF16 | | 75 | – | | 25 | | | | |
| AF26 | | 112 | – | | 35 | LF38-4 | 1SBN072305R1000 | 2 | 0.040 |
| AF30, AF38 | | 125 | – | | 50 | | | | |
| AF09 | – | – | 70 | – | 25 | LG16-4 | 1SBN071306R1000 | 2 | 0.025 |
| AF12 | – | – | 78 | – | 25 | | | | |
| AF16 | – | – | 84 | – | 25 | | | | |




Main dimensions

| Type | For contactors | Dimensions | | | | | |
|---|---|---|---|---|---|---|---|
| | | A | | B | | C | |
| | | mm | inch | mm | inch | mm | inch |
| LH38-4 | AF09 ... AF16 | 111.20 | 4.38" | 83 | 3.27" | 22 | 0.87" |
| | AF26 ... AF38 | 114 | 4.49" | 86 | 3.39" | 16 | 0.63" |
| LF16-4 | AF09 ... AF16 | 121 | 4.76" | 87 | 3.43" | 23 | 0.91" |
| LF38-4 | AF26 ... AF38 | 135.20 | 5.32" | 103 | 4.06" | 31 | 1.22" |
| LG16-4 | AF09 ... AF16 | 124.20 | 4.89" | 87 | 3.43" | 23 | 0.91" |

# Connection accessories for starting solutions




BEA16-4




BPR65-4

## Connecting links with manual motor starters

The BEA insulated 3-pole connecting links are used to connect AF09 ... AF65 contactors with the MS116 or MS132 or MS165 manual motor starters. The BEA insulated 3-pole connecting links ensure the electrical and mechanical connection between the contactor and the associated manual motor starter. BPR65-4 35 mm rail hooks used with BEA65-4 connecting link, allow direct mounting on 2 rails 35 mm of MS165 manual motor starters with AF40 ... AF65 contactors.

| For 3-pole contactors | Manual motor starter | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| AF09 ... AF16 | MS116-0.16 ... MS116-25, MS132-0.16... MS132-25 | BEA16-4 | 1SBN081306T1000 | 10 | 0.025 |
| AF26 ... AF38 | MS116-0.16 ... MS116-16, MS132-0.16 ... MS132-10 | BEA26-4 | 1SBN082306T1000 | 10 | 0.025 |
| | MS116-20 ... MS116-32, MS132-12 ... MS132-32 | BEA38-4 | 1SBN082306T2000 | 10 | 0.030 |
| AF40 ... AF65 | MS165-16 ... MS165-65 | BEA65-4 | 1SBN083406R1000 | 1 | 0.090 |
| | MS165-16 ... MS165-65 (1) | BPR65-4 (2) | 1SBN113405R1000 | 1 | 0.007 |

Note: BEA16-4, BEA26-4 and BEA38-4 used with the PMS38-4 adapting plate, are suitable for AF..Z contactors with DC control voltage 24 V DC (coil 30).
(1) Applicable for MS165 manufactured after week 31, 2016 (date code > 16214).
(2) Use one BPR65-4 for each contactor AF40 ... AF65.



PMS38-4

## Adapting plate for MS.. and BEA.. series

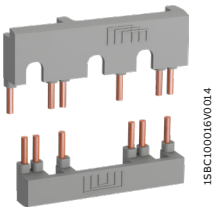
The PMS38-4 is an adapting plate allowing the assembly of Direct-on-line (DOL) motor starters using MS116 or MS132(K) manual motor starters, AF..Z..(K) contactors with DC control voltage 24 V DC (coil 30) and BEA..-4(KF) connecting links.

PMS38-4 is made of two parts: one part to fix on the manual motor starter, the second one to fix on the connecting link.

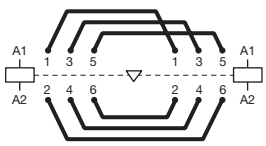
DOL starting and reversing starters can be mounted on single TH35 rail or fixed by screws on plate using MS serie's FS116 fixing kits.

PMS38-4 is the adequate solution in case of use of three-phase busbar systems feeding DOL and reversing starter using contactors of different depths.

| For combinations | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| AF09Z..(K)..-30 ... AF38Z..(K)..-30 with BEA...-4(KF) with MS..(K) | PMS38-4 | 1SBN090106R000 | 1 | 0.175 |




BER16-4




BER, BEM
Reversing connections

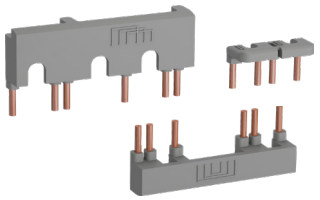
## Connection sets for reversing contactors

The BER and BEM connection sets are used to connect the main poles of two 3-pole contactors mounted side by side. The BER connection sets are made up of 1 upstream and 1 downstream connections. The BEM connection sets are made up of 3 upstream and 3 downstream connections. BER and BEM connection sets are insulated and made of solid copper bars.

| For 3-pole contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| AF09 ... AF16 | BER16-4 | 1SBN081311R1000 | 1 | 0.045 |
| AF26 ... AF38 | BER38-4 | 1SBN082311R1000 | 1 | 0.100 |
| AF40 ... AF65 | BER65-4 | 1SBN083411R1000 | 1 | 0.175 |
| AF80, AF96 | BER96-4 | 1SBN083911R1000 | 1 | 0.250 |
| AF116 ... AF146 | BER140-4 | 1SFN084211R1000 | 1 | 0.615 |
| AF190, AF205 | BER205-4 | 1SFN084811R1000 | 1 | 1.237 |
| AF265 ... AF370 | BER370-4 | 1SFN085411R1000 | 1 | 2.140 |
| AF400, AF460 | BEM460-30 | 1SFN085701R1000 | 1 | 4.400 |
| AF580, AF750 | BEM750-30 | 1SFN086101R1000 | 1 | 7.300 |

# Connection accessories for starting solutions






BEY16-4

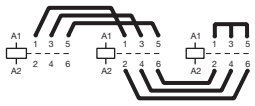
## Connecting sets for star-delta starter

The BEY and BED connection sets are used to connect the main poles of the Line, Delta and Star contactors of a star-delta starter.

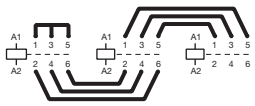
The connection sets are made up of:

- Line contactor / delta contactor:
  - BEY: upstream phase-to-phase connection
  - BED: upstream connection in parallel
- Delta contactor / star contactor: downstream connection in parallel
- Star contactor: star point upstream
- Insulated, solid copper bar.

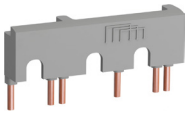
| For 3-pole line, delta & star contactors | Interlock unit between delta & star contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| AF09 ... AF16 | With or without VM4 or VEM4 | BEY16-4 | 1SBN081313R2000 | 1 | 0.050 |
| AF26 ... AF38 | With or without VM4 or VEM4 | BEY38-4 | 1SBN082713R2000 | 1 | 0.110 |
| AF40 ... AF65 | With or without VM96-4 | BEY65-4 | 1SBN083413R2000 | 1 | 0.200 |
| AF80, AF96 | With or without VM96-4 | BEY96-4 | 1SBN083913R2000 | 1 | 0.250 |
| AF116 ... AF146 | With or without VM19 | BEY140-4 | 1SFN084413R1000 | 1 | 1.040 |
| AF190 ... AF205 (line and delta)<br>AF116 ... AF146 (star) | With or without VM140/190 | BEY190-4 | 1SFN084813R1000 | 1 | 1.154 |
| AF190, AF205 | With or without VM19 | BEY205-4 | 1SFN085213R1000 | 1 | 1.205 |
| AF265 ... AF370 (line and delta)<br>AF190 ... AF205 (star) | With or without VM205/265 | BEY265-4 | 1SFN085413R1000 | 1 | 2.020 |
| AF265 ... AF370 | With or without VM19 | BEY370-4 | 1SFN085813R1000 | 1 | 2.110 |
| AF400 ... AF460 | With or without VM750H | BED460 | 1SFN085703R1000 | 1 | 4.700 |
| AF580 ... AF750 (line and delta)<br>AF400 ... AF460 (star) | With or without VM750H | BED580 | 1SFN085903R1000 | 1 | 6.300 |
| AF580 ... AF750 | With or without VM750H | BED750 | 1SFN086103R1000 | 1 | 7.700 |



AF09 ... AF370
Line-delta-star connection



AF400 ... AF750
Star-delta-line connection



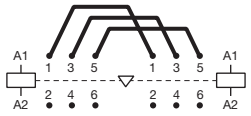
BEP16-30




BEP140-30

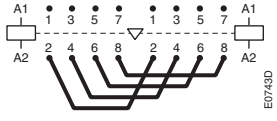
## Phase to phase connections

The BEP and BES connection sets are used to connect phase to phase between the main poles of two contactors mounted side by side. 4-pole contactors will then operate as source reversing contactors. The BEP connection sets contain 1 busbar used for upstream or downstream connection. The BES connection sets are made up of 3 busbars used for upstream or downstream connection. BEP and BES connection sets are insulated and made of solid copper bars.



BEP, BES
3-pole phase to phase connections

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| **3-pole contactors** | | | | |
| AF09 ... AF16 | BEP16-30 | 1SBN081314R1000 | 1 | 0.025 |
| AF26 ... AF38 | BEP38-30 | 1SBN082314R1000 | 1 | 0.050 |
| AF116 ... AF146 | BEP140-30 | 1SFN084214R1000 | 1 | 0.320 |
| AF190, AF205 | BEP205-30 | 1SFN084814R1000 | 1 | 0.534 |
| AF265 ... AF370 | BEP370-30 | 1SFN085414R1000 | 1 | 0.926 |
| AF400, AF460 | BES460 | 1SFN085704R1000 | 1 | 2.200 |
| AF580, AF750 | BES750 | 1SFN086104R1000 | 1 | 3.700 |
| **4-pole contactors** | | | | |
| AF116 ... AF140 | BEP140-40 | 1SFN084214R2000 | 1 | 0.420 |
| AF190 ... AF205 | BEP205-40 | 1SFN084814R2000 | 1 | 0.710 |
| AF265 ... AF370 | BEP370-40 | 1SFN085414R2000 | 1 | 1.230 |




BEP
4-pole changeover connections

# Connection accessories for starting solutions with Push-in Spring terminals




BEA16-4KF

## Connecting links with manual motor starters

The BEA..-4KF insulated 3-pole connecting links are used to connect AF09..K ... AF38..K contactors with the MS132-K manual motor starters. The BEA..-4KF insulated 3-pole connecting links ensure the electrical and mechanical connection between the contactor and the associated manual motor starter. Black fork pieces help for a quick dismounting of the DOL starter.

| For 3-pole contactors | Manual motor starter | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| AF09..K ... AF16..K | MS132-0.16 ... MS132-25 | BEA16-4KF | 1SBN081325T1000 | 10 | 0.052 |
| AF26..K ... AF38..K | MS132-0.16 ... MS132-32 | BEA38-4KF | 1SBN082325T2000 | 10 | 0.057 |



PMS38-4

## Adapting plate for MS.. and BEA.. series

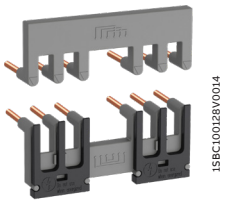
The PMS38-4 is an adapting plate allowing the assembly of Direct-on-line (DOL) motor starters using MS116 or MS132(K) manual motor starters, AF..Z..(K) contactors with DC control voltage 24 V DC (coil 30) and BEA..-4(KF) connecting links.

PMS38-4 is made of two parts: one part to fix on the manual motor starter, the second one to fix on the connecting link.

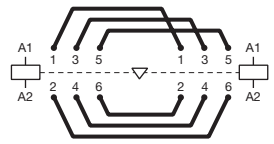
DOL starting and reversing starters can be mounted on single TH35 rail or fixed by screws on plate using MS serie's FS116 fixing kits.

PMS38-4 is the adequate solution in case of use of three-phase busbar systems feeding DOL and reversing starter using contactors of different depths.

| For combinations | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| AF09Z..(K)..-30 ... AF38Z..(K)..-30 with BEA...-4(KF) with MS..(K) | PMS38-4 | 1SBN090106R000 | 1 | 0.175 |




BER16-4KF




BER
Reversing connections

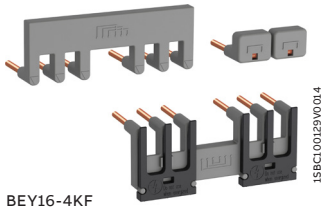
## Connection sets for reversing contactors

The BER..-4KF connection sets are used to connect the main poles of two 3-pole AF09..K ... AF38..K contactors mounted side by side.

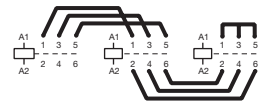
The connection sets are made up of:

- 1 upstream and 1 downstream connections
- Insulated, solid copper bars
- Black fork pieces for a quick dismounting of reversing contactors.

| For 3 pole contactors | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|
| AF09..K ... AF16..K | BER16-4KF | 1SBN081322R1000 | 1 | 0.050 |
| AF26..K ... AF38..K | BER38-4KF | 1SBN082322R1000 | 1 | 0.080 |




BEY16-4KF




BEY
Line-delta-star connection

## Connection sets for star-delta starter

The BEY..-4KF connection sets are used to connect the main poles of the Line, Delta and Star AF09..K ... AF38..K contactors of a star-delta starter.

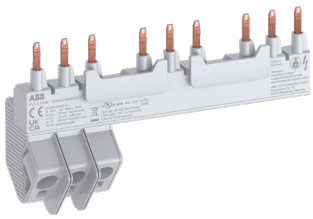
The connection sets are made up of:

- Line contactor / delta contactor: upstream phase-to-phase connection
- Delta contactor / star contactor: downstream connection in parallel
- Star contactor: star point upstream
- Insulated, solid copper bar
- Black fork pieces for a quick dismounting of Line, Delta and Star contactors.

| For 3 pole contactors | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|
| AF09..K ... AF16..K | BEY16-4KF | 1SBN081323R2000 | 1 | 0.055 |
| AF26..K ... AF38..K | BEY38-4KF | 1SBN082323R2000 | 1 | 0.090 |

# Connection accessories for starting solutions with Push-in Spring terminals





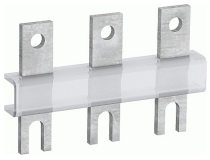
PS 1-3-1-65K busbar
with Push-in Spring terminals

## Busbars

3-phase busbars enable an easy and fast parallel connection of No. of MS132-K manual mo tor starters without the need of any tools by simply pushing the busbar into the terminals. The feeder block is integrated into the busbar, optimizing logistics and planning by reducing the amount of needed parts. The rated current is 65 A. PS1-K busbars are certified for UL Type E and Type F applications.

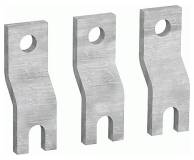
| Suitable for | Rated operational current A | No. of manual motor starter | Number of lateral auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|---|---|
| MS132K, MS132-KT | 65 | 2 | 0 | PS1-2-0-65K | 1SAM301903R1002 | 1 | 0.091 |
| | 65 | 3 | 0 | PS1-3-0-65K | 1SAM301903R1003 | 1 | 0.116 |
| | 65 | 4 | 0 | PS1-4-0-65K | 1SAM301903R1004 | 1 | 0.140 |
| | 65 | 5 | 0 | PS1-5-0-65K | 1SAM301903R1005 | 1 | 0.165 |
| | 65 | 2 | 1 | PS1-2-1-65K | 1SAM301903R1012 | 1 | 0.094 |
| | 65 | 3 | 1 | PS1-3-1-65K | 1SAM301903R1013 | 1 | 0.123 |
| | 65 | 4 | 1 | PS1-4-1-65K | 1SAM301903R1014 | 1 | 0.151 |
| | 65 | 5 | 1 | PS1-5-1-65K | 1SAM301903R1015 | 1 | 0.178 |

# Connection bars



1SFC101061V0001

BEA140/XT2



1SFC101064V0001

BEA205/T4



1SFC101065V0001

BEA370/T5

Connection between contactors/starters and moulded case circuit breakers.
These connection sets are solid copper bars.

| For 3-pole contactors | MCCB | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| **Vertical assembly** | | | | | |
| AF116 ... AF146 | XT2 | BEA140/XT2 | 1SFN084206R1000 | 1 | 0.058 |
| AF116 ... AF146 | XT3 | BEA140/XT3 | 1SFN084206R1002 | 1 | 0.070 |
| AF116 ... AF146 | XT4 | BEA140/XT4 | 1SFN084206R1001 | 1 | 0.068 |
| AF190, AF205 | XT4 | BEA205/XT4 | 1SFN084806R1000 | 1 | 0.200 |
| AF190, AF205 | T4 | BEA205/T4 | 1SFN084806R1001 | 1 | 0.190 |
| AF265 ... AF370 | T5 | BEA370/T5 | 1SFN085406R1000 | 1 | 0.350 |
| AF400 ... AF750 | T6/XT6 | BEA750/T6 | 1SFN086106R1000 | 1 | 0.410 |
| AF400 ... AF750 | T5 | BEA750/T5 | 1SFN086106R1001 | 1 | 0.410 |
| AF265...AF370 | XT5 | BEA370/XT5 | 1SFN085406R1001 | 1 | 0.262 |
| AF400...AF460 | XT5 | BEA460/XT5 | 1SFN085706R1001 | 1 | 0.430 |
| AF580...AF750 | XT5 | BEA750/XT5 | 1SFN086106R1005 | 1 | 0.580 |

Note: For XT5, Use back shield code 1SDA112971R1, to be ordered separately.
Alternatively, use an insulate back panel if the enclosure is bare metal

**Vertical assembly with control wire terminals**
(also suitable when using busbar kits for starter combinations)

| | | | | | |
|---|---|---|---|---|---|
| AF400 ... AF750 | T5 | BEA750D/T5 | 1SFN086106R1003 | 1 | 0.720 |
| AF400 ... AF750 | T6 | BEA750D/T6 | 1SFN086106R1002 | 1 | 0.720 |

**Horizontal assembly**
(also suitable when using busbar kits for starter combinations)

| | | | | | |
|---|---|---|---|---|---|
| AF400, AF460 | T6/XT6 | BEA460H/S6 | 1SFN085907R1000 | 1 | 2.450 |

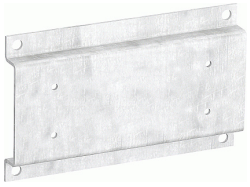
## Connection bars between contactors and switch fuse

Connection between contactors/starters and moulded case circuit breakers.
These connection sets are solid copper bars.

| For 3-pole contactors | Switch fuse | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| **Vertical assembly** | | | | | |
| AF400, AF460 | OESA400 | BEF460/OESA400 | 1SFN085708R1000 | 1 | 0.340 |
| AF460 ... AF750 | OESA630 to OESA800 | BEF750/OESA800 | 1SFN086108R1000 | 1 | 0.740 |
| **Horizontal assembly** | | | | | |
| AF400, AF460 | OESA400...LR | OESA460H/OESA400 | 1SFN085709R1000 | 1 | 1.250 |

Note: The BEF connection bars provided for the A145 ... A300 contactors can be used for the AF145 ... AF300 contactors.

# Adapter plates

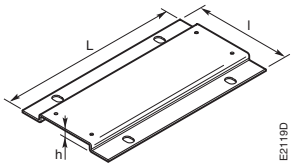


1SFC101048V0001

PR146-1

Adapter plates with fixing holes for replacing installed contactors.

| From contactors | To contactor | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|
| | | | | | kg |
| A95, AF95, A110, AF110 | AF116, AF140, AF146 | PR146-1 | 1SFN094200R1000 | 1 | 0.300 |
| EH150, EH160, EH175, EH210, EG160 | AF190, AF205 | PR210-1 | 1SFN094900R1000 | 1 | 0.440 |
| EH250, EH260, EH300 | AF265, AF305, AF370 | PR300-1 | 1SFN095300R1000 | 1 | 0.560 |
| EH370, EH550, EG315 | AF400, AF460, AF580 | PR460-1 | 1SFN095700R1000 | 1 | 0.900 |
| EH700, EH800 | AF750 | PR750-1 | 1SFN096100R1000 | 1 | 0.500 |
| OKYM150, OKYM175 | AF190 | PR185-2 | 1SFN095100R1001 | 1 | 0.500 |
| OKYM200, OKYM250 | AF265, AF305, AF370 | PR300-2 | 1SFN095300R1001 | 1 | 0.500 |
| OKYM315 | AF400, AF460 | PR400-2 | 1SFN095700R1002 | 1 | 0.820 |
| OKYM400 | AF400, AF460 | PR460-2 | 1SFN095700R1001 | 1 | 0.800 |
| OKYM500 | AF580 | PR580-2 | 1SFN096100R1002 | 1 | 0.700 |
| EH550, EG630, OKYM630 | AF580, AF750 | PR750-2 | 1SFN096100R1001 | 1 | 1.100 |
| EK110-40 | AF116-40, AF140-40 | PR140-4E | 1SFN094200R2000 | 1 | 0.410 |
| EK175-40, EK210-40 | AF190-40, AF205-40 | PR205-4E | 1SFN094800R2000 | 1 | 0.660 |
| EK370-40, EK550-40 | AF265-40, AF305-40, AF370-40 | PR370-4E | 1SFN095400R2000 | 1 | 1.000 |




E2119D

## Dimensions (mm)

| Type of the plate | Dimensions | | | Fixing holes |
|---|---|---|---|---|
| | L | l | h | mm |
| PR146-1 | 150 | 90 | 15 | 4 x ø 6.5 |
| PR210-1 | 200 | 132 | 11.5 | 4 x ø 7 |
| PR300-1 | 200 | 172 | 11.5 | 4 x ø 7 |
| PR460-1 | 278 | 198 | 11.5 | 4 x ø 7 |
| PR750-1 | 283 | 244 | 11.5 | 4 x ø 7 |
| PR185-2 | 202 | 152 | 11.2 | 4 x ø 11 |
| PR300-2 | 202 | 152 | 11.2 | 4 x ø 11 |
| PR400-2 | 278 | 151 | 11.5 | 4 x ø 11 |
| PR460-2 | 278 | 176 | 11.5 | 4 x ø 11 |
| PR580-2 | 283 | 176 | 11.5 | 4 x ø 11 |
| PR750-2 | 283 | 255 | 11.5 | 4 x ø 14 |

Fixing holes according to the plate types

# Low Voltage Ride Through (LVRT) modules



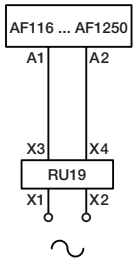

RU19/120

RU19 is designed to meet the Low Voltage Ride Through (LVRT) requirements for grid connections by staying operational during voltage dips preventing disturbances on the grid it self.

The RU19 is a separate module connected to the contactors coil connection A1-A2 creating a delay function of the opening of the contactor. When controlled by PLC, the contactor is operated directly whitout delay functionality. The RU19 can be screw or DIN rail mounted.

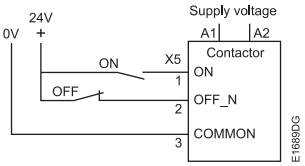
| For contactor | Rated control circuit voltage Uc<br>V 50/60 Hz | Type | Order code | Weight Pkg (1 pce)<br>kg |
|---|---|---|---|---|
| AF116 ... AF370 use coil 33 | 110...120 | RU19/120 | 1SFN170801R1001 | 0.400 |
| AF400 ... AF1250 use coil 69 | | | | |
| AF116 ... AF370 use coil 33 | 230...240 | RU19/240 | 1SFN170801R1002 | 0.400 |
| AF400 ... AF1250 use coil 70 | | | | |

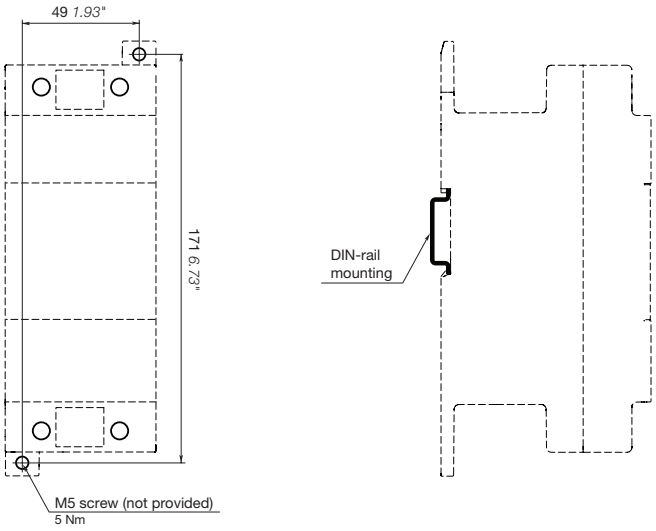
AF116 ... AF1250




For direct opening of AF400 ... AF1250 contactors, connect through built in PLC interface.

Control inputs




RU19/240

Main dimensions mm, inches

# Spare parts contactors

## Contactor coils, main contact sets and arc chutes




ZAF1650

### Contactor coils

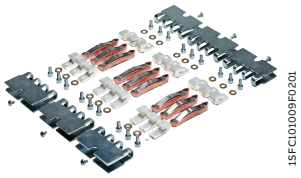
| For contactors | Rated control circuit voltage Uc min. ... Uc max. | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|
| | V 50/60 Hz | V DC | | | | kg |
| AF400, AF460 | - | 24...60 | ZAF460 | 1SFN155770R6806 | 1 | 0.525 |
| | 48...130 | 48...130 | ZAF460 | 1SFN155770R6906 | 1 | 0.525 |
| | 100...250 | 100...250 | ZAF460 | 1SFN155770R7006 | 1 | 0.525 |
| | 250...500 | 250...500 | ZAF460 | 1SFN155770R7106 | 1 | 0.525 |
| AF580 ... AF1250 | - | 24...60 | ZAF750 | 1SFN156170R6806 | 1 | 1.335 |
| | 48...130 | 48...130 | ZAF750 | 1SFN156170R6906 | 1 | 1.335 |
| | 100...250 | 100...250 | ZAF750 | 1SFN156170R7006 | 1 | 1.335 |
| | 250...500 | 250...500 | ZAF750 | 1SFN156170R7106 | 1 | 1.335 |
| AF1350 ... AF2050 | 100...250 | 100...250 | ZAF1650 (1) | 1SFN156570R7026 | 1 set | 0.900 |
| | | | ZP1650 (2) | 1SFN166521R1070 | 1 | 0.300 |
| AF2650 | 100...250 | 100...250 | ZAF2650 (1) | 1SFN156670R7026 | 1 set | 0.900 |
| | | | ZP2650 (2) | 1SFN166621R1070 | 1 | 0.300 |

ZAF460, ZAF750 : printed circuit board included.
(1) One set of two coil.
(2) Printed circuit board.

### Main contact sets

Replacement parts for the main contacts. Set for AF116 ... AF370 includes complete base, complete moving contact bridge and return springs.

Set for AF400 ... AF2650 consists of six fixed contacts, three moving contacts, springs and the required screws.




ZL1650

| For contactors | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|
| | | | | | kg |
| **3-pole contactors** | | | | | |
| AF116 | | ZL116 | 1SFN164203R1000 | 1 | 0.410 |
| AF140 | | ZL140 | 1SFN164403R1000 | 1 | 0.410 |
| AF146 | | ZL146 | 1SFN164603R1000 | 1 | 0.410 |
| AF190 | | ZL190 | 1SFN164803R1000 | 1 | 1.093 |
| AF205 | | ZL205 | 1SFN165203R1000 | 1 | 1.093 |
| AF265 | | ZL265 | 1SFN165403R1000 | 1 | 2.010 |
| AF305 | | ZL305 | 1SFN165803R1000 | 1 | 2.010 |
| AF370 | | ZL370 | 1SFN166003R1000 | 1 | 2.010 |
| AF400 | | ZL400 | 1SFN165703R1000 | 1 | 1.320 |
| AF460 | | ZL460 | 1SFN165903R1000 | 1 | 1.320 |
| AF580 | | ZL580 | 1SFN166103R1000 | 1 | 1.840 |
| AF750 | | ZL750 | 1SFN166303R1000 | 1 | 1.840 |
| AF1250 | | ZL1250 | 1SFN166403R1000 | 1 | 1.840 |
| AF1350 | For contactors produced before 2014-01-13, with serial number before 1S16010051403xxxx | ZL1350 | 1SFN166503R1000 | 1 | 2 500 |
| | For contactors produced since 2014-01-13, with serial number above 1S16010051403xxxx | ZL1350-1 | 1SFN166503R1001 | 1 | 4 500 |
| AF1650 | For contactors produced before 2014-01-13, with serial number before 1S16010051403xxxx | ZL1650 | 1SFN166703R1000 | 1 | 3 500 |
| | For contactors produced since 2014-01-13, with serial number above 1S16010051403xxxx | ZL1650-1 | 1SFN166703R1001 | 1 | 4 500 |
| AF2050 | For contactors produced before 2014-01-13, with serial number before 1S16010051403xxxx | ZL2050 | 1SFN167003R1000 | 1 | 3 500 |
| | For contactors produced since 2014-01-13, with serial number above 1S16010051403xxxx | ZL2050-1 | 1SFN167003R1001 | 1 | 4 500 |
| AF2650 (3) | | ZL2650 | 1SFN166603R1000 | 1 | 1.200 |
| **4-pole contactors** | | | | | |
| AF116 | | ZLT116 | 1SFN164204R1000 | 1 | 0.435 |
| AF140 | | ZLT140 | 1SFN164404R1000 | 1 | 0.435 |
| AF190 | | ZLT190 | 1SFN164804R1000 | 1 | 2.038 |
| AF205 | | ZLT205 | 1SFN165204R1000 | 1 | 2.038 |
| AF265 | | ZLT265 | 1SFN165404R1000 | 1 | 2.222 |
| AF305 | | ZLT305 | 1SFN165804R1000 | 1 | 2.222 |
| AF370 | | ZLT370 | 1SFN166004R1000 | 1 | 2.222 |

(3) Does not include fixed contacts and screws.
Note: Only suitable for AF116...AF370 contactors "Made in Sweden" produced after 2018-09-01 (010918).

## Contactor coil modules

Coil modules replacement kit for 3-pole contactors. Includes coil, electronic module, fasteners, damping and terminal cover.

| | Rated contol circuit voltage Uc | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|
| | V 50/60Hz | V DC | | | | kg |
| **3-pole contactors** | | | | | | |
| AF116 | 24...60 | 20...60 | ZAF116-11 | 1SFN154270R1106 | 1 | 0.324 |
| | 48...130 | 48...130 | ZAF116-12 | 1SFN154270R1206 | 1 | 0.313 |
| | 110...120 | 110...120 | ZAF116-42 | 1SFN154270R4206 | 1 | 0.313 |
| | 220...240 | 220...240 | ZAF116-43 | 1SFN154270R4306 | 1 | 0.288 |
| | 100...250 | 100...250 | ZAF116-13 | 1SFN154270R1306 | 1 | 0.288 |
| | 250...500 | 250...500 | ZAF116-14 | 1SFN154270R1406 | 1 | 0.040 |
| AF140 | 24...60 | 20...60 | ZAF140-11 | 1SFN154470R1106 | 1 | 0.324 |
| | 48...130 | 48...130 | ZAF140-12 | 1SFN154470R1206 | 1 | 0.313 |
| | 110...120 | 110...120 | ZAF140-42 | 1SFN154470R4206 | 1 | 0.313 |
| | 220...240 | 220...240 | ZAF140-43 | 1SFN154470R4306 | 1 | 0.288 |
| | 100...250 | 100...250 | ZAF140-13 | 1SFN154470R1306 | 1 | 0.288 |
| | 250...500 | 250...500 | ZAF140-14 | 1SFN154470R1406 | 1 | 0.298 |
| AF146 | 24...60 | 20...60 | ZAF146-11 | 1SFN154670R1106 | 1 | 0.324 |
| | 48...130 | 48...130 | ZAF146-12 | 1SFN154670R1206 | 1 | 0.313 |
| | 110...120 | 110...120 | ZAF146-42 | 1SFN154670R4206 | 1 | 0.313 |
| | 220...240 | 220...240 | ZAF146-43 | 1SFN154670R4306 | 1 | 0.288 |
| | 100...250 | 100...250 | ZAF146-13 | 1SFN154670R1306 | 1 | 0.288 |
| | 250...500 | 250...500 | ZAF146-14 | 1SFN154670R1406 | 1 | 0.298 |
| AF190, AF205 | 24...60 | 20...60 | ZAF205-11 | 1SFN154870R1106 | 1 | 0.856 |
| | 48...130 | 48...130 | ZAF205-12 | 1SFN154870R1206 | 1 | 0.831 |
| | 110...120 | 110...120 | ZAF205-42 | 1SFN154870R4206 | 1 | 0.831 |
| | 220...240 | 220...240 | ZAF205-43 | 1SFN154870R4306 | 1 | 0.823 |
| | 100...250 | 100...250 | ZAF205-13 | 1SFN154870R1306 | 1 | 0.823 |
| | 250...500 | 250...500 | ZAF205-14 | 1SFN154870R1406 | 1 | 0.818 |
| AF265, AF305, AF370 | 24...60 | 20...60 | ZAF370-11 | 1SFN155470R1106 | 1 | 1.262 |
| | 48...130 | 48...130 | ZAF370-12 | 1SFN155470R1206 | 1 | 1.316 |
| | 110...120 | 110...120 | ZAF370-42 | 1SFN155470R4206 | 1 | 1.316 |
| | 220...240 | 220...240 | ZAF370-43 | 1SFN155470R4306 | 1 | 1.036 |
| | 100...250 | 100...250 | ZAF370-13 | 1SFN155470R1306 | 1 | 1.036 |
| | 250...500 | 250...500 | ZAF370-14 | 1SFN155470R1406 | 1 | 1.006 |
| AF400, AF460 | - | 24...60 | ZAF460 | 1SFN155770R6806 | 1 | 0.525 |
| | 48...130 | 48...130 | ZAF460 | 1SFN155770R6906 | 1 | 0.525 |
| | 100...250 | 100...250 | ZAF460 | 1SFN155770R7006 | 1 | 0.525 |
| | 250...500 | 250...500 | ZAF460 | 1SFN155770R7106 | 1 | 0.525 |
| AF580 ... AF1250 | - | 24...60 | ZAF750 | 1SFN156170R6806 | 1 | 1.335 |
| | 48...130 | 48...130 | ZAF750 | 1SFN156170R6906 | 1 | 1.335 |
| | 100...250 | 100...250 | ZAF750 | 1SFN156170R7006 | 1 | 1.335 |
| | 250...500 | 250...500 | ZAF750 | 1SFN156170R7106 | 1 | 1.335 |
| AF1350 ... AF2050 | 100...250 | 100...250 | ZAF1650 (1) | 1SFN156570R7026 | 1 set | 0.900 |
| | | | ZP1650 (2) | 1SFN166521R1070 | 1 | 0.300 |
| AF2650 | 100...250 | 100...250 | ZAF2650 (1) | 1SFN156670R7026 | 1 set | 0.900 |
| | | | ZP2650 (2) | 1SFN166621R1070 | 1 | 0.300 |

# Spare parts contactors

## Contactor coils, main contact sets and arc chutes

| | Rated contol circuit voltage Uc | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|
| | V 50/60Hz | V DC | | | | kg |
| **3-pole contactors with built-in PLC interface** | | | | | | |
| AF116 | 24...60 | 20...60 | ZAF116-31 | 1SFN154270R3106 | 1 | 0.310 |
| | 48...130 | 48...130 | ZAF116-32 | 1SFN154270R3206 | 1 | 0.324 |
| | 100...250 | 100...250 | ZAF116-33 | 1SFN154270R3306 | 1 | 0.310 |
| | 250...500 | 250...500 | ZAF116-34 | 1SFN154270R3406 | 1 | 0.324 |
| AF140 | 24...60 | 20...60 | ZAF140-31 | 1SFN154470R3106 | 1 | 0.310 |
| | 48...130 | 48...130 | ZAF140-32 | 1SFN154470R3206 | 1 | 0.324 |
| | 100...250 | 100...250 | ZAF140-33 | 1SFN154470R3306 | 1 | 0.310 |
| | 250...500 | 250...500 | ZAF140-34 | 1SFN154470R3406 | 1 | 0.324 |
| AF146 | 24...60 | 20...60 | ZAF146-32 | 1SFN154670R3106 | 1 | 0.310 |
| | 48...130 | 48...130 | ZAF146-32 | 1SFN154670R3206 | 1 | 0.324 |
| | 100...250 | 100...250 | ZAF146-33 | 1SFN154670R3306 | 1 | 0.310 |
| | 250...500 | 250...500 | ZAF146-34 | 1SFN154670R3406 | 1 | 0.324 |
| AF190 | 24...60 | 20...60 | ZAF190-31 | 1SFN154870R3106 | 1 | 0.893 |
| | 48...130 | 48...130 | ZAF190-32 | 1SFN154870R3206 | 1 | 0.878 |
| | 100...250 | 100...250 | ZAF190-33 | 1SFN154870R3306 | 1 | 0.893 |
| | 250...500 | 250...500 | ZAF190-34 | 1SFN154870R3406 | 1 | 0.878 |
| AF205 | 24...60 | 20...60 | ZAF205-31 | 1SFN155270R3106 | 1 | 0.893 |
| | 48...130 | 48...130 | ZAF205-32 | 1SFN155270R3206 | 1 | 0.878 |
| | 100...250 | 100...250 | ZAF205-33 | 1SFN155270R3306 | 1 | 0.893 |
| | 250...500 | 250...500 | ZAF205-34 | 1SFN155270R3406 | 1 | 0.878 |
| AF265 | 24...60 | 20...60 | ZAF265-31 | 1SFN155470R3106 | 1 | 1.124 |
| | 48...130 | 48...130 | ZAF265-32 | 1SFN155470R3206 | 1 | 1.094 |
| | 100...250 | 100...250 | ZAF265-33 | 1SFN155470R3306 | 1 | 1.124 |
| | 250...500 | 250...500 | ZAF265-34 | 1SFN155470R3406 | 1 | 1.094 |
| AF305 | 24...60 | 20...60 | ZAF305-31 | 1SFN155870R3106 | 1 | 1.124 |
| | 48...130 | 48...130 | ZAF305-32 | 1SFN155870R3206 | 1 | 1.094 |
| | 100...250 | 100...250 | ZAF305-33 | 1SFN155870R3306 | 1 | 1.124 |
| | 250...500 | 250...500 | ZAF305-34 | 1SFN155870R3406 | 1 | 1.094 |
| AF370 | 24...60 | 20...60 | ZAF370-31 | 1SFN156070R3106 | 1 | 1.124 |
| | 48...130 | 48...130 | ZAF370-32 | 1SFN156070R3206 | 1 | 1.094 |
| | 100...250 | 100...250 | ZAF370-33 | 1SFN156070R3306 | 1 | 1.124 |
| | 250...500 | 250...500 | ZAF370-34 | 1SFN156070R3406 | 1 | 1.094 |

Note: Only suitable for AF116...AF370 contactors "Made in Sweden" produced after 2018-09-01 (010918).

## Contactor coil modules

Coil modules replacement kit for 3-pole contactors. Includes coil, electronic module, fasteners, damping and terminal cover.

| | Rated contol circuit voltage Uc | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|
| | V 50/60Hz | V DC | | | | kg |
| **4-pole contactors** | | | | | | |
| AF116 | 24...60 | 20...60 | ZAF116-40-11 | 1SFN154270R1146 | 1 | 0.340 |
| | 48...130 | 48...130 | ZAF116-40-12 | 1SFN154270R1246 | 1 | 0.331 |
| | 100...250 | 100...250 | ZAF116-40-13 | 1SFN154270R1346 | 1 | 0.308 |
| | 250...500 | 250...500 | ZAF116-40-14 | 1SFN154270R1446 | 1 | 0.320 |
| AF140 | 24...60 | 20...60 | ZAF140-40-11 | 1SFN154470R1146 | 1 | 0.340 |
| | 48...130 | 48...130 | ZAF140-40-12 | 1SFN154470R1246 | 1 | 0.331 |
| | 100...250 | 100...250 | ZAF140-40-13 | 1SFN154470R1346 | 1 | 0.308 |
| | 250...500 | 250...500 | ZAF140-40-14 | 1SFN154470R1446 | 1 | 0.320 |
| AF190, AF205 | 24...60 | 20...60 | ZAF205-40-11 | 1SFN154870R1146 | 1 | 0.864 |
| | 48...130 | 48...130 | ZAF205-40-12 | 1SFN154870R1246 | 1 | 0.841 |
| | 100...250 | 100...250 | ZAF205-40-13 | 1SFN154870R1346 | 1 | 0.839 |
| | 250...500 | 250...500 | ZAF205-40-14 | 1SFN154870R1446 | 1 | 0.834 |
| AF265, AF305, AF370 | 24...60 | 20...60 | ZAF370-40-11 | 1SFN155470R1146 | 1 | 1.272 |
| | 48...130 | 48...130 | ZAF370-40-12 | 1SFN155470R1246 | 1 | 1.328 |
| | 100...250 | 100...250 | ZAF370-40-13 | 1SFN155470R1346 | 1 | 1.052 |
| | 250...500 | 250...500 | ZAF370-40-14 | 1SFN155470R1446 | 1 | 1.032 |

Note: Only suitable for AF116...AF370 contactors "Made in Sweden" produced after 2018-09-01 (010918).

## Electronic Modules

Control circuit electronic module spare part.

| | Rated contol circuit voltage Uc | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|
| | V 50/60Hz | V DC | | | | kg |
| **3-pole contactors** | | | | | | |
| AF116 | 24...60 | 20...60 | ZP116-11 | 1SFN164223R1011 | 1 | 0.133 |
| | 48...130 | 48...130 | ZP116-12 | 1SFN164223R1012 | 1 | 0.131 |
| | 110...120 | 110...120 | ZP116-42 | 1SFN164223R1042 | 1 | 0.131 |
| | 220...240 | 220...240 | ZP116-43 | 1SFN164223R1043 | 1 | 0.133 |
| | 100...250 | 100...250 | ZP116-13 | 1SFN164223R1013 | 1 | 0.133 |
| | 250...500 | 250...500 | ZP116-14 | 1SFN164223R1014 | 1 | 0.143 |
| AF140 | 24...60 | 20...60 | ZP140-11 | 1SFN164423R1011 | 1 | 0.133 |
| | 48...130 | 48...130 | ZP140-12 | 1SFN164423R1012 | 1 | 0.131 |
| | 110...120 | 110...120 | ZP140-43 | 1SFN164423R1042 | 1 | 0.131 |
| | 220...240 | 220...240 | ZP140-43 | 1SFN164423R1043 | 1 | 0.133 |
| | 100...250 | 100...250 | ZP140-13 | 1SFN164423R1013 | 1 | 0.133 |
| | 250...500 | 250...500 | ZP140-14 | 1SFN164423R1014 | 1 | 0.143 |
| AF146 | 24...60 | 20...60 | ZP146-11 | 1SFN164623R1011 | 1 | 0.133 |
| | 48...130 | 48...130 | ZP146-12 | 1SFN164623R1012 | 1 | 0.131 |
| | 110...120 | 110...120 | ZP146-42 | 1SFN164623R1042 | 1 | 0.131 |
| | 220...240 | 220...240 | ZP146-43 | 1SFN164623R1043 | 1 | 0.133 |
| | 100...250 | 100...250 | ZP146-13 | 1SFN164623R1013 | 1 | 0.133 |
| | 250...500 | 250...500 | ZP146-14 | 1SFN164623R1014 | 1 | 0.143 |
| AF190, AF205 | 24...60 | 20...60 | ZP205-11 | 1SFN164823R1011 | 1 | 0.610 |
| | 48...130 | 48...130 | ZP205-12 | 1SFN164823R1012 | 1 | 0.610 |
| | 110...120 | 110...120 | ZP205-42 | 1SFN164823R1042 | 1 | 0.610 |
| | 220...240 | 220...240 | ZP205-43 | 1SFN164823R1043 | 1 | 0.610 |
| | 100...250 | 100...250 | ZP205-13 | 1SFN164823R1013 | 1 | 0.610 |
| | 250...500 | 250...500 | ZP205-14 | 1SFN164823R1014 | 1 | 0.620 |
| AF265, AF305, AF370 | 24...60 | 20...60 | ZP370-11 | 1SFN165423R1011 | 1 | 0.696 |
| | 48...130 | 48...130 | ZP370-12 | 1SFN165423R1012 | 1 | 0.704 |
| | 110...120 | 110...120 | ZP370-42 | 1SFN165423R1042 | 1 | 0.704 |
| | 220...240 | 220...240 | ZP370-43 | 1SFN165423R1043 | 1 | 0.694 |
| | 100...250 | 100...250 | ZP370-13 | 1SFN165423R1013 | 1 | 0.694 |
| | 250...500 | 250...500 | ZP370-14 | 1SFN165423R1014 | 1 | 0.694 |

# Spare parts contactors

## Contactor coils, main contact sets and arc chutes

| | Rated contol circuit voltage Uc | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|
| | V 50/60Hz | V DC | | | | kg |
| **3-pole contactors with built-in PLC interface** | | | | | | |
| AF116 | 24...60 | 20...60 | ZAF116-31 | 1SFN154270R3106 | 1 | 0.310 |
| | 48...130 | 48...130 | ZAF116-32 | 1SFN154270R3206 | 1 | 0.324 |
| | 100...250 | 100...250 | ZP116-33 | 1SFN164223R1033 | 1 | 0.155 |
| | 250...500 | 250...500 | ZP116-34 | 1SFN164223R1034 | 1 | 0.169 |
| AF140 | 24...60 | 20...60 | ZAF140-31 | 1SFN154470R3106 | 1 | 0.310 |
| | 48...130 | 48...130 | ZAF140-32 | 1SFN154470R3206 | 1 | 0.324 |
| | 100...250 | 100...250 | ZP140-33 | 1SFN164423R1033 | 1 | 0.155 |
| | 250...500 | 250...500 | ZP140-34 | 1SFN164423R1034 | 1 | 0.169 |
| AF146 | 24...60 | 20...60 | ZAF146-32 | 1SFN154670R3106 | 1 | 0.310 |
| | 48...130 | 48...130 | ZAF146-32 | 1SFN154670R3206 | 1 | 0.324 |
| | 100...250 | 100...250 | ZP146-33 | 1SFN164623R1033 | 1 | 0.155 |
| | 250...500 | 250...500 | ZP146-34 | 1SFN164623R1034 | 1 | 0.169 |
| AF190 | 24...60 | 20...60 | ZAF190-31 | 1SFN154870R3106 | 1 | 0.893 |
| | 48...130 | 48...130 | ZAF190-32 | 1SFN154870R3206 | 1 | 0.878 |
| | 100...250 | 100...250 | ZP190-33 | 1SFN164823R1033 | 1 | 0.680 |
| | 250...500 | 250...500 | ZP190-34 | 1SFN164823R1034 | 1 | 0.680 |
| AF205 | 24...60 | 20...60 | ZAF205-31 | 1SFN155270R3106 | 1 | 0.893 |
| | 48...130 | 48...130 | ZAF205-32 | 1SFN155270R3206 | 1 | 0.878 |
| | 100...250 | 100...250 | ZP205-33 | 1SFN165223R1033 | 1 | 0.680 |
| | 250...500 | 250...500 | ZP205-34 | 1SFN165223R1034 | 1 | 0.680 |
| AF265 | 24...60 | 20...60 | ZAF265-31 | 1SFN155470R3106 | 1 | 1.124 |
| | 48...130 | 48...130 | ZAF265-32 | 1SFN155470R3206 | 1 | 1.094 |
| | 100...250 | 100...250 | ZP265-33 | 1SFN165423R1033 | 1 | 0.782 |
| | 250...500 | 250...500 | ZP265-34 | 1SFN165423R1034 | 1 | 0.782 |
| AF305 | 24...60 | 20...60 | ZAF305-31 | 1SFN155870R3106 | 1 | 1.124 |
| | 48...130 | 48...130 | ZAF305-32 | 1SFN155870R3206 | 1 | 1.094 |
| | 100...250 | 100...250 | ZP305-33 | 1SFN165823R1033 | 1 | 0.782 |
| | 250...500 | 250...500 | ZP305-34 | 1SFN165823R1034 | 1 | 0.782 |
| AF370 | 24...60 | 20...60 | ZAF370-31 | 1SFN156070R3106 | 1 | 1.124 |
| | 48...130 | 48...130 | ZAF370-32 | 1SFN156070R3206 | 1 | 1.094 |
| | 100...250 | 100...250 | ZP370-33 | 1SFN166023R1033 | 1 | 0.782 |
| | 250...500 | 250...500 | ZP370-34 | 1SFN166023R1034 | 1 | 0.782 |

Note: Only suitable for AF116...AF370 contactors "Made in Sweden" produced after 2018-09-01 (010918).

## Electronic Modules

Control circuit electronic module spare part.

| | Rated contol circuit voltage Uc | | Type | | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|
| | V 50/60Hz | V DC | | | | kg |
| **4-pole contactors** | | | | | | |
| AF116 | 24...60 | 20...60 | ZPT116-11 | 1SFN164224R1011 | 1 | 0.149 |
| | 48...130 | 48...130 | ZPT116-12 | 1SFN164224R1012 | 1 | 0.149 |
| | 100...250 | 100...250 | ZPT116-13 | 1SFN164224R1013 | 1 | 0.153 |
| | 250...500 | 250...500 | ZPT116-14 | 1SFN164224R1014 | 1 | 0.165 |
| AF140 | 24...60 | 20...60 | ZPT140-11 | 1SFN164424R1011 | 1 | 0.149 |
| | 48...130 | 48...130 | ZPT140-12 | 1SFN164424R1012 | 1 | 0.149 |
| | 100...250 | 100...250 | ZPT140-13 | 1SFN164424R1013 | 1 | 0.153 |
| | 250...500 | 250...500 | ZPT140-14 | 1SFN164424R1014 | 1 | 0.165 |
| AF190, AF205 | 24...60 | 20...60 | ZPT205-11 | 1SFN165224R1011 | 1 | 0.618 |
| | 48...130 | 48...130 | ZPT205-12 | 1SFN165224R1012 | 1 | 0.620 |
| | 100...250 | 100...250 | ZPT205-13 | 1SFN165224R1013 | 1 | 0.626 |
| | 250...500 | 250...500 | ZPT205-14 | 1SFN165224R1014 | 1 | 0.636 |
| AF265, AF305, AF370 | 24...60 | 20...60 | ZPT370-11 | 1SFN166024R1011 | 1 | 0.706 |
| | 48...130 | 48...130 | ZPT370-12 | 1SFN166024R1012 | 1 | 0.716 |
| | 100...250 | 100...250 | ZPT370-13 | 1SFN166024R1013 | 1 | 0.710 |
| | 250...500 | 250...500 | ZPT370-14 | 1SFN166024R1014 | 1 | 0.720 |

Note: Only suitable for AF116...AF370 contactors "Made in Sweden" produced after 2018-09-01 (010918).

## Arc chutes

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| AF400, AF460 | ZW460 | 1SFN165710R1000 | 1 | 1.380 |
| AF580, AF750, AF1250 | ZW750 | 1SFN166110R1000 | 1 | 1.500 |
| AF1350, AF1650, AF2050 | ZW1650 | 1SFN166510R1001 | 1 | 4.560 |
| AF2650 /AF2850 | ZW2650 | 1SFN166610R1000 | 1 | 4.000 |



**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**1SBN010010R1010**

# Accessories for UA, UA..RA, GAF contactors



**3/**346 Auxiliary contact blocks
**3/**352 Electronic timers
**3/**355 CA5, CE5, CAL, CEL18 and TEF5 fitting details
**3/**356 Function markers
**3/**357 Surge suppressors for contactor coils
**3/**359 Interface relays
**3/**361 Mechanical latching units
**3/**363 Terminal blocks and terminal enlargments
**3/**364 Terminals for control lead connections
**3/**365 Connection bars for contactors
**3/**366 Contactor coils and main contact sets

# Auxiliary contact blocks




CA5-10




CA5-40E




CAL5-11




CAL18-11

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits for standard industrial environments.

Types of auxiliary contact blocks for front mounting:

- CA5 1 or 4-pole block, instantaneous with N.O., N.C. contacts
- CC5 1-pole block, with N.O. leading contact or N.C. lagging contact.

Select the 4-pole auxiliary contact blocks CA5 type, according to the contactor type for compliance with the standard requirements (see "Terminal Marking and Positioning").

Types of auxiliary contact blocks for side mounting:

- CAL 2-pole block instantaneous N.O. + N.C. contacts.

For clipping onto the right- and/or left-hand side of the contactors.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

| For contactors | Auxiliary contacts | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|
| |  | | | | | kg |
| **Front-mounted instantaneous auxiliary contact blocks, 1-pole** | | | | | | |
| UA16 ... UA110 | 1 0 | – – | CA5-10 | 1SBN010010R1010 | 10 | 0.014 |
| | 0 1 | – – | CA5-01 | 1SBN010010R1001 | 10 | 0.014 |
| | – – | 1 0 | CC5-10 | 1SBN010011R1010 | 10 | 0.014 |
| | – – | 0 1 | CC5-01 | 1SBN010011R1001 | 10 | 0.014 |
| **Front-mounted instantaneous auxiliary contact blocks, 4-pole** | | | | | | |
| UA16 ... UA30 | 2 2 | – – | CA5-22M | 1SBN010040R1122 | 2 | 0.060 |
| | 3 1 | – – | CA5-31M | 1SBN010040R1131 | 2 | 0.060 |
| | 1 3 | – – | CA5-13M | 1SBN010040R1113 | 2 | 0.060 |
| | 0 4 | – – | CA5-04M | 1SBN010040R1104 | 2 | 0.060 |
| | 1 1 | 1 1 | CA5-11/11M | 1SBN010040R1118 | 2 | 0.060 |
| UA50 ... UA110 | 2 2 | – – | CA5-22E | 1SBN010040R1022 | 2 | 0.060 |
| | 3 1 | – – | CA5-31E | 1SBN010040R1031 | 2 | 0.060 |
| | 4 0 | – – | CA5-40E | 1SBN010040R1040 | 2 | 0.060 |
| | 0 4 | – – | CA5-04E | 1SBN010040R1004 | 2 | 0.060 |
| | 1 1 | 1 1 | CA5-11/11E | 1SBN010040R1018 | 2 | 0.060 |
| **Side-mounted instantaneous auxiliary contact blocks, 2-pole** | | | | | | |
| UA16 ... UA75 | 1 1 | – – | CAL5-11 | 1SBN010020R1011 | 2 | 0.050 |
| UA95, UA110, GAF460...GAF2050 | 1 1 | – – | CAL18-11 | 1SFN010720R1011 | 2 | 0.050 |

For each contactor type, refer to "Accessory fitting details" table.

Note: The CAL auxiliary contact blocks can be used with UA..RA contactors. See "Accessory fitting details" for this contactor type.

# Auxiliary contact blocks

## Technical data

| | | | Front mounted | Side mounted | |
|---|---|---|---|---|---|
| Types | | | 1-pole CA5, 1-pole CC5, 4-pole CA5 | CAL5-11 | CAL18-11, CAL18-11B |
| **Contact utilization characteristics according to IEC** | | | | | |
| Standards | | | IEC/EN 60947-5-1 | | |
| Rated insulation voltage Ui acc. to IEC 60947-5-1 | | | 690 V | | |
| Pollution degree | | | 3 | | |
| Rated operational voltage Ue max. | | | 24...690 V AC | | |
| Conventional thermal current Ith - θ ≤ 40 °C | | | 16 A | | |
| Ie / Rated operational current AC-15 | | | | | |
| acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | | 6 A | | |
| | 220-240 V 50/60 Hz | | 4 A | | |
| | 380-440 V 50/60 Hz | | 3 A | | |
| | 500-690 V 50/60 Hz | | 2 A | | |
| Making capacity acc. to IEC 60947-5-1 | | | 10 x Ie AC-15 | | |
| Breaking capacity acc. to IEC 60947-5-1 | | | 10 x Ie AC-15 | | |
| Ie / Rated operational current DC-13 | | | | | |
| acc. to IEC 60947-5-1 | | 24 V DC | 6 A / 144 W | | |
| | | 48 V DC | 2.8 A / 134 W | | |
| | | 72 V DC | 1 A / 72 W | | |
| | | 110 V DC | 0.55 A / 60 W | | |
| | | 125 V DC | 0.55 A / 69 W | | |
| | | 220 V DC | 0.3 A / 66 W | | |
| | | 250 V DC | 0.3 A / 75 W | | |
| Short-circuit protection device gG type fuse | | | 10 A | | |
| Rated short-time withstand current Icw | | for 1.0 s | 100 A | | |
| θ = 40 °C | | for 0.1 s | 140 A | | |
| Minimum switching capacity | | | | | |
| A40 ... A75 contactors | | | 17 V / 1 mA | | – |
| with failure rate acc. to IEC 60947-5-4 | | | ≤ $10^{-7}$ | | – |
| A95 ... A110 contactors | | | 24 V / 50 mA | – | 24 V / 50 mA (0.5 million of operating cycles) |
| with failure rate acc. to IEC 60947-5-4 | | | – | – | ≤ 10-6 |
| Power dissipation per pole at 6 A | | | 0.1 W | | 0.15 W |
| Mechanical durability | Number of operating cycles | | 10 millions (UA16 ... UA75) | 10 millions | 5 millions (UA95 ... UA110) |
| | | | 3 millions (UA95 ... UA110) | | 3 millions (GAF185 ... GAF750) |
| | | | | | 0.5 million (GAF1250 ... GAF2050) |
| | Max. switching frequency | | 3600 cycles/h | | |
| Electrical durability | Number of operating cycles | | see "Electrical durability" curves | | |
| | Max. switching frequency | AC-15 | 1200 cycles/h | | |
| | | DC-13 | 900 cycles/h | | |

## Contact utilization characteristics according to UL / CSA

| | |
|---|---|
| Standards | UL 508, CSA C22.2 No. 14 |
| Max. operational voltage | 600 V AC, 250 V DC |
| Pilot duty | A600, Q300 |
| AC thermal rated current | 10 A |

## Connecting characteristics

| | | | | |
|---|---|---|---|---|
| Connection capacity (min. ... max.) | | | | |
| Rigid Solid/Stranded | | 1 x | 1...4 mm² | |
| | | 2 x | 1...4 mm² | |
| Flexible with ferrule | | 1 x | 0.75...2.5 mm² | |
| | | 2 x | 0.75...2.5 mm² | |
| Lugs | | L ≤ | 7.7 mm | 8 mm |
| | | l > | 3.7 mm | 3.7 mm |
| Stripping length | | | 10 mm | - |
| Tightening torque | | | 1 Nm | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | Terminals | IP20 | |
| Screw terminals | | | Delivered in open position, screws of unused terminals must be tightened | |
| All terminals | | | M3.5 | |
| Screwdriver type | | | Flat Ø 5.5 / Pozidriv 2 | |

# Auxiliary contact blocks for severe industrial environments






CE5-01W

The auxiliary contact blocks are used for the operation of auxiliary and control circuits for severe industrial environments.

Types of auxiliary contact blocks for front mounting:

- CE5 1-pole block, instantaneous with N.O. contact or N.C. contact, designed in 2 protection versions:
  - CE5-.. D with built-in microswitch IP40, degree of protection (IP20 on terminals)
  - CE5-.. W with built-in microswitch IP67, degree of protection (IP20 on terminals).

Types of auxiliary contact blocks for side mounting:

- CEL18 1-pole block with built-in microswitch IP67 degree of protection (IP20 on terminals). Instantaneous N.O. or N.C. contact.

For clipping onto the right- and/or left-hand side of the contactors.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

| For contactors | Auxiliary contacts | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|
| |  |  | | | | kg |
| **Front-mounting instantaneous auxiliary contact blocks, 1-pole** | | | | | | |
| UA16 ... UA75 | 1 | – – | CE5-10D0.1 | 1SBN010015R1010 | 1 | 0.020 |
| | – 1 | – – | CE5-01D0.1 | 1SBN010015R1001 | 1 | 0.020 |
| | 1 | – – | CE5-10D2 | 1SBN010017R1010 | 1 | 0.020 |
| | – 1 | – – | CE5-01D2 | 1SBN010017R1001 | 1 | 0.020 |
| | 1 | – – | CE5-10W0.1 | 1SBN010016R1010 | 1 | 0.020 |
| | – 1 | – – | CE5-01W0.1 | 1SBN010016R1001 | 1 | 0.020 |
| | 1 | – – | CE5-10W2 | 1SBN010018R1010 | 1 | 0.020 |
| | – 1 | – – | CE5-01W2 | 1SBN010018R1001 | 1 | 0.020 |
| **Side-mounting instantaneous auxiliary contact blocks, 1-pole microswitch auxiliary contact N.O. or N.C.** | | | | | | |
| UA95, UA110<br>GAF460 ... GAF2050 | 1 0 | – – | CEL18-10 | 1SFN010716R1010 | 1 | 0.050 |
| UA95, UA110<br>GAF460 ... GAF2050 | 0 1 | – – | CEL18-01 | 1SFN010716R1001 | 1 | 0.050 |

For each contactor type, refer to "Accessory fitting details" table.

# Auxiliary contact blocks



## Technical data

| | | | Front-mounted | | Side-mounted |
|---|---|---|---|---|---|
| Types | | | 1-pole CE5-..0.1 | 1-pole CE5-..2 | CEL18-10, CEL18-01 |
| **Contact utilization characteristics according to IEC** | | | | | |
| Standards | | | IEC 60947-5-1 and EN 60947-5-1 | | |
| Rated insulation voltage Ui acc. to IEC 60947-5-1 | | | 250 V | | |
| Pollution degree | | | 3 | | |
| Rated operational voltage Ue max. | | | 125 V | 250 V | 125 V |
| Conventional thermal current Ith - θ ≤ 40 °C | | | 0.1 A | 2 A | 0.1 A |
| Ie / Rated operational current | | | **AC-14** | **AC-15** | **AC-14** |
| acc. to IEC 60947-5-1 | | 24-127 V 50/60 Hz | 0.1 A | 2 A | 0.1 A |
| | | 220-240 V 50/60 Hz | – | 2 A | – |
| Making capacity acc. to IEC 60947-5-1 | | | 6 x Ie AC-14 | 10 x Ie AC-15 | 6 x Ie AC-14 |
| Breaking capacity acc. to IEC 60947-5-1 | | | 6 x Ie AC-14 | 10 x Ie AC-15 | 6 x Ie AC-14 |
| Ie / Rated operational current | | | **DC-12** | | |
| acc. to IEC 60947-5-1 | | 24 V DC | 0.1 A | 2 A | 0.1 A |
| | | 48 V DC | 0.1 A | 1 A | 0.1 A |
| | | 72 V DC | 0.1 A | 0.3 A | 0.1 A |
| | | 110 V DC | 0.1 A | 0.2 A | 0.1 A |
| | | 125 V DC | – | 0.2 A | – |
| | | 220 V DC | – | 0.1 A | – |
| Short-circuit protection device | | | 0.1 A (FF type fuses) (1) | 10 A (FF type fuses) (1) | 0.1 A (FF type fuses) (1) |
| Minimum switching capacity | | | | | |
| A40 ... A75 contactors | | | 3 V / 1 mA | 17 V / 1 mA | 3 V / 1 mA |
| With failure rate acc. to IEC 60947-5-4 | | | – | ≤ 10-7 | – |
| A95 ... A110 contactors | | | 3 V / 1 mA | 17 V / 1 mA | – |
| With failure rate acc. to IEC 60947-5-4 | | | – | ≤ 10-7 | – |
| Mechanical durability | Number of operating cycles | | 5 millions for CE5-..D0.1 | 5 millions for CE5-..D2 | 1 million |
| | | | 2.5 millions for CE5-..W0.1 | 2.5 millions for CE5-..W2 | – |
| | Max. switching frequency | | 3600 cycles/h | | 1200 cycles/h |
| Electrical durability | Number of operating cycles | | 2.5 millions for CE5-..D0.1 | 1 million for CE5-..D2 | 0.7 millions |
| | | | 0.7 millions for CE5-..W0.1 | 0.3 millions for CE5-..W2 | |
| | Max. switching frequency | AC-14, AC-15 | 1200 cycles/h | | |
| | | DC-12 | 900 cycles/h | | |

## Contact utilization characteristics according to UL / CSA

| | | | | |
|---|---|---|---|---|
| Standards | | UL 508, CSA C22.2 No. 14 | | |
| Max. operational voltage | | 125 V AC / 110 V DC | 250 V AC / 220 V DC | 125 V |
| Pilot duty | | | | |
| AC thermal rated current | | 0.1 A | 2 A | 0.1 A |

## Connecting characteristics

| | | | | | |
|---|---|---|---|---|---|
| Connection capacity (min. ... max.) | | | | | |
|  | Rigid Solid/Stranded | 1 x | 1...4 mm² | | |
|  | | 2 x | 1...4 mm² | | |
|  | Flexible with ferrule | 1 x | 0.75...2.5 mm² | | |
|  | | 2 x | 0.75...2.5 mm² | | |
|  | Bars or lugs | L ≤ | 7.7 mm | | |
| | | l > | 3.7 mm | | |
| Connection capacity acc. to UL/CSA | | 1 or 2 x | AWG 18...14 | | |
| Tightening torque | | | 1 Nm | | |
| Degree of protection | | Terminals | IP20 | | |
| acc. to IEC/EN 60947-1 and IEC/EN 60529 | | Microswitches | IP40 for CE5-..D0.1 | IP40 for CE5-..D2 | IP67 |
| | | | IP67 for CE5-..W0.1 | IP67 for CE5-..W2 | |
| Screw terminals | | | Delivered in open position, screws of unused terminals must be tightened | | |
| All terminals | | | M3.5 | | |
| Screwdriver type | | | Flat Ø 5.5 / Pozidriv 2 | | |

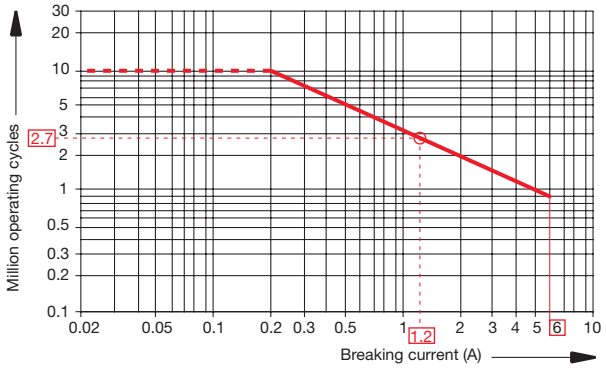
(1) or HRC fuses for very fast action (6.3 x 32 mm size).

# Auxiliary contacts
## Electrical durability

### Electrical durability for AC-15 utilization category

AC-15 utilization category according to IEC/EN 60947-5-1:
- making current: 10 x Ie with cos ϕ = 0.7 and Ue
- breaking current: Ie with cos ϕ = 0.4 and Ue.

These curves represent the electrical durability of the built-in or add-on auxiliary contacts, in relation to the breaking current.
The curves have been drawn for resistive and inductive loads up to 690 V, 40...60 Hz.

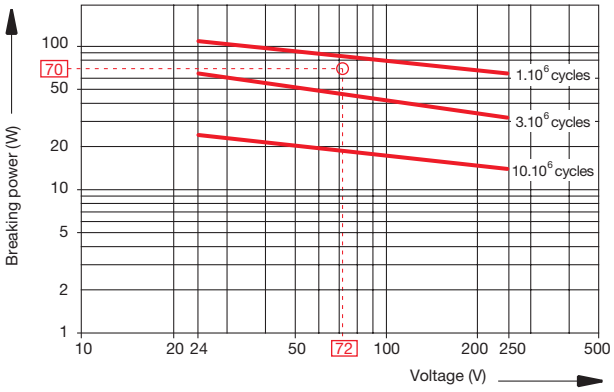



- 1-pole and 4-pole CA5,
  1-pole CC5,
  2-pole CAL5 and CAL18 add-on auxiliary contacts.

Example:
Breaking current = 1.2 A
On the opposite curve at intersection "O" 1.2 A
the corresponding value for the electrical durability is approximately 2.7 millions operating cycles.

### Electrical durability for DC-13 utilization category

DC-13 utilization category according to IEC/EN 60947-5-1: making and breaking current = Ie with Ue value.




- 1-pole and 4-pole CA5,
  1-pole CC5,
  2-pole CAL5 and CAL18 add-on auxiliary contacts.

Example:
Control of DC electro-magnet: Ue voltage = 72 V DC and breaking power = 70 W.
On the opposite curve at intersection "O" 72 V / 70 W
the corresponding value for the electrical durability is approximately 2 millions operating cycles.

# Add-on auxiliary contacts

## Terminal marking and positioning

### 1-pole auxiliary contacts




CA5-01




CA5-10




CE5-01, CEL18-01




CE5-10, CEL18-10

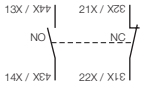



CC5-01

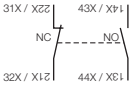



CC5-10

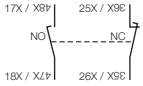
### 2-pole auxiliary contacts



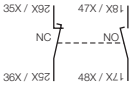

CAL5-11, CAL18-11
(Left-side mounted)




CAL5-11, CAL18-11
(Right-side mounted)

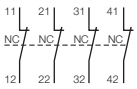



CCL5-11
(Left-side mounted)

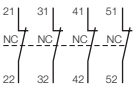



CCL5-11
(Right-side mounted)

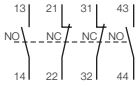
### 4-pole auxiliary contacts



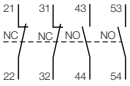

CA5-04E



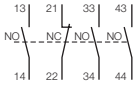

CA5-04M



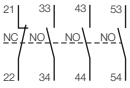

CA5-22E



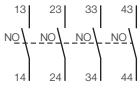

CA5-22M



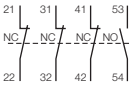

CA5-31E



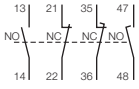

CA5-31M



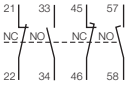

CA5-40E




CA5-13M




CA5-11/11E




CA5-11/11M

# Electronic timers




TEF5-OFF

TEF5 frontal electronic timers are used for realizing timing function and are available in ON-delay and OFF-delay versions.

**Compact solution in cabinet compared to separate timers**

TEF5 electronic timers are front-mounted and locked on contactors.
A mechanical indicator allows to show the state of the contactor.

TEF5 electronic timers are supplied by direct wiring to the coil terminals A1 - A2 of the contactor or contactor relay. A varistor is integrated on the timer to offer a built-in protection against surges in the contactor coil.

**Available for a wide control voltage range 24...240 V AC/DC**

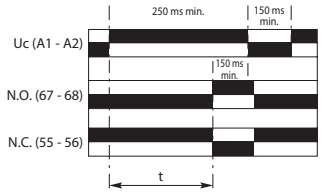
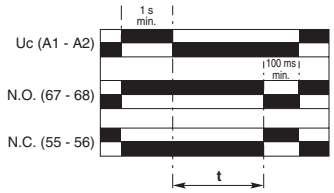
TEF5-ON or TEF5-OFF allow time-delayed functions up to 100 s in 3 distinct time ranges, independently of the control system. The time delay ranges are selected by a switch and the time delay can be adjusted by means of a rotary switch. The timing function is activated by closing or opening the device on which the timer is mounted. The OFF-delay version operates without additional control supply.

| For contactors, contactor relays | Time delay range selected by switch | Delay type | Rated control circuit voltage Uc<br>V 50/60 Hz or DC | Auxiliary contacts | Type | Order code | Weight<br>Pkg (1 pce)<br>kg |
|---|---|---|---|---|---|---|---|
| UA16 ... UA75 | 0.1...1 s<br>1...10 s<br>10...100 s | ON-delay | 24...240 | 1 1 | TEF5-ON | 1SBN020312R1000 | 0.065 |
| | | OFF-delay | 24...240 | 1 1 | TEF5-OFF | 1SBN020314R1000 | 0.065 |

# Electronic timers
## Technical data



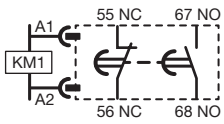
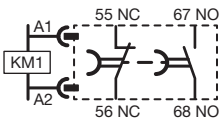
### Contact utilization characteristics according to IEC

| Types | | | **TEF5-ON** | **TEF5-OFF** |
|---|---|---|---|---|
| Standards | | | IEC/EN 60947-5-1 | |
| Rated insulation voltage Ui | | | | |
| acc. to IEC 60947-5-1 | | | 400 V | |
| Rated impulse withstand voltage Uimp | | | 4 kV | |
| Pollution degree | | | 3 | |
| Rated operational voltage Ue max. | | | 240 V | |
| Rated frequency (without derating) | | | 50 / 60 Hz | |
| Conventional thermal current Ith - θ ≤ 40 °C | | | 5 A | |
| Ie / Rated operational current AC-15 | | | | |
| acc. to IEC 60947-5-1 | | 24-127 V 50/60 Hz | 3 A | |
| | | 220-240 V 50/60 Hz | 1.5 A | |
| Making capacity | | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | |
| Breaking capacity | | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | |
| Ie / Rated operational current DC-13 | | | | |
| acc. to IEC 60947-5-1 | | 24 V DC | 1 A / 24 W | |
| Short-circuit protection device gG type fuse | | | 6 A | |
| Rated short-time withstand current Icw | | for 1.0 s | 8 A | |
| θ = 40 °C | | for 0.1 s | 8 A | |
| Minimum switching capacity | | | 12 V / 3 mA | |
| with failure rate acc. to IEC 60947-5-4 | | 24 V DC | $10^{-7}$ | |
| Power dissipation per pole at 3 A | | | 0.1 W | |
| Function diagram | | | ON-delay<br> | OFF-delay<br> |
| | | | Bistable relay inside.<br>Before use, once apply Uc then switch it off in order to initialize position of the contacts. | |
| Control circuit voltage | | | | |
| AC control voltage | Rated control circuit voltage Uc | | 24...240 V AC | |
| 50/60 Hz | Average consumption | | 1.5 mA RMS | 1 mA RMS |
| DC control voltage | Rated control circuit voltage Uc | | 24...240 V DC | |
| | Average consumption | | 1.5 mA | 1 mA |
| Rated frequency limits | | | 50 / 60 Hz | |
| Supply voltage range | | | 0.85...1.1 x Uc (at θ ≤ 70 °C) | |
| Overvoltage protection | | | Varistor included | |
| Time delay range (t) selected by switch | | 0.1...1 s |  | |
| | | 1...10 s |  | |
| | | 10...100 s |  | |
| On-load reiteration accuracy under constant conditions | | | ≤ 1 % | |
| Minimum ON period | | | 0.15 s | 1 s |
| Recovery time | | | 0.15 s | 0.1 s |
| Ambient air temperature | Operation | | -25 °C ... +70 °C | |
| | Storage | | -40 °C ... +80 °C | |
| Climatic withstand | | | Category B according to IEC 60947-1 Annex Q | |
| Maximum operating altitude | | | 2000 m | |
| Mounting positions | | | Acc. to mounting positions permitted on contactors or contactor relays | |
| Shock withstand | | | 1/2 sinusoidal shock for 11 ms: no change in contact position | |
| acc. to IEC/EN 60068-2-27 | | | Same as contactor | |
| (Mounting position 1) | | | | |
| Mechanical durability | | | | |
| | Number of operating cycles | | 5 millions operating cycles | |
| | Max. switching frequency | | 3600 cycles/h | 1800 cycles/h |
| Max. electrical switching frequency | | | | |
| | | AC-15 | 1200 cycles/h | |
| | | DC-13 | 900 cycles/h | |

# Electronic timers
## Technical data



### Connecting characteristics

| | | | |
|---|---|---|---|
| Connection capacity (min. ... max.) | | | |
| | Rigid Solid/Stranded | 1 x | 1...2.5 mm² |
| | | 2 x | 1...2.5 mm² |
| | Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² |
| | | 2 x | 0.75...2.5 mm² |
| | Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² |
| | | 2 x | 0.75...1.5 mm² |
| | Lugs | L ≤ | 8 mm |
| | | I > | 3.7 mm |
| | Stripping length | | 10 mm |
| | Tightening torque | | 1 N.m / 9 lb.in |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | IP20 |
| Screw terminals | | | Delivered in open position, screws of unused terminals should be tightened |
| | All terminals | | M3.5 |
| Screwdriver type | | | Flat Ø 5.5 / Pozidriv 2 |
| Terminal Marking | | |   |

# CA5, CE5, CAL, CEL18 and TEF5 fitting details

**Many configurations are possible depending on whether these are front-mounted or side-mounted.**

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories<br>Auxiliary contact blocks<br>1-pole CA5<br>1-pole CE5 | 4-pole CA5 | Electronic timer<br>TEF5 | Side-mounted accessories<br>Auxiliary contact blocks<br>2-pole CAL<br>1-pole CEL18 |
|---|---|---|---|---|---|---|
| **UA contactors** | | | | | | |
| UA16 ... UA26 | 3 0 | 1 0 | 1 to 4 x CA5 | **or** 1 x 4-pole CA5 | **or** 1 x TEF5 | **+** 1 to 2 x CAL5-11 |
| | | | 1 to 2 x CE5 max. (1) | **+** 1 x 1-pole CA5 or CE5 (1) | **+** 1 x 1-pole CA5 | – |
| UA30 | 3 0 | 1 0 | 1 to 5 x CA5 | **or** 1 x 4-pole CA5 | **or** 1 x TEF5 | **+** 1 to 2 x CAL5-11 |
| | | | 1 to 3 x CE5 max. (1) | **+** 1 x 1-pole CA5 or CE5 (1) | **+** 1 x 1-pole CA5 | – |
| UA50 ... UA75 | 3 0 | 0 0 | 1 to 6 x CA5 | **or** 1 x 4-pole CA5 | **or** 1 x TEF5 | **+** 1 to 2 x CAL5-11 |
| | | | 1 to 5 x CE5 max. (2) | + 2 x 1-pole CA5 or CE5 (1) | **+** 2 x 1-pole CA5 | – |
| | 3 0 | 1 1 | 1 to 6 x CA5 | **or** 1 x 4-pole CA5 | **or** 1 x TEF5 | **+** 1 x CAL5-11 |
| | | | 1 to 5 x CE5 max. (2) | **+** 2 x 1-pole CA5 or CE5 (1) | **+** 2 x 1-pole CA5 | – |
| UA95, UA110 | 3 0 | 0 0 | 1 to 6 x CA5 | **or** 1 x 4-pole CA5 | – | **+** 1 to 2 x CAL18-11 |
| | | | 1 to 5 x CE5 max. (2) | **+** 2 x 1-pole CA5 or CE5 (1) | – | **or** 1 to 2 x CEL18 |
| | 3 0 | 1 1 | 1 to 6 x CA5 | **or** 1 x 4-pole CA5 | – | **+** 1 x CAL18-11 |
| | | | 1 to 5 x CE5 max. (2) | **+** 2 x 1-pole CA5 or CE5 (1) | – | **or** 1 x CEL18 |
| **UA..RA contactors** | | | | | | |
| UA16-30-10RA | 3 0 | 1 0 | – | – | – | **+** 1 x CAL5-11 |
| UA26-30-10RA | 3 0 | 1 0 | | | | |
| UA30-30-10RA | 3 0 | 1 0 | 1 x CA5<br>1 x CE5 | – | – | **+** 1 to 2 x CAL5-11 |
| UA50-30-00RA | 3 0 | 0 0 | 1 to 2 x CA5<br>1 to 2 x CE5 | – | – | **+** 1 to 2 x CAL5-11 |
| UA63-30-00RA | 3 0 | 0 0 | | | | |
| UA75-30-00RA | 3 0 | 0 0 | | | | |
| UA95-30-00RA | 3 0 | 0 0 | 1 to 2 x CA5 | – | – | **+** 1 to 2 x CAL18-11 |
| UA110-30-00RA | 3 0 | 0 0 | 1 to 2 x CE5 | – | – | **or** 1 to 2 x CEL18 |

Notes regarding combination of CE5 with other accessories:
(1) The total number of N.O. or N.C. CE5 and other additional N.C. CA5 auxiliary contacts is limited to 3. CE5 auxiliary contacts not allowed in mounting position 5.
(2) The total number of N.O. or N.C. CE5 and other additional N.C. CA5 auxiliary contacts is limited to 5.

# Function markers




BA5-50

### BA5-50 Function markers

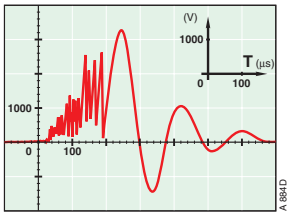
Set of 50 function markers designed to be clipped onto the front face of devices. Details can be added to these markers using a ball point pen, indelible felt-tip pen or pentel white.

Self-adhesive labels (not supplied) can also be added to them.

Marker dimensions: 7 x 19 mm (0.276" x 0.748").

| For contactors | Type | Order code | | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| UA, UA..RA and accessories | BA5-50 | 1SBN110000R1000 | | 1 | 0.017 |

# Surge suppressors for contactor coils




The operation of inductive circuits causes overvoltages, in particular on opening of the contactor coil.

The electromagnetic energy stored in the coil during contactor closing is restored on opening in the form of surges, the slope and amplitude of which may rise to several kilovolts. A number of drawbacks are observed ranging from interference on the electronic devices to breakdown of insulators and even destruction of certain sensitive components.
The graph opposite reproduces the oscillogram showing voltage discharges at the terminals of a 42 V / 50 Hz coil without peak clipping. The coil was switched by 8 series-connected poles of a contactor relay.

Following a burst of discharges with a very steep slope a damped oscillation emerges with a peak value of 3500 V.

Overvoltage Factor
The overvoltage factor k is defined as the ratio of the maximum overvoltage peak value Ûs to the peak value Ûc of the coil rated control voltage Uc:

$$k = \frac{\hat{U}s\ max.}{\hat{U}c} \qquad \text{in DC: } k = \frac{\hat{U}s\ max.}{Uc} \qquad \text{or in AC: } k = \frac{\hat{U}s\ max.}{Uc\sqrt{2}}$$

For example the following is obtained for the above graph: $k = \frac{3500}{42\sqrt{2}} \approx 60$


1SBC574001F0301

RV5/50

To reduce the harmful effects of these overvoltages, ABB has developed a range of surge suppressors designed to reduce the k factor defined above and to limit or even completely eliminate the high pre-damping voltage frequencies.

Each case is different, but the technical data tolerances and the generous sizing of parts have enabled us to reduce the number of variants.

We have chosen the following solutions: varistors and RC blocks.

Note: A varistor is a resistor whose value decreases to a very large extent when a certain voltage is applied at its terminals.


1SBC573891F0301

RC5-1/50

| For contactors | Rated control circuit voltage Uc | | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|
| | V | AC | DC | | | | kg |
| UA, UA..RA | 24...50 | ● | ● | RV5/50 | 1SBN050010R1000 | 2 | 0.015 |
| | 50...133 | ● | ● | RV5/133 | 1SBN050010R1001 | 2 | 0.015 |
| | 110...250 | ● | ● | RV5/250 | 1SBN050010R1002 | 2 | 0.015 |
| | 250...440 | ● | ● | RV5/440 | 1SBN050010R1003 | 2 | 0.015 |
| UA16...UA30, UA16RA...UA30RA | 24...50 | ● | – | RC5-1/50 | 1SBN050100R1000 | 2 | 0.012 |
| | 50...133 | ● | – | RC5-1/133 | 1SBN050100R1001 | 2 | 0.012 |
| | 110...250 | ● | – | RC5-1/250 | 1SBN050100R1002 | 2 | 0.012 |
| | 250...440 | ● | – | RC5-1/440 | 1SBN050100R1003 | 2 | 0.012 |
| UA50...UA110, UA50RA...UA110RA | 24...50 | ● | – | RC5-2/50 | 1SBN050200R1000 | 2 | 0.015 |
| | 50...133 | ● | – | RC5-2/133 | 1SBN050200R1001 | 2 | 0.015 |
| | 110...250 | ● | – | RC5-2/250 | 1SBN050200R1002 | 2 | 0.015 |
| | 250...440 | ● | – | RC5-2/440 | 1SBN050200R1003 | 2 | 0.015 |

# Surge suppressors for contactor coils

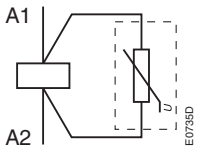


## Technical data

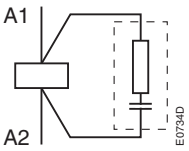
| Varistor | RV5/50 | RV5/133 | RV5/250 | RV5/440 |
|---|---|---|---|---|
| Rated control circuit voltage Uc | 24...50 V AC | 50...133 V AC | 110...250 V AC | 250...440 V AC |
| | 24...50 V DC | 50...133 V DC | 110...250 V DC | 250...440 V DC |
| Residual overvoltage (clipping voltage) | 132 V AC | 270 V AC | 480 V AC | 825 V AC |
| | 132 V DC | 270 V DC | 480 V DC | 825 V DC |
| Opening time growth factor | 1.1...1.5 | | | |
| Operating temperature | -20...+70 °C | | | |
| Connection to the coil terminals (parallel mounting) | Clip-on for both fixing and connection. | | | |
| Fixing | Clipped onto the top part of the contactor base without change in contactor overall dimensions. | | | |
| Advantages | High energy absorption: good damping - Unpolarized system. | | | |
| Drawback | Clipping as from Uvdr*, thus voltage front up to this point. | | | |
| | *Uvdr = Varistor operating voltage (voltage dependent resistor), tolerance ± 10 %. | | | |

| RC type | RC5-1/50<br>RC5-2/50 | RC5-1/133<br>RC5-2/133 | RC5-1/250<br>RC5-2/250 | RC5-1/440<br>RC5-2/440 |
|---|---|---|---|---|
| Rated control circuit voltage Uc | 24...50 V AC | 50...133 V AC | 110...250 V AC | 250...440 V AC |
| Residual overvoltage (clipping voltage) | 2 to 3 x Uc max. | | | |
| Opening time growth factor | 1.2...1.3 | | | |
| Operating temperature | -20...+70 °C | | | |
| Connection to the coil terminals (parallel mounting) | Clip-on for both fixing and connection. | | | |
| Fixing | Clipped onto the top part of the contactor base without change in contactor overall dimensions. | | | |
| Advantages | Very fast clipping - Attenuation of steep fronts and thus of high frequencies. No operating delays. | | | |

## Wiring diagrams

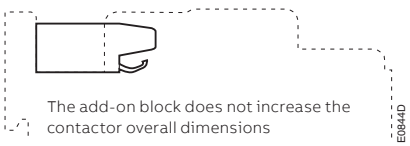



Varistor




RC type

## Dimensions




RV5, RC5

# Interface relays




RA5-1

RA5-1 interface relay is designed to receive 24 V DC signals delivered by PLC's or other sources with a low output power and to restore them with sufficient power to operate the coils of the relevant contactors.

RA5-1 interface relay is made up of a miniature electromechanical relay equipped with a N.O. contact and with a low consumption 24 V DC coil.

The interface relay coil is controlled by the PLC while the N.O. contact ensures switching of the power contactor.

Coil switching gives rise to overvoltages which have adverse effects on the electronic devices, insulators and, more generally, on component lifetime. The RA5-1 is equipped with surge suppressors:

- on the 24 V DC relay coil via a diode,
- on the power contactor coil via a varistor.

Furthermore, the RA5-1 is protected against relay pole reversal by a diode inserted between the E1 and E2 input terminals.

| For contactors | Coil voltages | Rated control circuit voltage Uc | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|
| | V 50/60 Hz | V DC | | | | kg |
| UA, UA..RA | 24...250 | 24 | RA5-1 | 1SBN060300R1000 | 1 | 0.050 |
| | | | RA5-1 | 1SBN060300T1000 | 10 | 0.050 |

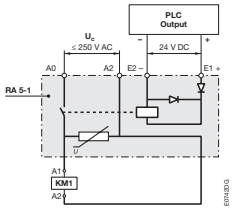
# Interface relays



## Technical data

| Type | | | **RA5-1** |
|---|---|---|---|
| **Utilization characteristics according to IEC** | | | |
| Standards | | | IEC 60255-5 |
| Rated insulation voltage Ui acc. to IEC 60947-4-1 | | | 250 V AC |
| Pollution degree | | | 3 |
| Ambient air temperature | | | |
| In free air operation | at Uc = 24 V DC (between E1 and E2) | | -25...+70 °C |
| | from 0.85 to 1.1 x Uc | | -25...+55 °C |
| Storage | | | -40...+70 °C |
| Climatic withstand | | | Complies with that of associated contactors |
| Maximum operating altitude | | | 3000 m |
| Mounting positions | | | No limitation |
| Fixing | | | Using the contactor A1 and A2 teminal connecting parts |
| **Connecting characteristics** | | | |
| Connection capacity (min. ... max.) | | | |
| Rigid Solid/Stranded | | 1 x | 1...4 mm² |
| | | 2 x | 1...4 mm² |
| Flexible with ferrule | | 1 x | 0.75...2.5 mm² |
| | | 2 x | 0.75...2.5 mm² |
| Lugs | | L < | 8 mm |
| | | l > | 3.5 mm |
| Stripping length (all terminals) | | | 10 mm |
| Tightening torque | | | |
| Recommended | | | 1 Nm |
| Max. | | | 1.2 Nm |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | Protection against direct contact in acc. with EN 50274<br>RA5-1 wired and mounted on the associated contactor |
| Screw terminals | | | Delivered in open position, screws of unused terminals must be tightened |
| All terminals | | | M3.5 |
| Screwdriver type | | | Flat Ø 5.5 / Pozidriv 2 |
| **Working data** | | | |
| Surge suppression | | | |
| For contactor coil | | | Varistor |
| For interface relay coil | | | Diode |
| Protection against polarity reversal between terminals E1 and E2 | | | Diode |
| Interface relay operating time | | | Closing and drop-out ≤ 10 ms |
| Total operating time, interface relay + contactor | | | |
| Between energization and: | N.O. contact closing | | 20...37 ms |
| | N.C. contact opening | | 17...32 ms |
| Between de-energization and: | N.O. contact opening | | 17...25 ms |
| | N.C. contact closing | | 20...28 ms |
| **Electrical input data** | | | |
| Control voltage (E1 and E2 terminals) Uc | | | |
| Rated value | | | 24 V DC |
| Max. range at ambient temperature 20 °C | | | 19...30 V DC |
| Max. consumption for Uc = 24 V DC, θ = 20 °C | | | 0.3 W |
| "0" status (relay open) | | for Uc | ≤ 2.4 V DC |
| | | for Ic | < 1 mA |
| "1" status (relay closed) | | for Uc | ≥ 19 V DC |
| Max. short supply interruption immunity time | | | 2 ms |
| **Electrical output data** | | | |
| Switching voltage (A0 and A2 terminals) | | | ≤ 250 V AC |
| Electrical durability | | | |
| Number of operating cycles | | | 2 millions (600 cycles/h) on UA16(RA) ... UA75(RA) contactors |
| | | | 0.5 million (600 cycles/h) on UA95(RA) and UA110(RA) contactors |

## Connection




The "E1+" and "E2-" input terminals must be connected, according to their polarity, to the PLC output.
The RA5-1 is equipped with two terminal pads for connection to the A1 and the A2 terminals of the contactor coil.
This coil is supplied between the A0 and the A2 terminals of the RA5-1.
Mounting: terminals pads clamped inside the contactor coil terminals.

# Mechanical latching units




WB75-A

For converting standard contactors into latched contactors.

The WB75-A block contains a mechanical latching device with electromagnetic impulse unlatching (AC or DC) or manual unlatching.

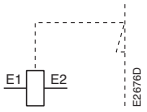
Captive screw type connecting terminals, built-in cable clamps, M3.5 (+,-) pozidriv 2 screw with screwdriver guidance; delivered untightened and protected against accidental direct contact.

Operation
After closing, the contactor continues to be held in the closed position by the latching mechanism should the supply voltage fail at the contactor coil terminals.

Contactor opening can be controlled:

- electrically by an impulse (AC or DC) on the WB75-A block coil.
  (the coil is not designed to be permanently energized)
- manually by pressing the pushbutton on the front face of the WB75-A block.

Mounting
The WB75-A block is clipped onto the front face of the 1-stack contactor where it takes up two slots. The two other slots may accept CA5... single pole auxiliary contacts (1 block on each side of the mechanical latch).




Terminal marking

| For contactors | Rated control circuit voltage Uc | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|
| | V 50 Hz or DC | V 60 Hz | | | | kg |
| UA16 ... UA75 | 24 | 24...28 | WB75-A | FPTN372726R1001 | 1 | 0.120 |
| | 42 | 42...48 | WB75-A | FPTN372726R1002 | 1 | 0.120 |
| | 48 | 48...55 | WB75-A | FPTN372726R1003 | 1 | 0.120 |
| | 110 | 110...127 | WB75-A | FPTN372726R1004 | 1 | 0.120 |
| | 220...230 | 220...255 | WB75-A | FPTN372726R1006 | 1 | 0.120 |
| | 230...240 | 230...277 | WB75-A | FPTN372726R1005 | 1 | 0.120 |
| | 380...415 | 380...440 | WB75-A | FPTN372726R1007 | 1 | 0.120 |
| | 415...440 | 440...480 | WB75-A | FPTN372726R1008 | 1 | 0.120 |

# Mechanical latching units



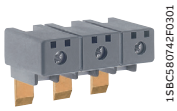
## Technical data

| Type | | | **WB75-A** |
|---|---|---|---|
| **Utilization characteristics according to IEC** | | | |
| Rated insulation voltage Ui acc. to IEC 60947-1 | | | 690 V |
| Pollution degree | | | 3 |
| Max. electrical impulse time | | | |
| On AC coil (with load factor 5 %) | | | 20 s |
| On DC coil (with load factor 3 %) | | | 8 s |
| Min. electrical impulse time | | | |
| For latching (energizing of the contactor coil) | | AC | 50 ms (UA, GA contactors) |
| | | DC | 50 ms (GAE contactors) |
| For pull-out (energizing of the WB block coil) | | AC | 30 ms (UA, GA contactors) |
| | | DC | 50 ms (GAE contactors) |
| Coil operating limits | | AC or DC supply | 0.85...1.1 x Uc |
| AC control voltage 50/60 Hz | | | |
| Rated control circuit voltage Uc | | | 24...480 V AC |
| Coil consumption | | Average pull-in value | 90 VA |
| | | Average holding value | 60 VA |
| DC control voltage | | | |
| Rated control circuit voltage Uc | | | 24...440 V DC |
| Coil consumption | | Average pull-in value | 110 W |
| | | Average holding value | 110 W |
| On contactor closing (latching) Between coil energization and: | | N.O. contact closing | No difference with the operation of a contactor without mechanical latching unit |
| | | N.C. contact opening | No difference with the operation of a contactor without mechanical latching unit |
| On contactor opening (unlatching) Between WB coil energization and: | | N.O. contact opening | 5...25 ms |
| | | N.C. contact closing | 7...28 ms |
| Mechanical durability | | | |
| | | Number of operating cycles | 1 million operating cycles |
| Max. switching frequency | | | 3600 cycles/h with on-load factor of 8 % |

## Connecting characteristics

| Connection capacity (min. ... max.) | | | |
|---|---|---|---|
| Rigid Solid/Stranded | | 1 x | 1...4 mm² |
| | | 2 x | 1...4 mm² |
| Flexible with ferrule | | 1 x | 0.75...2.5 mm² |
| | | 2 x | 0.75...2.5 mm² |
| Lugs | | L < | 8 mm |
| | | I > | 3.5 mm |
| Stripping length | | | 10 mm |
| Tightening torque | Recommended | | 1 Nm |
| | Max. | | 1.2 Nm |
| Screw terminals | | | Delivered in open position, screws of unused terminals must be tightened |
| All terminals | | | M3.5 |
| Screwdriver type | | | Flat Ø 5.5 / Pozidriv 2 |

# Terminal blocks and terminal enlargements




LD75

## Terminal blocks

The LD terminal blocks are designed to increase the connecting capacity of the contactor on which they are fitted and for preparation of the wiring before final connection on the contactor.

The LD blocks are 3-pole terminal blocks with tunnel terminals.

The LD75 terminal blocks are fixed in the 3 independent slots located above the built-in connectors.

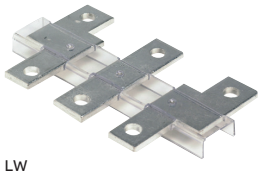
| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| UA50(RA) ... UA75(RA) | LD75 | 1SBN073508R1000 | 1 | 0.115 |

## Technical data

| Types | | | | LD75 |
|---|---|---|---|---|
| Rated insulation voltage Ui | | | | |
| acc. to IEC 60947-4-1 | | | | 690 V |
| acc. to UL / CSA | | | | 600 V |
| Pollution degree | | | | 3 |
| Main terminals | | | |  |
| | | | | Screw terminals with single connector |
| | | | | 10x11 mm |
| Connection capacity (min. ... max.) | | | | |
| | Rigid | Solid (≤ 4 mm²) | 1 x | 6...50 mm² |
| | | Stranded (≥ 6 mm²) | 2 x | 6...25 mm² |
| | Flexible with ferrule | | 1 x | 6...35 mm² |
| | | | 2 x | 6...16 mm² |
| | Bars | | | 10 mm |
| Tightening torque | | | | 4 Nm |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | IP10 |
| Screw terminals | | | | Delivered in closed position |
| | | | | M6 |
| | | | Screwdriver type | pozidriv 2 |

Note: The utilization of LD additional terminal blocks leaves the possibility to connect the following cables directly into the contactor main terminals.

| | LD75 |
|---|---|
| Possible cross section of rigid cable in the contactor terminals | 50 mm² |




LW

## Terminal enlargements

Enlargement pieces designed to increase the width of the contactor terminal pads in order to allow larger connections to be mounted.

Sets containing 3 tin plated copper bars fixed by an isolating spacer.

| For contactors | Dimensions | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|---|
| | hole Ø mm | bar mm | | | | |
| UA95, UA110 | 6.5 | 15 x 3 | LW110 | 1SFN074307R1000 | 1 | 0.100 |

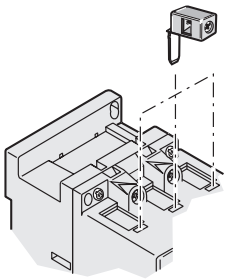
# Terminals for control lead connections




LK75-L




LK75-F



LK positioning

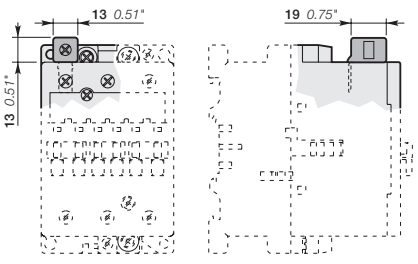
Terminals designed to connect the control conductors to the main poles of the UA and GA contactors and derivative versions.

Accessories clipped into the slots placed above each power terminal connector.

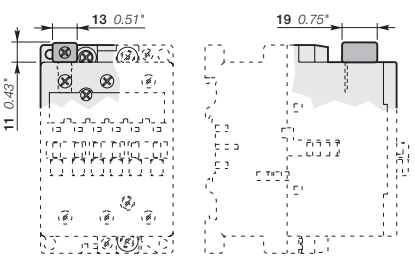
The LK75 are fitted with a pin designed to hold them in place until the connector has been fully clamped with its power cable.

- Degree of protection IP20
- Connecting terminal delivered in open position: cable clamp and M3.5 (+,-) pozidriv 2 screw.
- Cable cross-sectional area:
  - 1 or 2 rigid conductors.....1...4 mm²
  - 1 or 2 flexible conductors with cable end .....0.75...2.5 mm²
- Tightening torque for the LK screw:
  - recommended .....1.00 Nm
  - maxi. .....1.20 Nm

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| Right and left on:<br>UA50(RA) ... UA75(RA) | LK75-L | 1SBN073552R1003 | 2 | 0.006 |
| Opposite on:<br>UA50(RA) ... UA75(RA) | LK75-F | 1SBN073552R1002 | 2 | 0.006 |



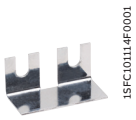

LK75-L




LK75-F

Main dimensions mm, inches

# Connection bars for contactor




LP185




LP2050

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| **Connection bars for contactor** | | | | |
| GAF185 | LP185 | 1SFN074712R1000 | 2 | 0.300 |
| GAF300 | LP300 | 1SFN075112R1000 | 2 | 0.400 |
| GAF460 | LP460 | 1SFN075712R1000 | 4 | 0.550 |
| GAF750 | LP750 | 1SFN076112R1000 | 4 | 0.950 |
| GAF1250 | LP1250 | 1SFN076412R1000 | 4 | 1.900 |
| GAF1650, GAF2050 | LP2050 | 1SFN076512R1000 | 4 | 2.900 |

## Maximum continuous current with two parrallel connection strips per pole

| Connexion kit (includes 4 pcs of connection strips) | Ie max |
|---|---|
| 2 x LP185 | 220 A |
| 2 x LP300 | 370 A |
| 1 x LP460 | 600 A |
| 1 x LP750 | 800 A |
| 1 x LP1250 | 900 A |
| 1 x LP2050 | 1650 A |

# Contactor coils and main contact sets






ZAF1650

## Contactor coils

| For contactors | Rated control circuit voltage Uc | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|
| | V 50 Hz | V 60 Hz | | | | kg |
| GAF460 | - | 24...60 | ZAF460 | 1SFN155770R6806 | 1 | 0.525 |
| | 48...130 | 48...130 | ZAF460 | 1SFN155770R6906 | 1 | 0.525 |
| | 100...250 | 100...250 | ZAF460 | 1SFN155770R7006 | 1 | 0.525 |
| | 250...500 | 250...500 | ZAF460 | 1SFN155770R7106 | 1 | 0.525 |
| GAF750 ... AF1250 | - | 24...60 | ZAF750 | 1SFN156170R6806 | 1 | 1.335 |
| | 48...130 | 48...130 | ZAF750 | 1SFN156170R6906 | 1 | 1.335 |
| | 100...250 | 100...250 | ZAF750 | 1SFN156170R7006 | 1 | 1.335 |
| | 250...500 | 250...500 | ZAF750 | 1SFN156170R7106 | 1 | 1.335 |
| GAF1650 ... GAF2050 | 100...250 | 100...250 | ZAF1650 (1) | 1SFN156570R7026 | 1 set | 0.900 |
| | | | ZP1650 (2) | 1SFN166521R1070 | 1 | 0.300 |

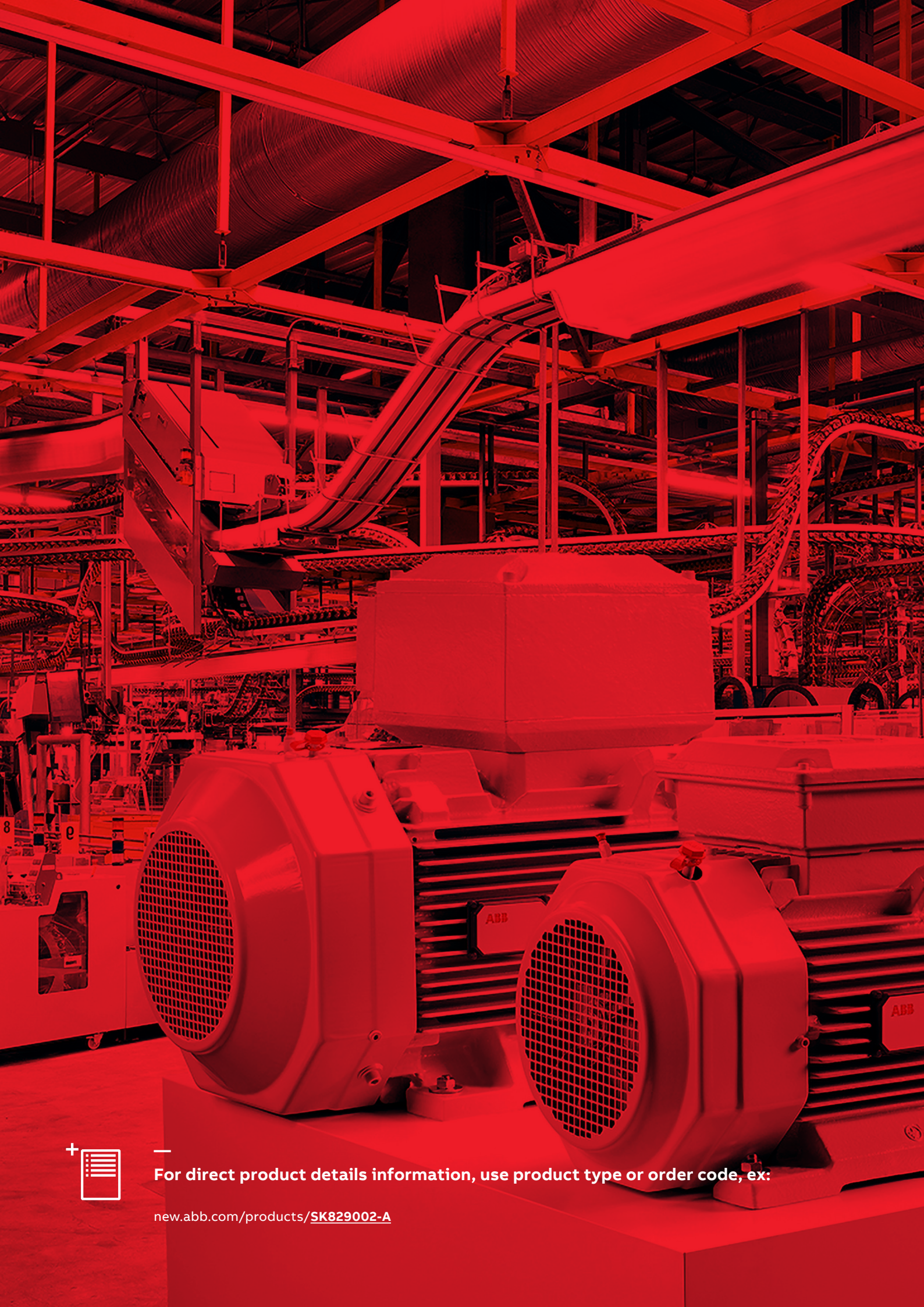
ZAF460, ZAF750 : printed circuit board included.
(1) One set of two coil.
(2) Printed circuit board.

## Main contact sets

The contact sets for 3-pole contactors consists of six fixed contacts, three moving contacts, springs and the required screws.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|
| | | | | kg |
| UA95 | ZLU95 | 1SFN164302R1000 | 1 | 0.190 |
| UA110 | ZLU110 | 1SFN164502R1000 | 1 | 0.190 |

# Notes



**For direct product details information, use product type or order code, ex:**

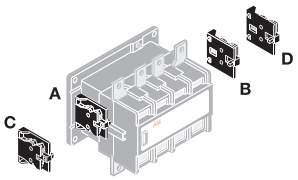
new.abb.com/products/**SK829002-A**

# Accessories for EK550, EK1000 4-pole contactors



**3/**370 Auxiliary contact blocks
**3/**374 Mechanical interlock units, terminal shrouds and connection sets
**3/**375 Surge suppressors for contactor coils
**3/**377 Main contact sets and arc chutes
**3/**378 Contactor coils

# Auxiliary contact blocks




Mounting positions of the CAL16-11

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits.

Types of auxiliary contact blocks for standard industrial environments:

- CAL instantaneous with N.O. + N.C. contacts
- CCL N.O. leading contact + N.C. lagging contact.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact, and bear the corresponding function marking.
Mounting: Screwed onto the right and / or lefthand side of the EK550, EK1000 contactors.

| For contactors | Number of blocks | Auxiliary contacts | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|---|---|
| **2-pole auxiliary contacts N.O. + N.C.** | | | | | | | |
| EK | 1 | 1 | 1 | CAL16-11A | SK829002-A | 1 | 0.050 |
| | 1 | 1 | 1 | CAL16-11B | SK829002-B | 1 | 0.050 |
| | 1 | 1 | 1 | CAL16-11C | SK829002-C | 1 | 0.050 |
| | 1 | 1 | 1 | CAL16-11D | SK829002-D | 1 | 0.050 |
| | 1 | 1 | 1 | CCL16-11E (1) | SK829002-E | 1 | 0.050 |

(1) Mounting of CCL16-11E blocks does not allow an additional second block to be added on top of it.
All DC operated EK contactors are equipped with one CCL16-11E on the right side.

# Auxiliary contact blocks



## Technical data

| Types | | | 2-pole CAL 16-11, 2-pole CCL 16-11 |
|---|---|---|---|
| **Contact utilization characteristics according to IEC** | | | |
| Standards | | | IEC/EN 60947-5-1 |
| Rated insulation voltage Ui acc. to IEC 60947-5-1 | | | 690 V |
| Rated operational voltage Ue max. | | | 24...690 V |
| Conventional thermal current Ith - θ ≤ 40 °C | | | 10 A |
| Rated frequency (without derating) | | | 50/60 Hz |
| Ie / Rated operational current AC-15 | | | |
| acc. to IEC 60947-5-1 | 24-127 V | | 6 A |
| | 220-240 V | | 6 A |
| | 380-440 V | | 4 A |
| | 500-690 V | | 1 A |
| Making capacity acc. to IEC 60947-5-1 | | | 10 x Ie AC-15 |
| Breaking capacity acc. to IEC 60947-5-1 | | | 10 x Ie AC-15 |
| Ie / Rated operational current DC-13 | | | |
| acc. to IEC 60947-5-1 | | 24 V DC | 6 A |
| | | 48 V DC | 6 A |
| | | 72 V DC | 4 A |
| | | 125 V DC | 1.8 A |
| | | 250 V DC | 0.6 A |
| Short-circuit protection device gG type fuse | | | 10 A |
| Rated short-time withstand current Icw | | for 1.0 s | 50 A |
| θ = 40 °C | | for 0.1 s | 100 A |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | | | 0.25 VA / 12 V or 0.25 VA / 5 mA |
| Power dissipation per pole at 6 A | | | 0.2 W |
| Mechanical durability | Number of operating cycles | | 10 millions operating cycles |
| | Max. switching frequency | | 3600 cycles/h |
| Electrical durability | Number of operating cycles | | see "Electrical durability" curves |
| | Max. switching frequency | | 1200 cycles/h |

## Contact utilization characteristics according to UL / CSA

| | |
|---|---|
| Max. operational voltage | 600 V |
| Pilot duty | A600 |

## Connecting characteristics

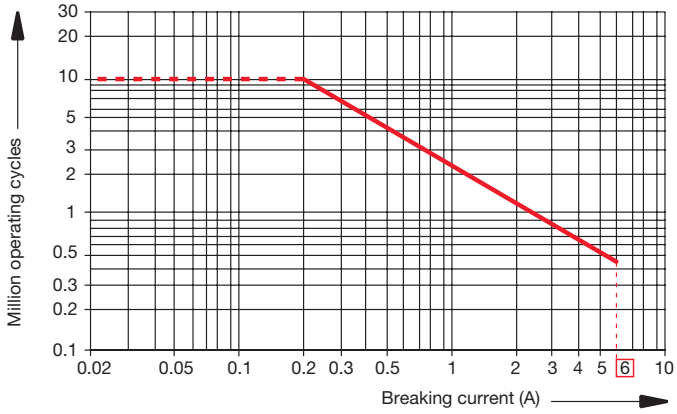
| | | | |
|---|---|---|---|
| Connection capacity (min. ... max.) | | | |
|  | Rigid Solid/Stranded | 1 x | 0.5...2.5 mm² |
|  | | 2 x | 0.5...2.5 mm² |
|  | Flexible with ferrule | 1 x | 0.5...2.5 mm² |
|  | | 2 x | 0.5...2.5 mm² |
|  | Flexible with insulated ferrule | 1 x | 0.5...1.5 mm² |
|  | | 2 x | 0.5...1.5 mm² |
|  | Lugs | L ≤ | 8 mm |
| | | I > | 3.7 mm |
| Tightening torque | Recommended | | 1.00 Nm |
| | Max. | | 1.20 Nm |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | IP20 |
| Screw terminals | | | Delivered in open position, screws of unused terminals must be tightened |
| All terminals | | | M3.5 |
| Screwdriver type | | | Pozidriv 2 |

# Auxiliary contacts
## Electrical durability

### Electrical Durability for AC-15 Utilization Category

AC-15 utilization category according to IEC/EN 60947-5-1:
- making current: 10 x Ie with cos ϕ = 0.7 and Ue
- breaking current: Ie with cos ϕ = 0.4 and Ue.

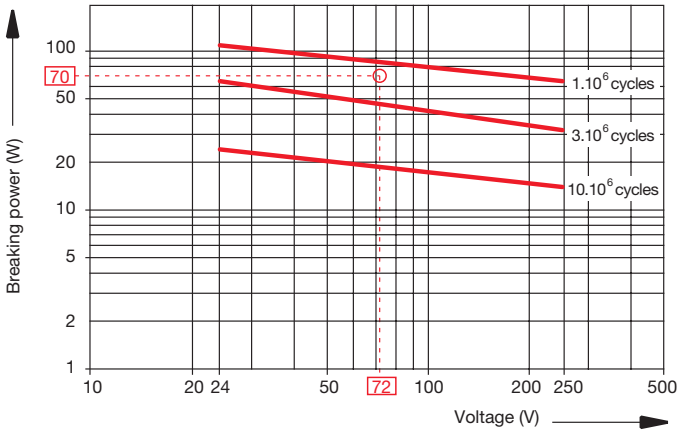
This curve represents the electrical durability of the auxiliary contacts in relation to the breaking current.
The curve has been drawn for resistive and inductive loads up to 690 V, 40...60 Hz.




2-pole CAL16... and CCL16... auxiliary contact blocks

### Electrical Durability for DC-13 Utilization Category

DC-13 utilization category according to IEC/EN 60947-5-1:
making and breaking current = Ie with Ue value.




2-pole CAL16... and CCL16... auxiliary contact blocks

Example:
Control of d.c. electro-magnet: Ue voltage = 72 V d.c. and breaking power = 70 W.
On the opposite curve at intersection "O" 72 V / 70 W the correspon-ding value for the electrical durability is approx-imately 2 millions cycles.

# Add-on auxiliary contacts

## Terminal marking and positioning

### 2-pole auxiliary contacts




CAL16-11A




CAL16-11B




CAL16-11C



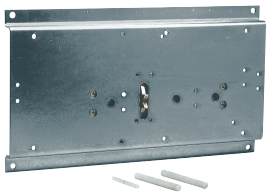

CAL16-11 D




CAL16-11E

# Mechanical interlock units, terminal shrouds and connection sets






## Mechanical interlock units

The mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed.

VH800 interlock unit is used for the mechanical interlocking of two horizontal mounted EK550, EK1000 contactors. Mounting plate is included.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| **Mechanical interlock unit for two horizontal mounted contactors** | | | | |
| EK550, EK1000 | VH800 | SK829070-F | 1 | 6.000 |

## Terminal shrouds

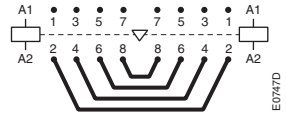
The use of terminal shrouds on the main terminals of EK contactors is required in electrical panels or cubicles to be built in compliance with the rules for protection against direct contact with live parts in acc. with EN 50274.

On EK550, EK1000 contactors:

- The auxiliary contact blocks and coils are designed to provide an IP20 degree of protection
- The main terminals, equipped with lugs or connectors, can be protected against accidental direct contact after wiring (EN 50274) by the addition of terminal shrouds (see table below).

Each terminal shroud protects all the terminals on one side of the contactor. Two terminal shrouds should be provided for each separate contactor.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| EK550 | LT550-EK | SK178001-LB | 1 | 0.190 |
| EK1000 | LT1000-EK | SK178001-MB | 1 | 0.200 |




BSS550, BSS1000

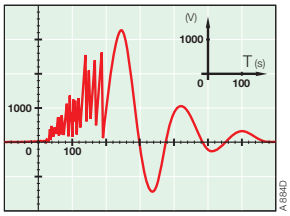
## Connection sets

Connection between the main poles of two 4-pole contactors mounted side by side so that they operate as source reversing contactors.

These sets are made up of four downstream connections.
BSS550, BSS1000 – Bare, solid copper bars.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| **Mechanical and electrical interlock units for two horizontal mounted contactors** | | | | |
| EK550 | BSS550 | SK829090-E | 1 | 3.300 |
| EK1000 | BSS1000 | SK829090-H | 1 | 5.500 |

# Surge suppressors for contactor coils







RC-EH

The operation of inductive circuits causes overvoltages, in particular on opening of the contactor coil.

The electromagnetic energy stored in the coil during contactor closing is restored on opening in the form of surges, the slope and amplitude of which may rise to several kilovolts. A number of drawbacks are observed ranging from interference on the electronic devices to breakdown of insulators and even destruction of certain sensitive components.
The graph opposite reproduces the oscillogram showing voltage discharges at the terminals of a 42 V / 50 Hz coil without peak clipping. The coil was switched by 8 series-connected poles of a contactor relay.

Following a burst of discharges with a very steep slope a damped oscillation emerges with a peak value of 3500 V.

**Overvoltage Factor**
The overvoltage factor k is defined as the ratio of the maximum overvoltage peak value Ûs to the peak value Ûc of the coil rated control voltage Uc:

$$k = \frac{\hat{U}s\ max.}{\hat{U}c} \qquad \text{in DC: } k = \frac{\hat{U}s\ max.}{Uc} \qquad \text{or in AC: } k = \frac{\hat{U}s\ max.}{Uc\sqrt{2}}$$

For example the following is obtained for the above graph: $k = \frac{3500}{42\sqrt{2}} \approx 60$

To reduce the harmful effects of these overvoltages, ABB has developed a range of surge suppressors designed to reduce the k factor defined above and to limit or even completely eliminate the high pre-damping voltage frequencies.

Each case is different, but the technical data tolerances and the generous sizing of parts have enabled us to reduce the number of variants.

We have chosen the following solutions: transil diodes, varistors and RC blocks.

Note: A varistor is a resistor whose value decreases to a very large extent when a certain voltage is applied at its terminals.

| For contactors | Rated control circuit voltage Uc | | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|
| | V | AC | DC | | | | kg |
| EK550, EK1000 | 48...110 | ● | – | RC-EH800/110 | SK829007-C | 1 | 0.015 |
| EK550, EK1000 | 24...125 | – | ● | RC-EH800/110 | SK829007-C | 1 | 0.015 |
| EK550, EK1000 | 220...600 | ● | – | RC-EH800/600 | SK829007-D | 1 | 0.015 |

# Surge suppressors for contactor coils

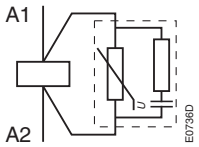


## Technical data

| Varistor + RC | **RC-EH800/110** | **RC-EH800/600** |
|---|---|---|
| Rated control circuit voltage Uc | 48...110 V AC | 220...600 V AC |
| | 24...125 V DC | – |
| Residual overvoltage (clipping voltage) | 205 V AC | 1100 V AC |
| | 205 V DC | – |
| Opening time growth factor | 1.1 ... 1.15 | |
| Operating temperature | -20 ... +70 °C | |
| Connection to the coil terminals (parallel mounting) | Flexible, accessible leads, equipped with forked lugs | |
| Fixing | Glued to the top part of the contactor base | |
| Advantages | - High energy absorption: good damping<br>- Unpolarized system<br>- The RC system damps the voltage front under the Uvdr (1) threshold. | |

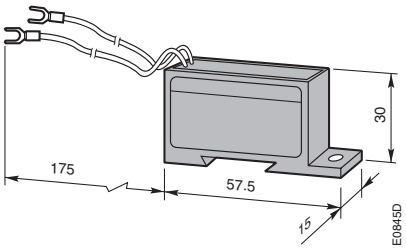
(1) Uvdr = Varistor operating (voltage dependant resistor), tolerance ±10 %.

## Wiring diagrams




Varistor + RC

## Main dimensions mm




RC-EH

# Main contact sets and arc chutes




KZK

## Main contact sets

The contact sets for 4-pole contactors consist of eight fixed contacts, four moving contacts, springs and the necessary screws. In addition, the sets include four moving arcing contacts for EK550, EK1000 contactors.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| EK550 | KZK550 | SK827204-B | 1 | 2.400 |
| EK1000 | KZK1000 | SK827204-F | 1 | 3.000 |

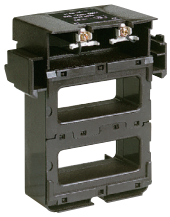
## Arc chutes

The arc chutes sets for EK 4-pole contactors contain 8 pieces.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| EK550 | KWK550 | 5223351-Z | 1 | 3.170 |
| EK1000 | KWK1000 | 5223351-AN | 1 | 3.170 |

# Contactor coils






KH800

## For AC operated coil

Coils for EK550, EK1000 - AC operated.

| For contactors | Rated control circuit voltage Uc (1) | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|
| | V 50 Hz | V 60 Hz | | | | kg |
| EK550, EK1000 | 220 | 220...240 | KH800 | SK828100-EL | 1 | 0.950 |
| | 220...230 | 230...255 | KH800 | SK828100-EM | 1 | 0.950 |
| | 380...400 | 400...440 | KH800 | SK828100-ER | 1 | 0.950 |
| | 400...415 | - | KH800 | SK828100-AR | 1 | 0.950 |

(1) Other control voltages, see voltage code table.

## For DC operated coil

Coils for EK550, EK1000 - DC operated with sets including a DC coil, an economy resistor and a insertion contact.

| For contactors | Rated control circuit voltage Uc (1) | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|
| | V DC | | | | kg |
| EK550, EK1000 | 110 | KP800 | SK828150-DE | 1 set | 1.060 |
| | 125 | KP800 | SK828150-DU | 1 set | 1.060 |
| | 220 | KP800 | SK828150-DF | 1 set | 1.060 |

(1) Other control voltages, see voltage code table.

# Notes



**For direct product details information, use product type or order code, ex:**

www.abb.com/productdetails/**1SBL137001R1310**

# Contactors and contactor relays Terminal marking and positioning, Dimensions

**Terminal marking and positioning**

**3/**382 AF, AF..K, AFS 3-pole contactors
**3/**389 AF, EK 4-pole contactors
**3/**390 UA, UA ... RA contactors
**3/**392 NF contactor relays

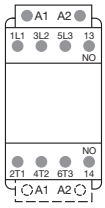
**Dimensions**

**3/**394 AF, AFS, AF..K 3-pole contactors
**3/**443 AF, EK 4-pole contactors
**3/**446 GAF contactors
**3/**451 UA, UA ... RA contactors
**3/**454 NF contactor relays

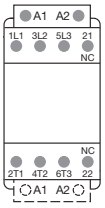
# AF09 ... AF96 3-pole contactors
## Terminal marking and positioning



### AF09 ... AF96 contactors - AC / DC operated (1)
Standard devices without addition of auxiliary contacts



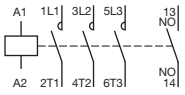
AF09 ... AF16..-30-10



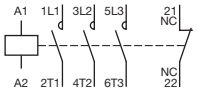
AF09 ... AF16..-30-01



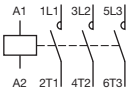
AF26 ... AF96-30-00



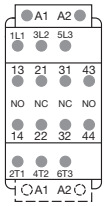
AF09 ... AF16..-30-10



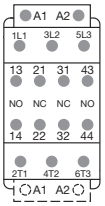
AF09 ... AF16..-30-01



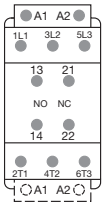
AF26 ... AF96-30-00



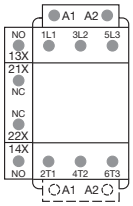
AF09 ... AF16..-30-22



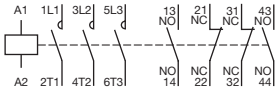
AF26 ... AF96-30-22



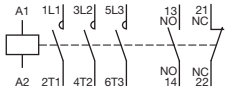
AF26 ... AF38..-30-11



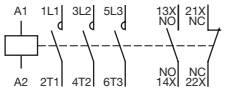
AF40 ... AF96-30-11



AF09 ... AF96-30-22

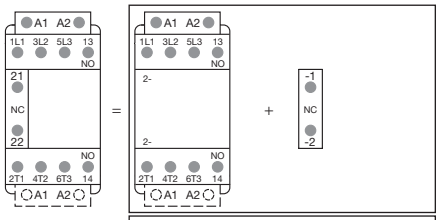


AF26 ... AF38..-30-11

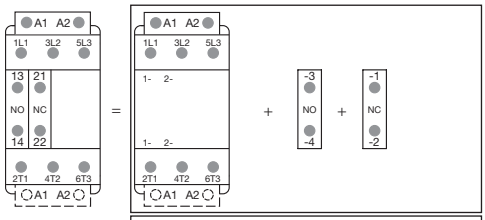


AF40 ... AF96-30-11

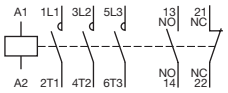
### Other possible contact combinations with auxiliary contacts added by the user



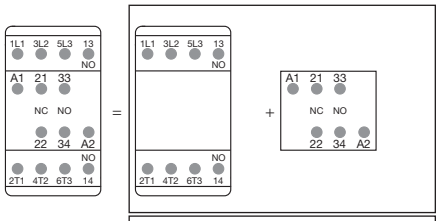
Combination 11 = AF09 ... AF16..-30-10 + CA4-01 (1)



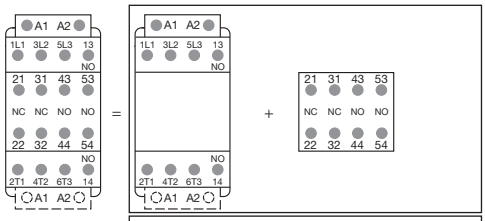
Combination 11 = AF26 ... AF96-30-00 + CA4-10 + CA4-01 (1)



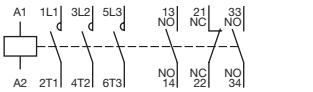
Combination 11



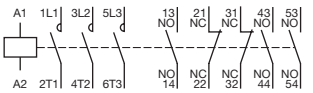
Combination 21 = AF09 ... AF16..-30-10 + CAT4-11M



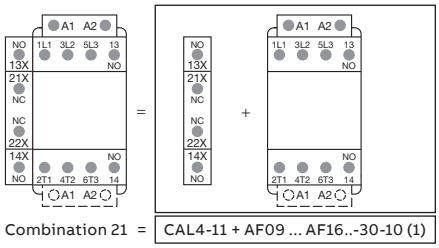
Combination 32 = AF09 ... AF16..-30-10 + CA4-22M (1)



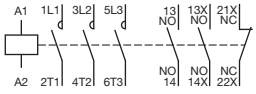
Combination 21



Combination 32



Combination 21 = CAL4-11 + AF09 ... AF16..-30-10 (1)



Combination 21

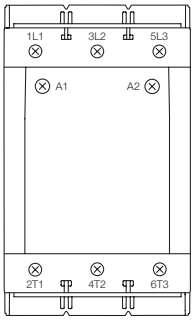
Note: only AF..Z contactor with DC control voltages 12...20 V DC (coil 20) and 24 V DC (coil 30) need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.
(1) For AF09..K ... AF38..K contactors with Push-in Spring terminals, terminal marking and positioning are the same.

# AF116 ... AF370 3-pole contactors

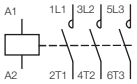
## Terminal marking and positioning

### AF116 ... AF370 contactors - AC / DC operated

Standard devices without addition of auxiliary contacts

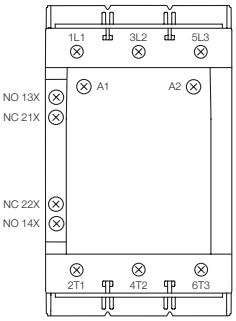



AF116 ... AF370-30-00

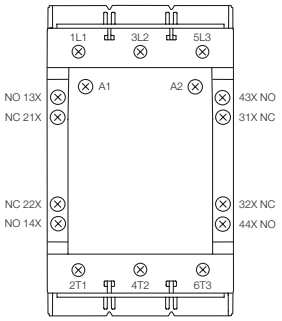



AF116 ... AF370-30-00

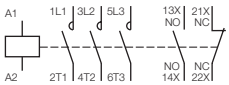
Standard devices with factory mounted auxiliary contacts




AF116 ... AF370-30-11




AF116 ... AF370-30-22




AF116 ... AF370-30-11




AF116 ... AF370-30-22

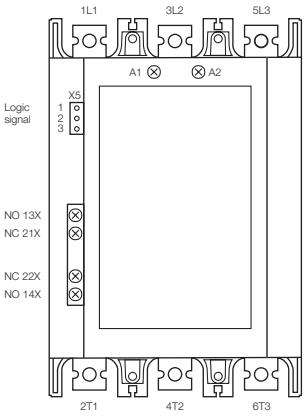
# AF400 ... AF2850 3-pole contactors

Terminal marking and positioning

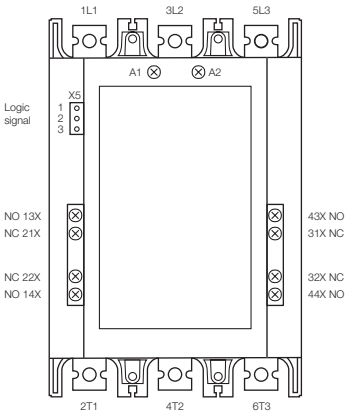


## AF400 ... AF1250 contactors - AC / DC operated

Standard devices with factory mounted auxiliary contacts

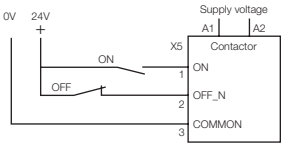



AF400 ... AF1250-30-11

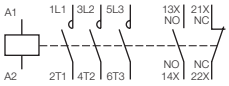



AF400 ... AF1250-30-22

Control with logic signal




AF400 ... AF1250-30-11, AF400 ... AF1250-30-22



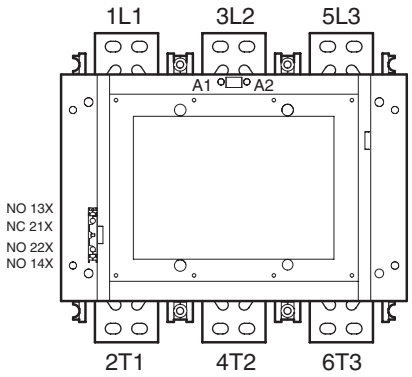

AF400 ... AF1250-30-11



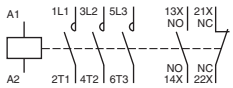

AF400 ... AF1250-30-22

## AF1350 ... AF2850 contactors - AC / DC operated

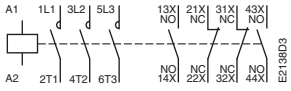
Standard devices with factory mounted auxiliary contacts




AF1350 ... AF2850-30-11

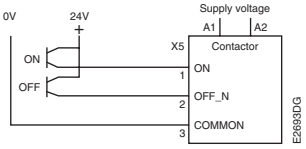



AF1350 ... AF2850-30-11



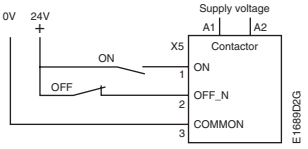

AF1350 ... AF2850-30-22

Wiring diagrams
when used with transistor output




**AF1350, AF1650**

when used with transistor output

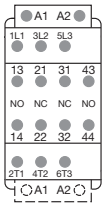


# AFS09 ... AFS750 3-pole contactors for safety applications

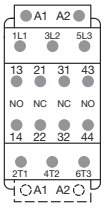
## Terminal marking and positioning

### AFS09 ... AFS96 contactors - AC / DC operated

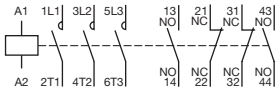
Standard devices




AFS09 ... AFS16..-30-22



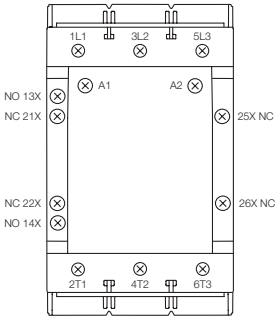

AFS26 ... AFS96-30-22



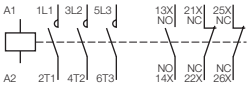

AFS09 ... AFS96-30-22

### AFS116 ... AFS370 contactors - AC / DC operated

Standard devices with factory mounted auxiliary contacts



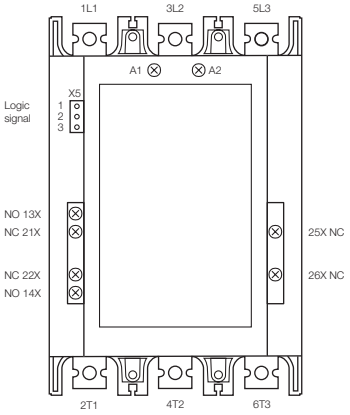

AFS116 ... AFS370-30-12




AFS116 ... AFS370-30-12

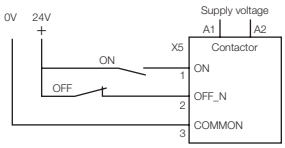
### AFS400 ... AFS750 contactors - AC / DC operated

Standard devices with factory mounted auxiliary contacts

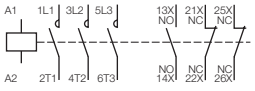



AFS400 ... AFS750-30-12

Control with logic signal




AFS400 ... AFS750-30-12

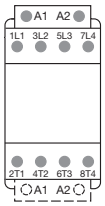



AFS400 ... AFS750-30-12

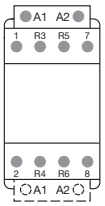
# AF09 ... AF80 4-pole contactors
## Terminal marking and positioning



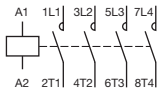
### AF09 ... AF80 contactors - AC / DC operated (1)
Standard devices without addition of auxiliary contacts



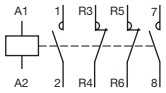
AF09 ... AF80-40-00



AF09 ... AF40-22-00
AF80-22-00

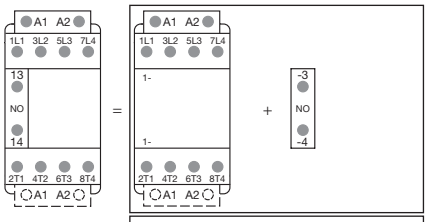


AF09 ... AF80-40-00

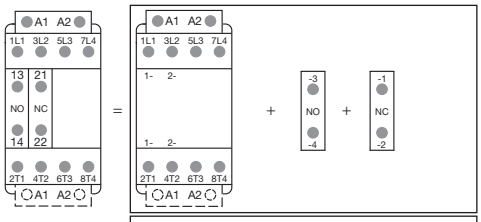


AF09 ... AF80-22-00

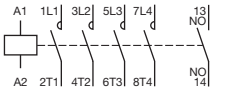
### Other possible contact combinations with auxiliary contacts added by the user



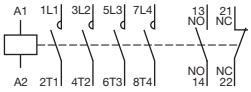
Combination 10 = AF09 ... AF80-40-00 + CA4-10



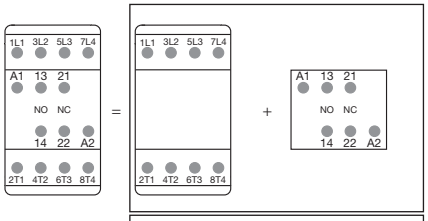
Combination 11 = AF09 ... AF80-40-00 + CA4-10 + CA4-01



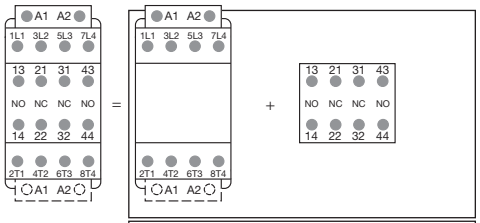
Combination 10



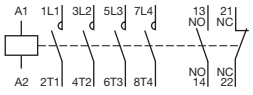
Combination 11



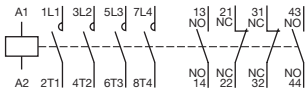
Combination 11 = AF09 ... AF80-40-00 + CAT4-11E



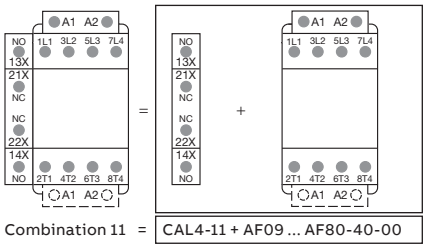
Combination 22 = AF09 ... AF80-40-00 + CA4-22E



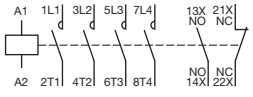
Combination 11



Combination 22



Combination 11 = CAL4-11 + AF09 ... AF80-40-00

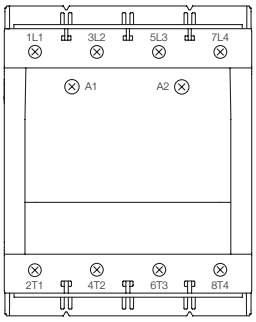


Combination 11

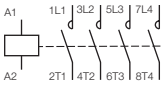
Note: only AF..Z contactor with DC control voltages 12...20 V DC (coil 20) and 24 V DC (coil 30) need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.
(1) For AF09..K ... AF16..K contactors with Push-in Spring terminals, terminal marking and positioning are the same.

# AF116 ... AF370 4-pole contactors
## Terminal marking and positioning

### AF116 ... AF370 contactors - AC / DC operated
Standard devices without addition of auxiliary contacts

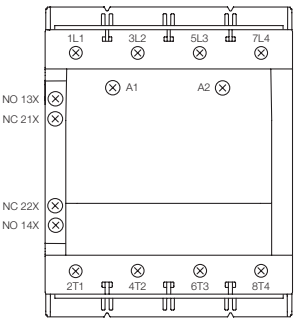



AF116 ... AF370-40-00

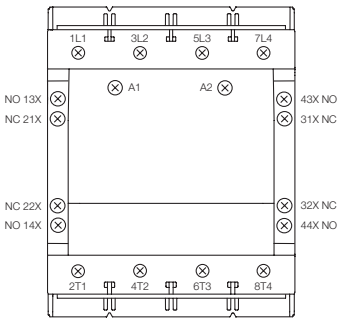



AF116 ... AF370-40-00

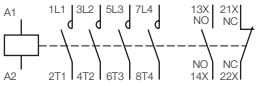
Standard devices with factory mounted auxiliary contacts



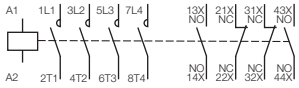

AF116 ... AF370-40-11




AF116 ... AF370-40-22




AF116 ... AF370-40-11




AF116 ... AF370-40-22

# Add-on auxiliary contacts for AF09 ... AF370 contactors

Terminal marking and positioning

## 1-pole auxiliary contacts




CA4-01 (1)




CA4-10 (1)




CC4-01

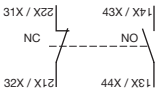



CC4-10

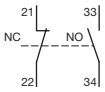
## 2-pole auxiliary contacts



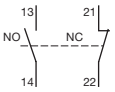

CAL4-11 (1)
(Left-side mounted)



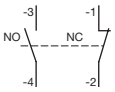

CAL4-11 (1)
(Right-side mounted)



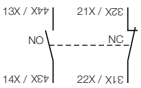

CAT4-11M



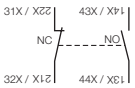

CAT4-11E



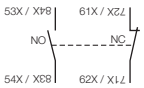

CAT4-11U



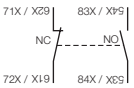

CAL18-11, CAL19-11
(Left-side mounted)




CAL18-11, CAL19-11
(Right-side mounted)

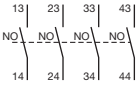



CAL18-11B, CAL19-11B
(Left-side mounted)

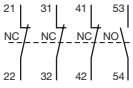



CAL18-11B, CAL19-11B
(Right-side mounted)

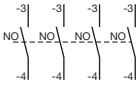
## 4-pole auxiliary contacts



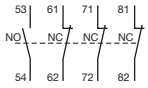

CA4-40E (1)



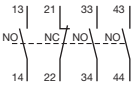

CA4-13M (1)



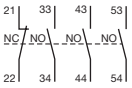

CA4-40U



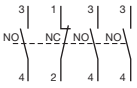

CA4-13N (1)



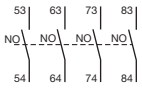

CA4-31E (1)



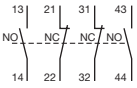

CA4-31M (1)



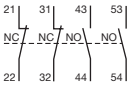

CA4-31U



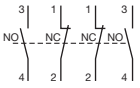

CA4-40N (1)



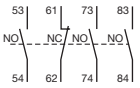

CA4-22E (1)



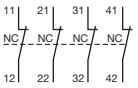

CA4-22M (1)



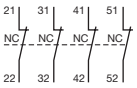

CA4-22U



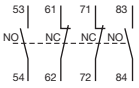

CA4-31N (1)



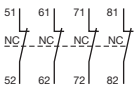

CA4-04E




CA4-04M (1)




CA4-22N (1)




CA4-04N (1)

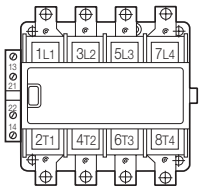
(1) available with Push-in Spring terminals

# EK 4-pole contactors

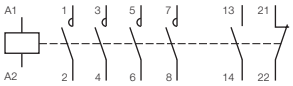
## Terminal marking and positioning

### EK550, EK1000 contactors - AC operated

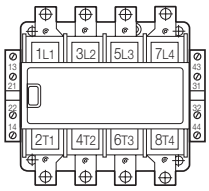
Standard devices



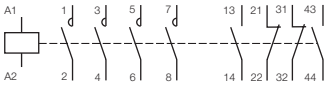

EK550, EK1000-40-11




EK550, EK1000-40-11

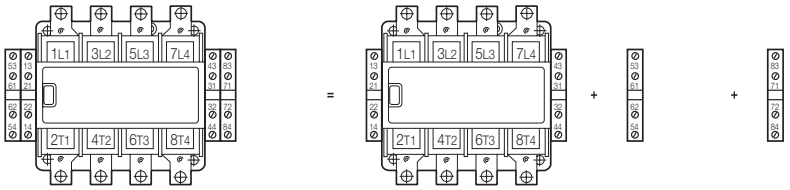



EK550, EK1000-40-22

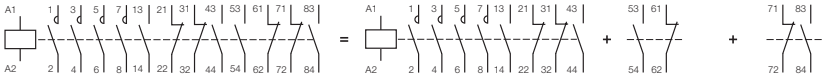



EK550, EK1000-40-22

Other possible contact combinations with auxiliary contacts added by the user



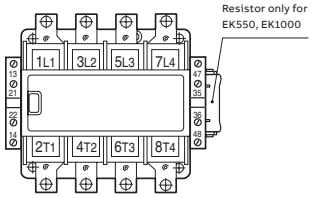

Combination 44 = EK550, EK1000-40-22 + CAL16-11C + CAL16-11D



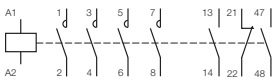

Combination 44 = EK550, EK1000-40-22 + CAL16-11C + CAL16-11D

### EK550, EK1000 contactors - with multifrequency coil or DC operated

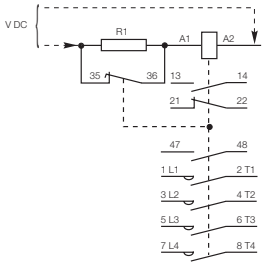
Standard devices




EK550, EK1000-40-21

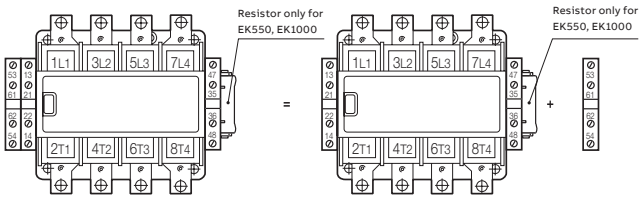



EK550, EK1000-40-21

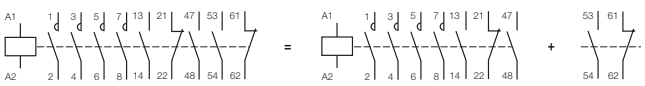



EK550, EK1000 DC operated

Other possible contact combinations with auxiliary contacts added by the user




Combination 32 = EK550, EK1000-40-21 + CAL16-11C




Combination 32 = EK550, EK1000-40-21 + CAL16-11C

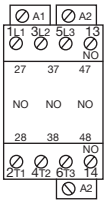
# UA..RA contactors

## Terminal marking and positioning

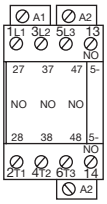


### UA..RA contactors - AC operated

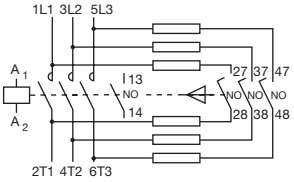
Standard devices without addition of auxiliary contacts



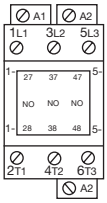

UA16-30-10 RA
UA26-30-10 RA



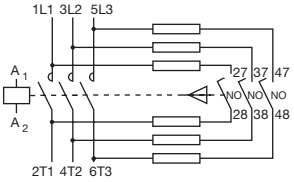

UA30-30-10 RA




UA16 ... 30-30-10 RA




UA50 ... 110-30-00 RA



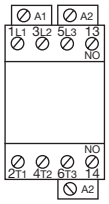

UA50 ... 110-30-00 RA

# UA... contactors

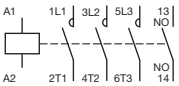
## Terminal marking and positioning

### UA... contactors - AC operated

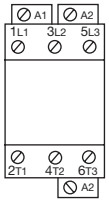
Standard devices without addition of auxiliary contacts



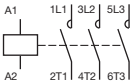

UA16 ... UA30-30-10




UA16 ... UA30-30-10

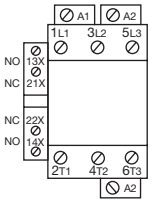



UA50 ... UA110-30-00

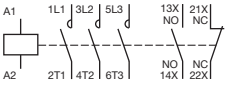



UA50 ... UA110-30-00

Standard devices with factory mounted auxiliary contacts




UA50 ... UA110-30-11



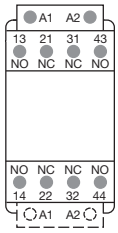

UA50 ... UA110-30-11

03

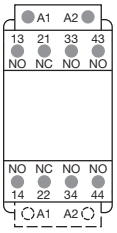
# NF contactor relays

## Terminal marking and positioning

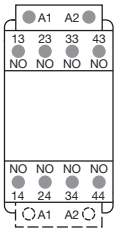
### Standard devices without addition of auxiliary contacts (1)



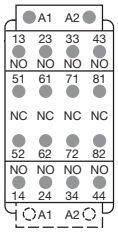

NF..22E



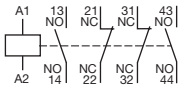

NF..31E



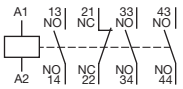

NF..40E



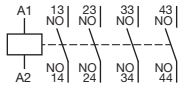

NF..44E



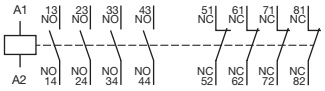

NF..22E



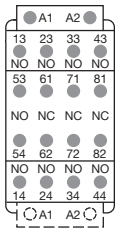

NF..31E



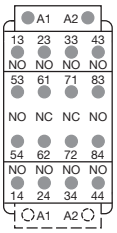

NF..40E



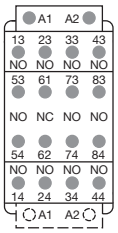

NF..44E



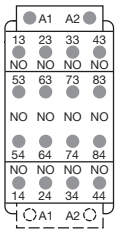

NF..53E




NF..62E



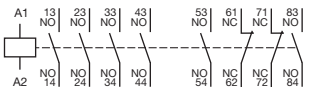

NF..71E



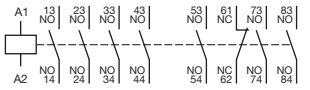

NF..80E



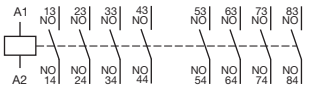

NF..53E



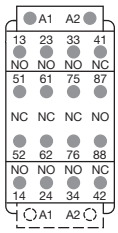

NF..62E



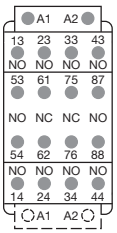

NF..71E



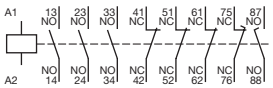

NF..80E



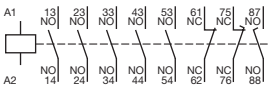

NF..33/11 (1)




NF..51/11 (1)

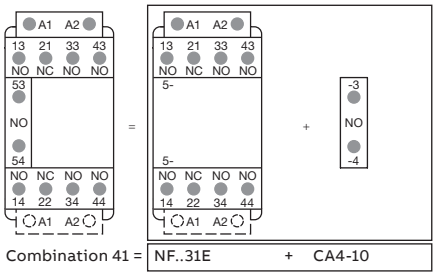



NF..33/11 (1)

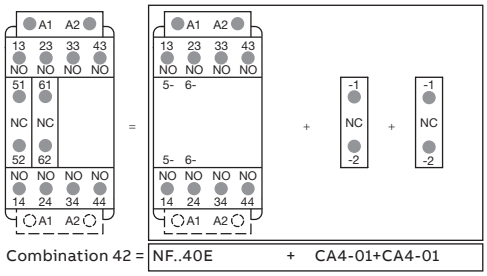



NF..51/11 (1)

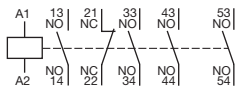
### Other possible contact combinations with auxiliary contacts added by the user



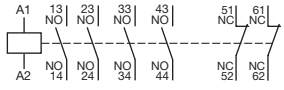

Combination 41 = NF..31E + CA4-10



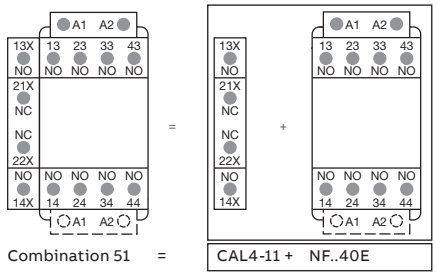

Combination 42 = NF..40E + CA4-01+CA4-01



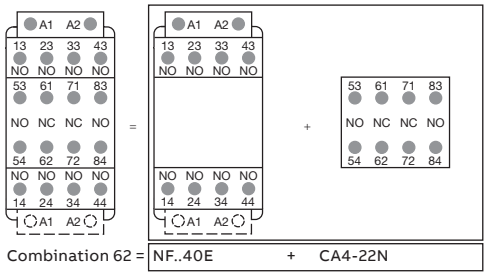

Combination 41 E



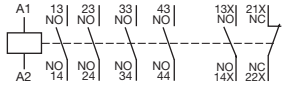

Combination 42 E




Combination 51 = CAL4-11 + NF..40E




Combination 62 = NF..40E + CA4-22N




Combination 51 E



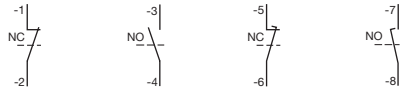

Combination 62 E

Note: only NFZ contactor relays with DC control voltages 12...20 V DC (coil 20) and 24 V DC (coil 30) need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.
(1) For NF..K contactor relays with Push-in Spring terminals, terminal marking and positioning are the same.

# NF add-on auxiliary contacts

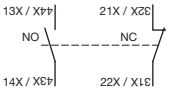
## Terminal marking and positioning

### 1-pole auxiliary contacts

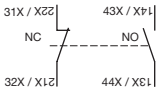



CA4-01 CA4-10 CC4-01 CC4-10

### 2-pole auxiliary contacts

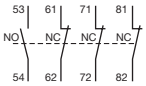



CAL4-11
(Left side-mounted)

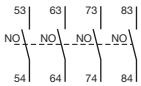



CAL4-11
(Right side-mounted)

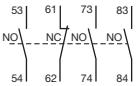
### 4-pole auxiliary contacts



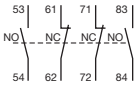

CA4-13N



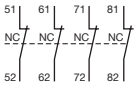

CA4-40N




CA4-31N

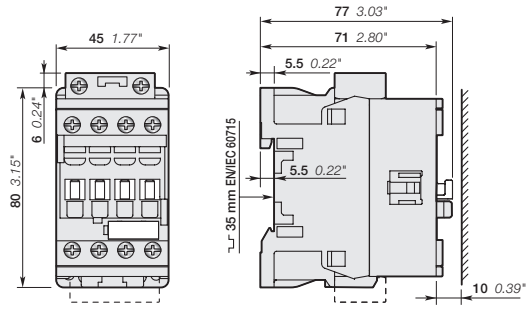



CA4-22N

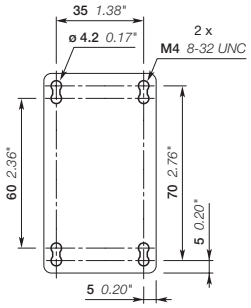



CA4-04N

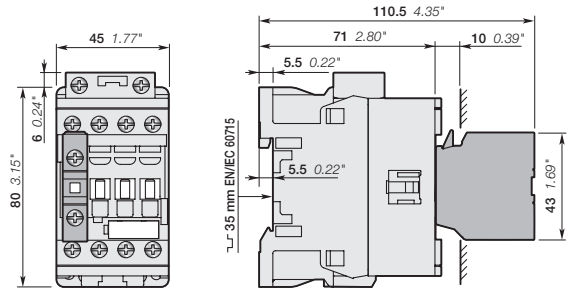
# AF09, AF12, AF16 3-pole contactors
## Dimensions



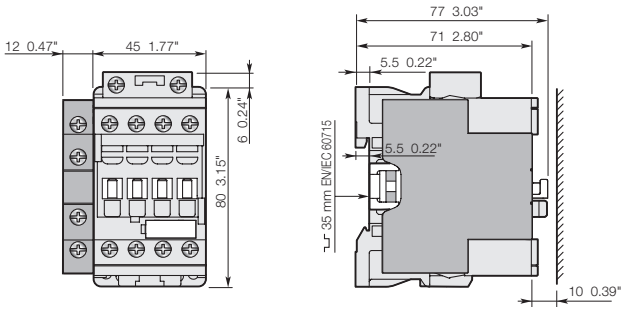

AF09, AF12, AF16



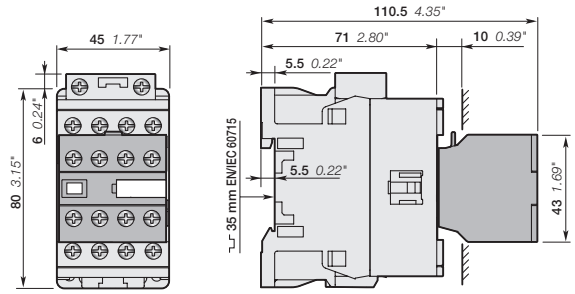

AF09, AF12, AF16



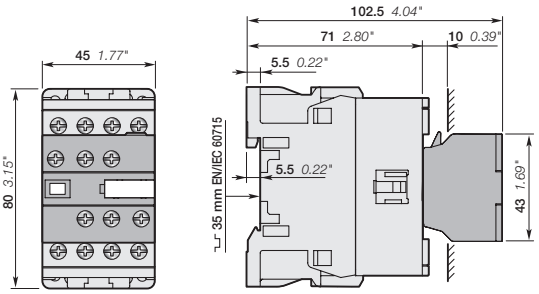

AF09, AF12, AF16
+ CA4, CC4 1-pole auxiliary contact block



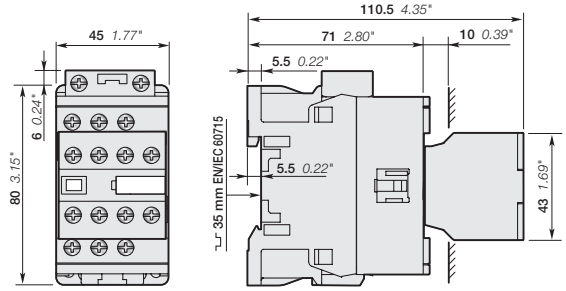

AF09, AF12, AF16
+ CAL4-11 2-pole auxiliary contact block



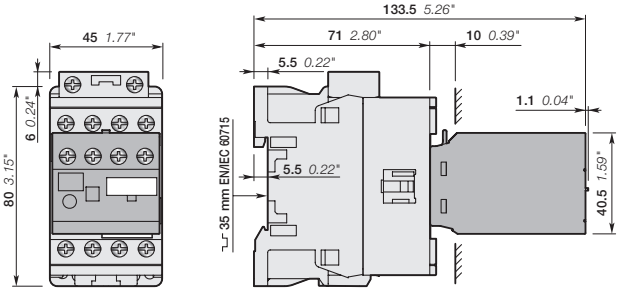

AF09, AF12, AF16
+ CA4 4-pole auxiliary contact block




AF09, AF12, AF16
+ CAT4 2-pole auxiliary contact and coil terminal block




AF09, AF12, AF16..-30-22

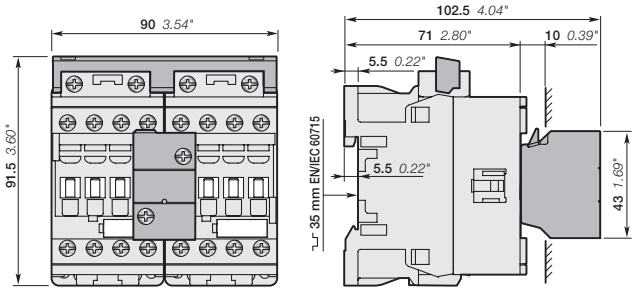



AF09, AF12, AF16
+ TEF4 electronic timer

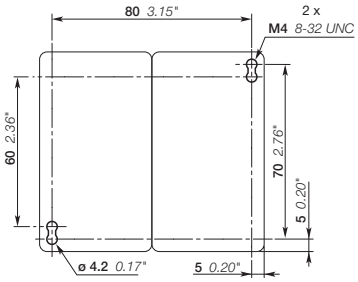
(1) Note: For AF09 ... AF16 contactors, lateral distance to grounded component 2 mm 0.08" min.
24 V DC operated contactor (coil 30) depth + 20 mm + 0.79".

Main dimensions mm, inches (1)

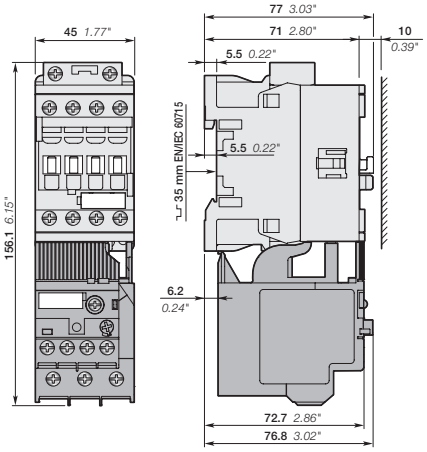
# AF09, AF12, AF16 3-pole contactors
## Dimensions



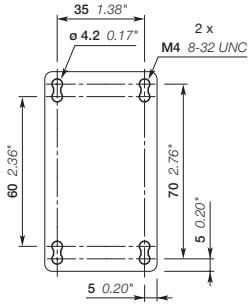

AF09, AF12, AF16
+ VEM4 mechanical and electrical interlock set



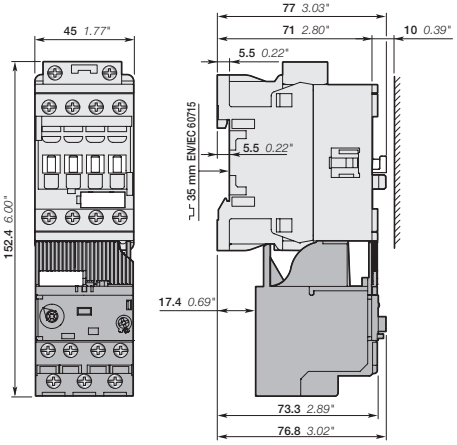

AF09, AF12, AF16
+ VEM4 mechanical and electrical interlock set




AF09, AF12, AF16
+ TF42 thermal overload relay




AF09, AF12, AF16
+ TF42, EF19



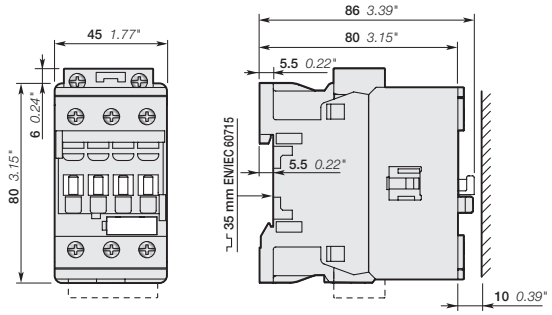

AF09, AF12, AF16 3-pole contactors
+ EF19 electronic overload relay

(1) Note: For AF09 ... AF16 contactors, lateral distance to grounded component 2 mm 0.08" min.
24 V DC operated contactor (coil 30) depth + 20 mm + 0.79".

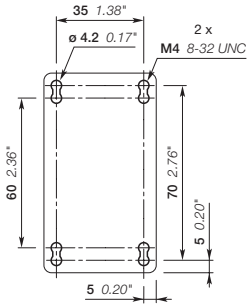
Main dimensions mm, inches (1)

# AF26, AF30, AF38 3-pole contactors
## Dimensions

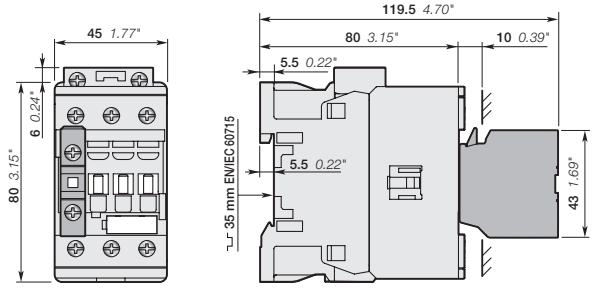




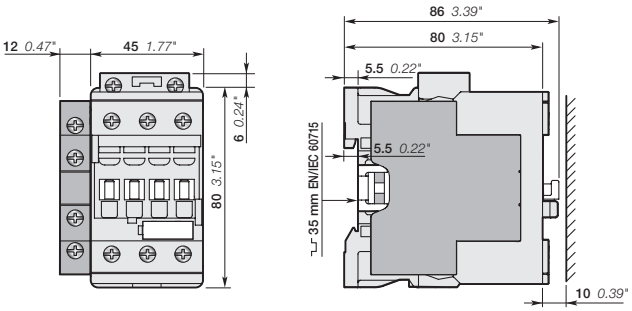

AF26, AF30, AF38



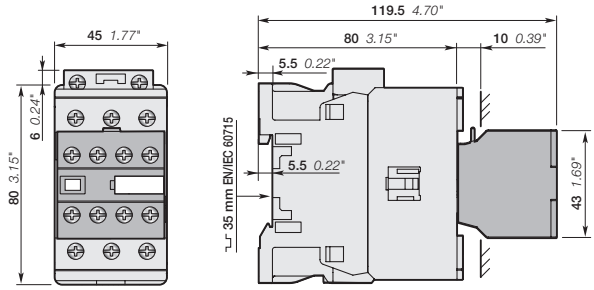

AF26, AF30, AF38



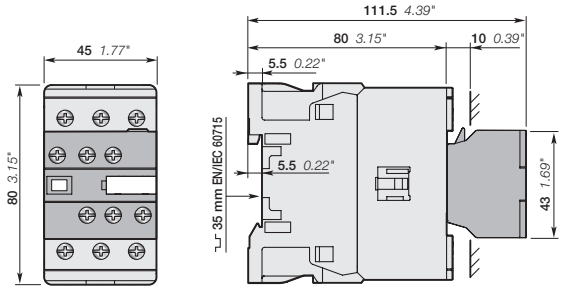

AF26, AF30, AF38
+ CA4, CC4 1-pole auxiliary contact block



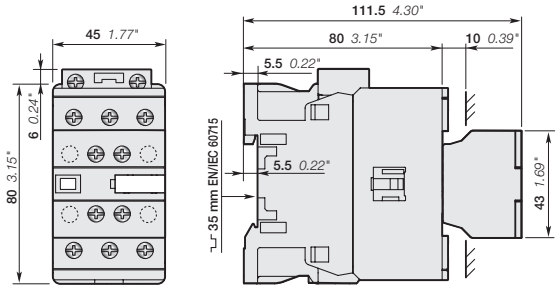

AF26, AF30, AF38
+ CAL4-11 2-pole auxiliary contact block



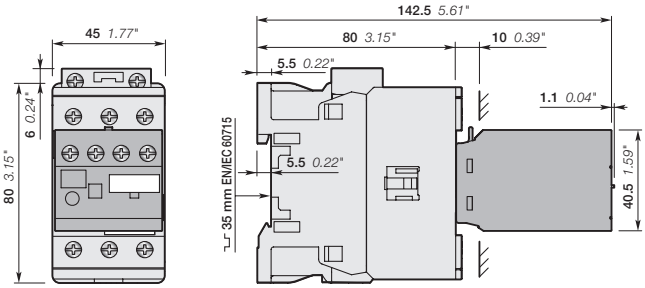

AF26, AF30, AF38
+ CA4 4-pole auxiliary contact block
AF26, AF30, AF38..-30-22




AF26, AF30, AF38
+ CAT4 2-pole auxiliary contact and coil terminal block




AF26, AF30, AF38..-30-11

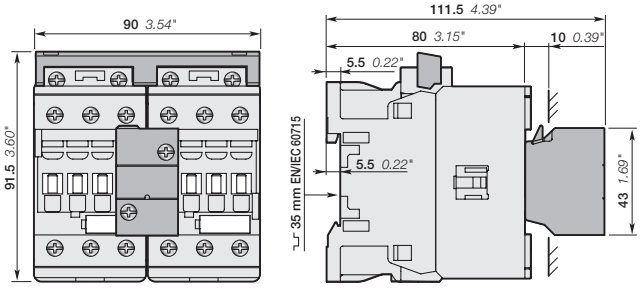



AF26, AF30, AF38
+ TEF4 electronic timer

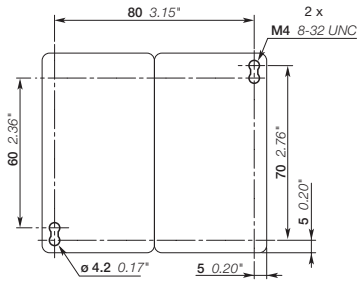
(1) Note: For AF26 ... AF38 contactors, lateral distance to grounded component 2 mm (0.08") min.
24 V DC operated contactor (coil 30) depth + 20 mm (+ 0.79").

Main dimensions mm, inches (1)

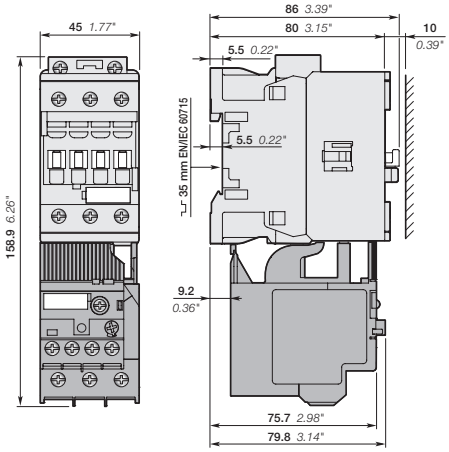
# AF26, AF30, AF38 3-pole contactors
## Dimensions



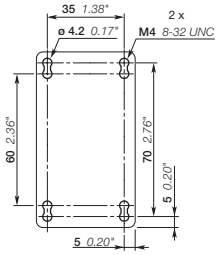

AF26, AF30, AF38
+ VEM4 mechanical and electrical interlock set



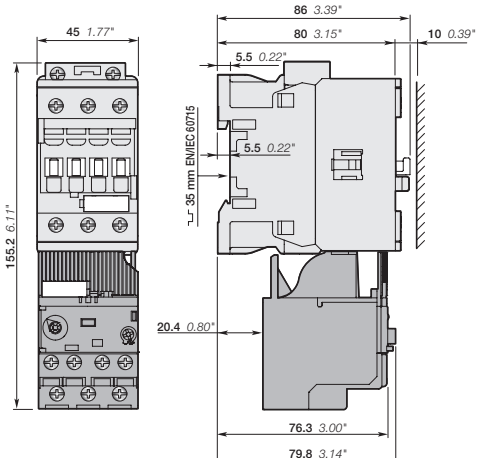

AF26, AF30, AF38
+ VEM4 mechanical and electrical interlock set



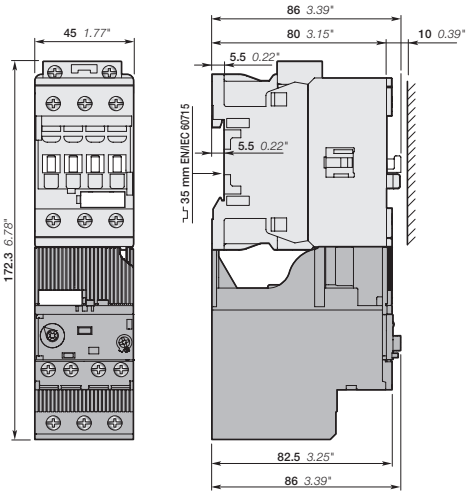

AF26, AF30, AF38
+ TF42 thermal overload relay




AF26, AF30, AF38
+ TF42, EF19, EF45




AF26 3-pole contactors
+ EF19 electronic overload relay

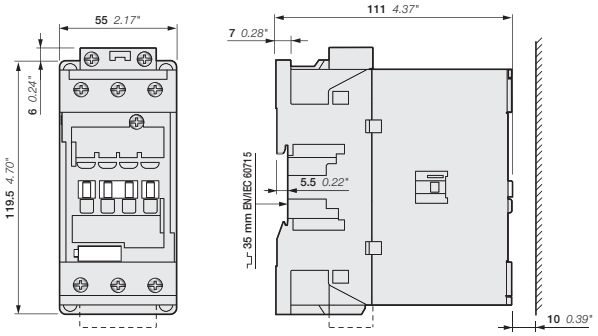



AF26, AF30, AF38 3-pole contactors
+ EF45 electronic overload relay

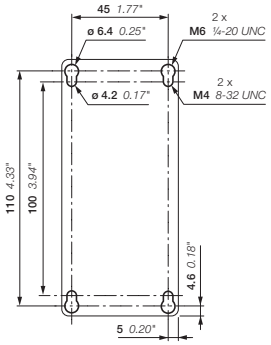
(1) Note: For AF26 ... AF38 contactors, lateral distance to grounded component 2 mm (0.08") min.
24 V DC operated contactor (coil 30) depth + 20 mm (+ 0.79").

Main dimensions mm, inches (1)

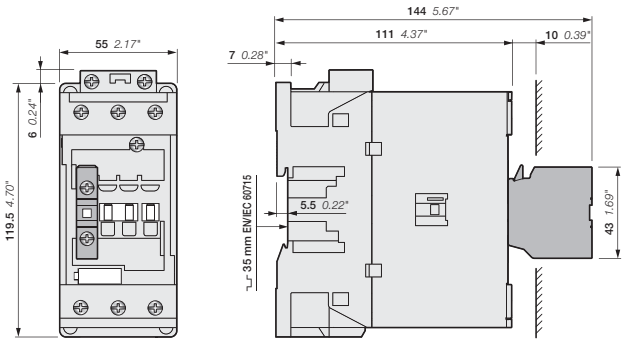
# AF40 ... AF65 3-pole contactors
## Dimensions



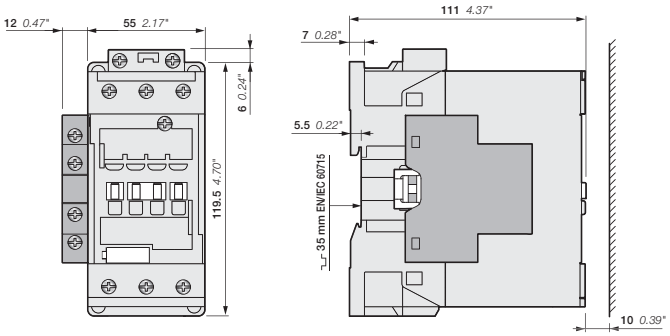

AF40, AF52, AF65



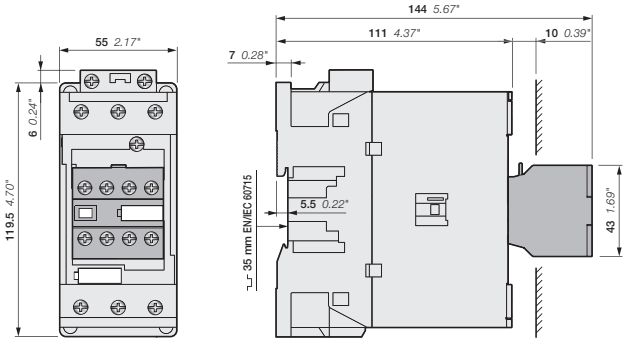

AF40, AF52, AF65



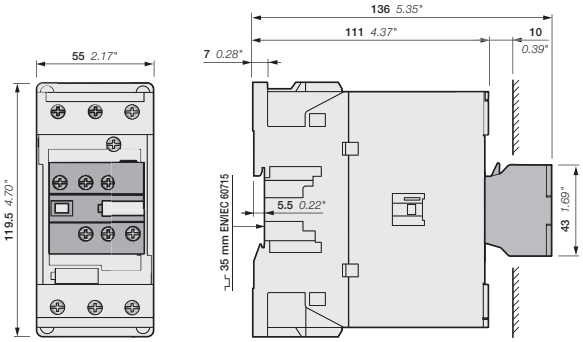

AF40, AF52, AF65
+ CA4, CC4 1-pole auxiliary contact block



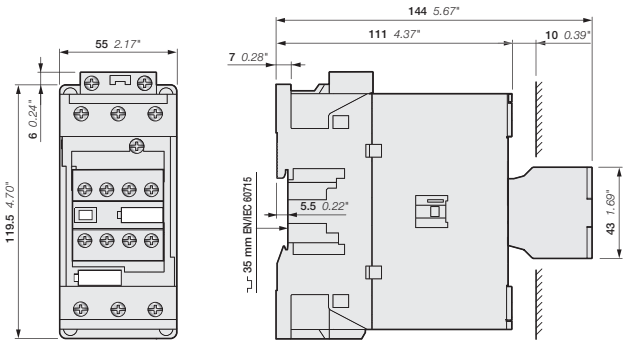

AF40, AF52, AF65-30-00 + CAL4-11 2-pole auxiliary contact block
AF40, AF52, AF65-30-11



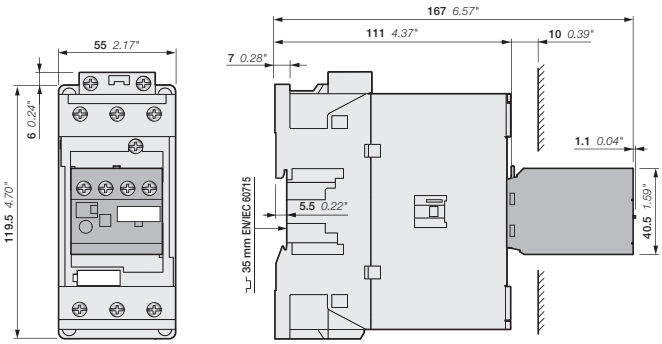

AF40, AF52, AF65
+ CA4 4-pole auxiliary contact block




AF40, AF52, AF65
+ CAT4 2-pole auxiliary contact and coil terminal block




AF40, AF52, AF65..-30-22

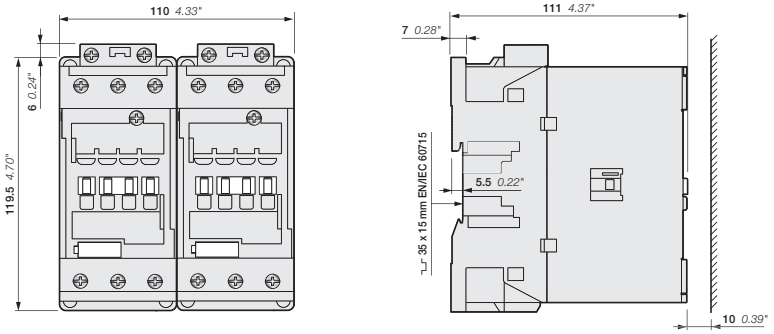



AF40, AF52, AF65
+ TEF4 electronic timer

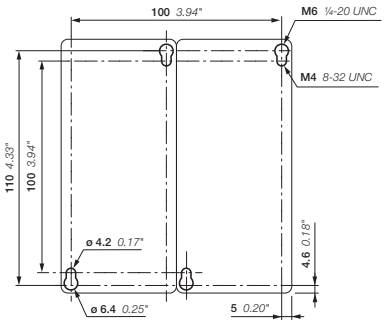
Main dimensions mm, inches

# AF40 ... AF65 3-pole contactors

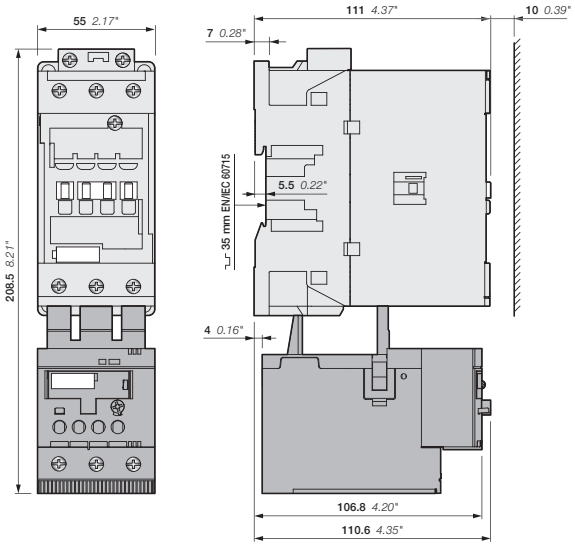
## Dimensions



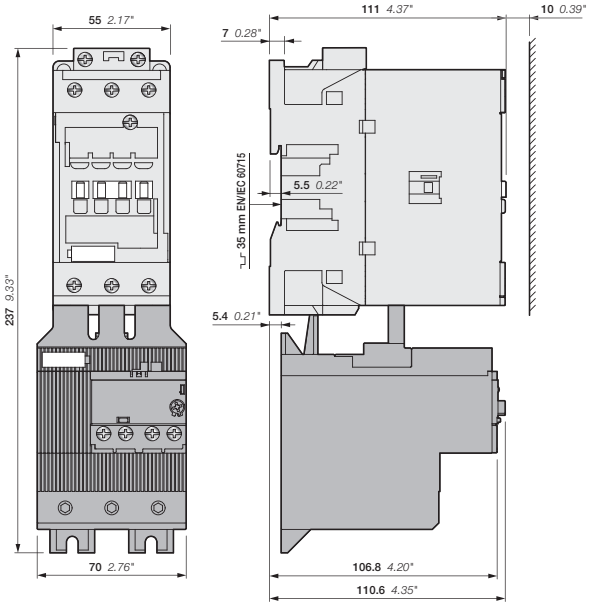

AF40, AF52, AF65
+ VM96-4 mechanical interlock unit



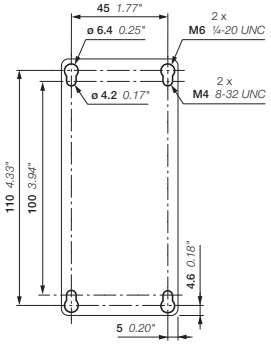

AF40, AF52, AF65
+ VM96-4 mechanical interlock unit




AF40, AF52, AF65
+ TF65 thermal overload relay



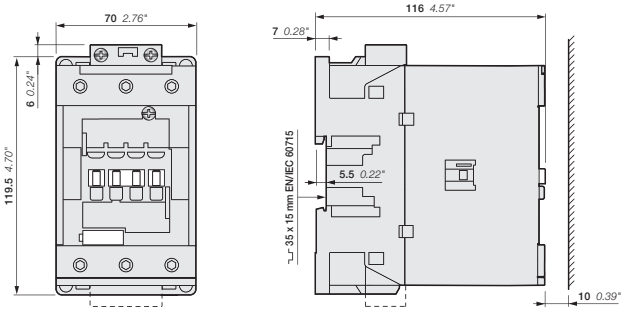

AF40, AF52, AF65
+ EF65 electronic overload relay



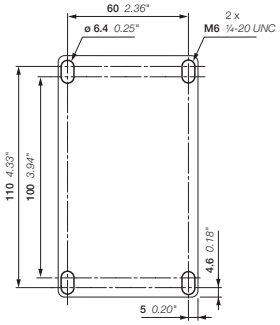

AF40, AF52, AF65
+ TF65, EF65

Main dimensions mm, inches

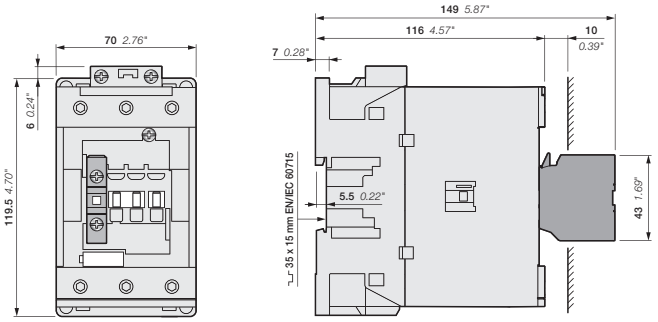
# AF80 ... AF96 3-pole contactors
## Dimensions



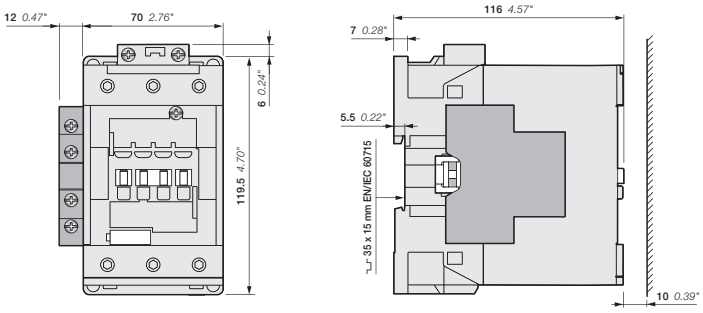

AF80, AF96



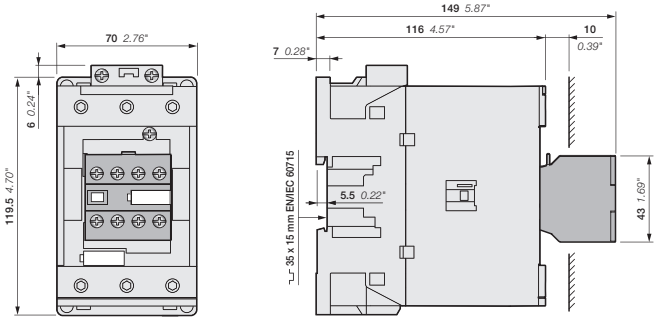

AF80, AF96



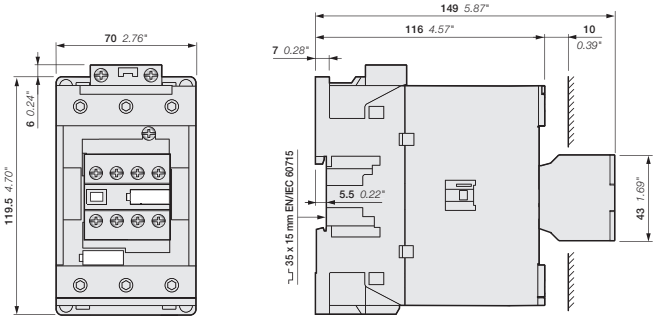

AF80, AF96
+ CA4, CC4 1-pole auxiliary contact block



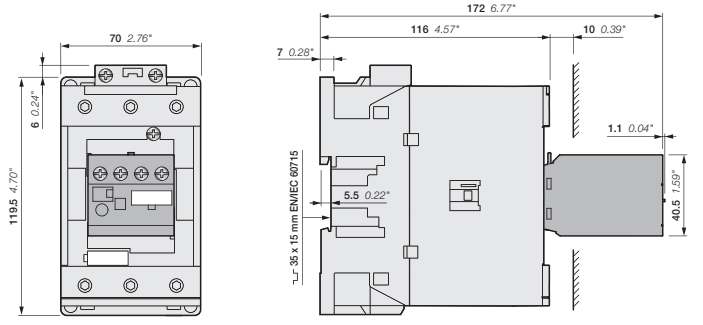

AF80, AF96-30-00 + CAL4-11 2-pole auxiliary contact block
AF80, AF96-30-11




AF80, AF96
+ CA4 4-pole auxiliary contact block




AF80, AF96..-30-22

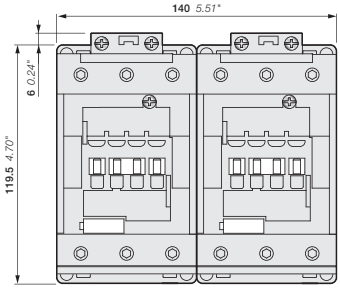


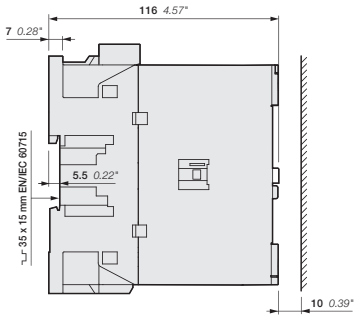

AF80, AF96
+ TEF4 electronic timer

Main dimensions mm, inches

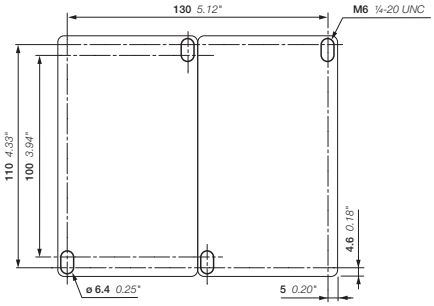
# AF80 ... AF96 3-pole contactors

## Dimensions

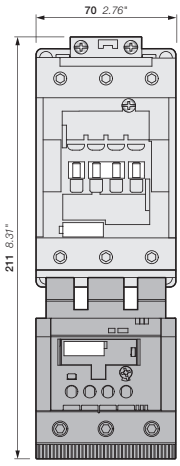


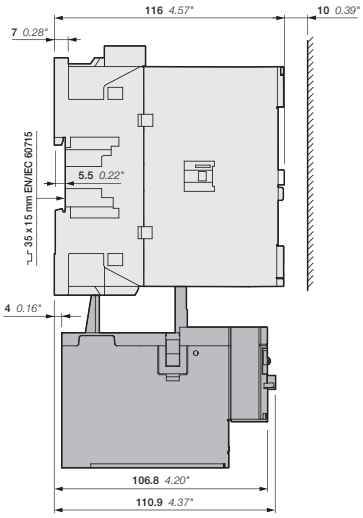




AF80, AF96
+ VM96-4 mechanical interlock unit

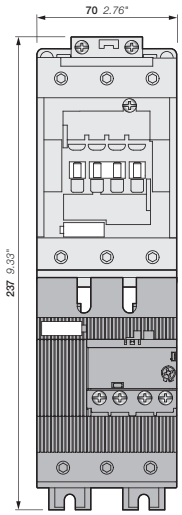


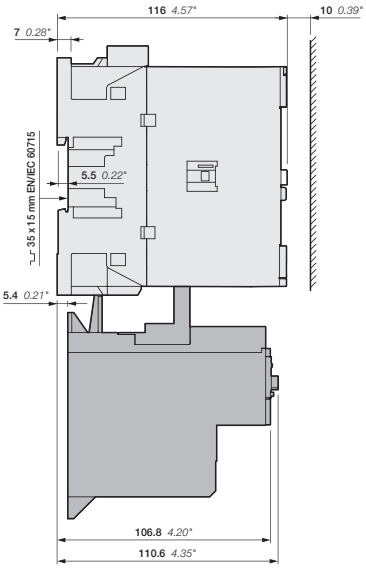

AF80, AF96
+ VM96-4 mechanical interlock unit



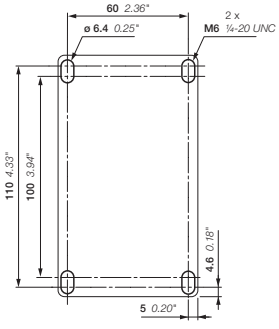




AF80, AF96
+ TF96 thermal overload relay



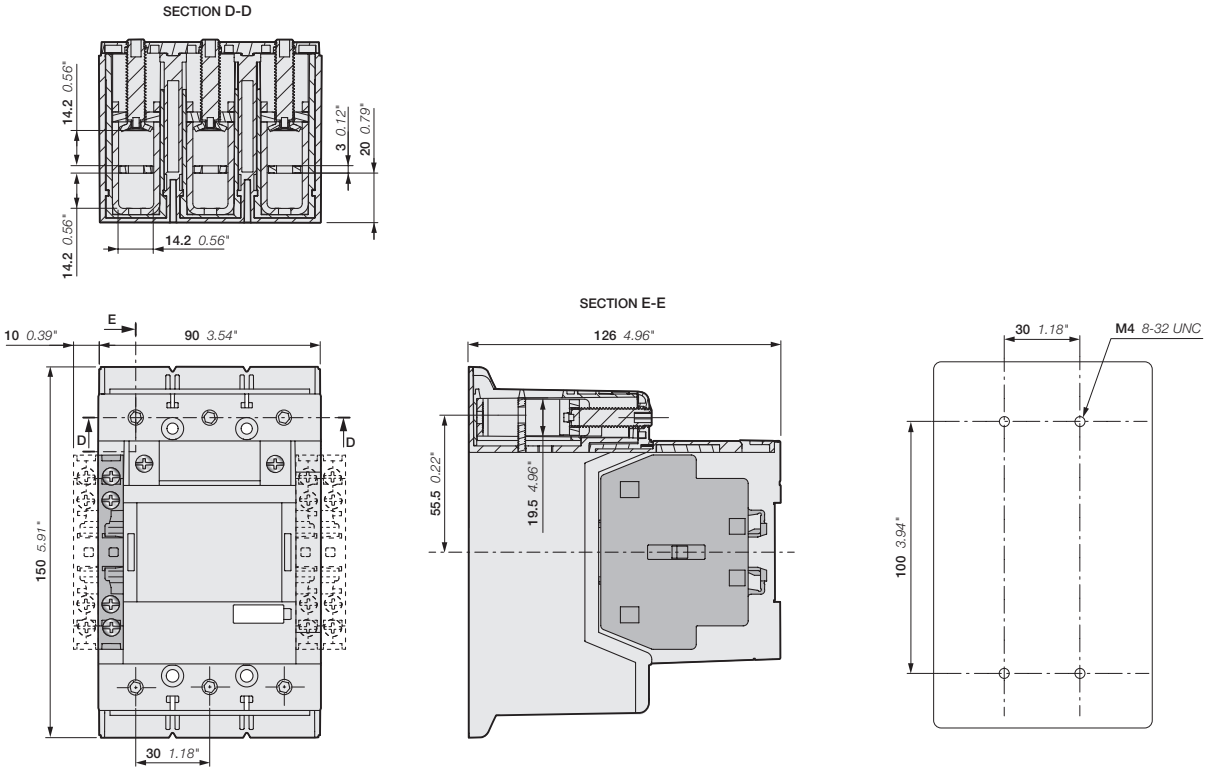

AF80, AF96
+ EF96 electronic overload relay




AF80, AF96
+ TF96, EF96

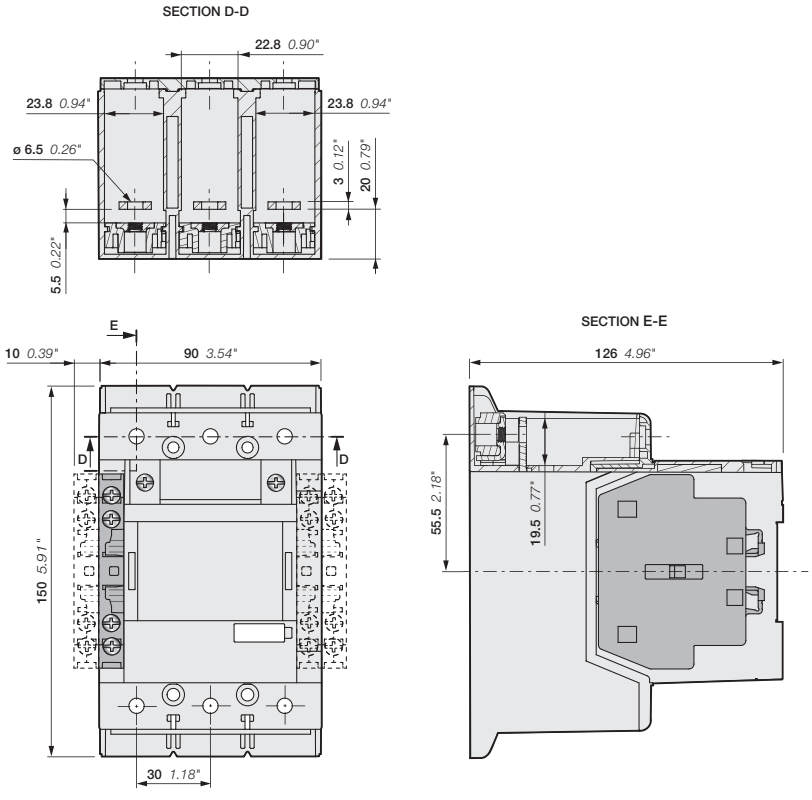
Main dimensions mm, inches

# AF116, AF140, AF146 3-pole contactors
## Dimensions




AF116, AF140, AF146-30-00 + CAL19 2-pole auxiliary contact block
AF116, AF140, AF146-30-11

AF116, AF140, AF146-30-..(B)

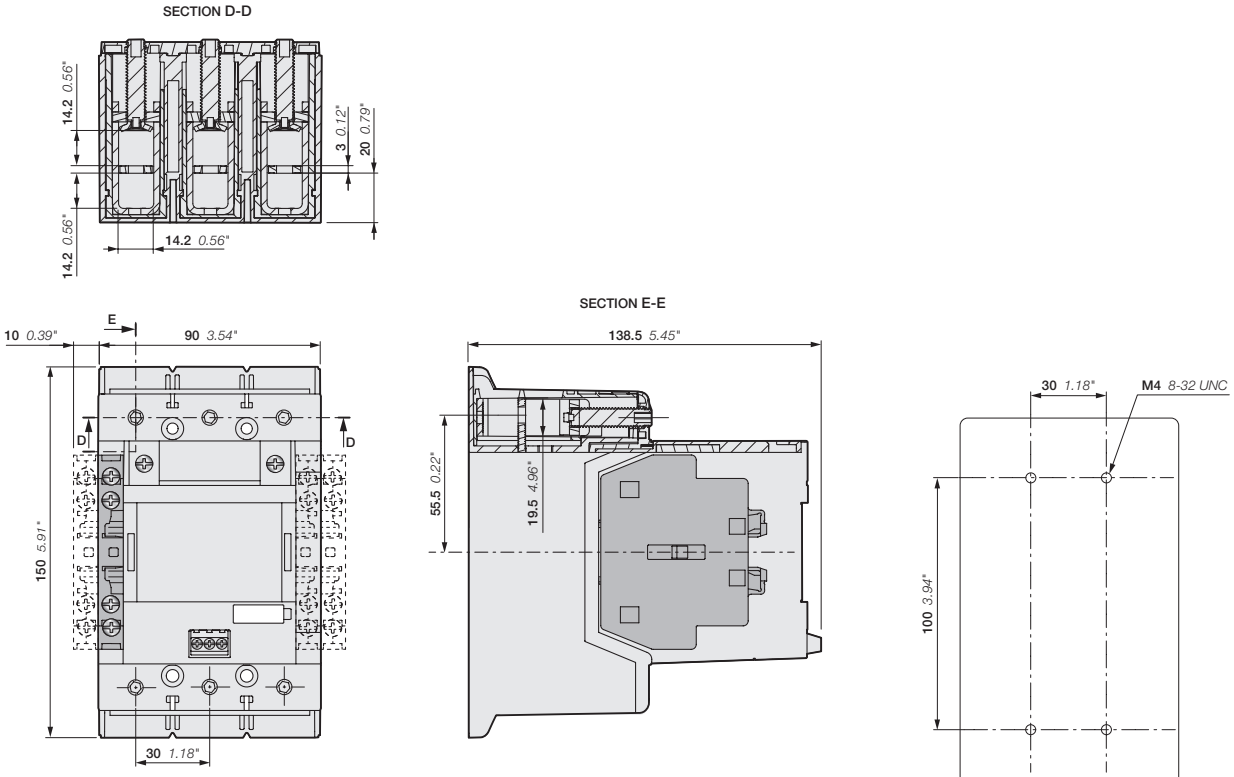



AF116, AF140, AF146-30-00B + CAL19 2-pole auxiliary contact block
AF116, AF140, AF146-30-11B

Main dimensions mm, inches

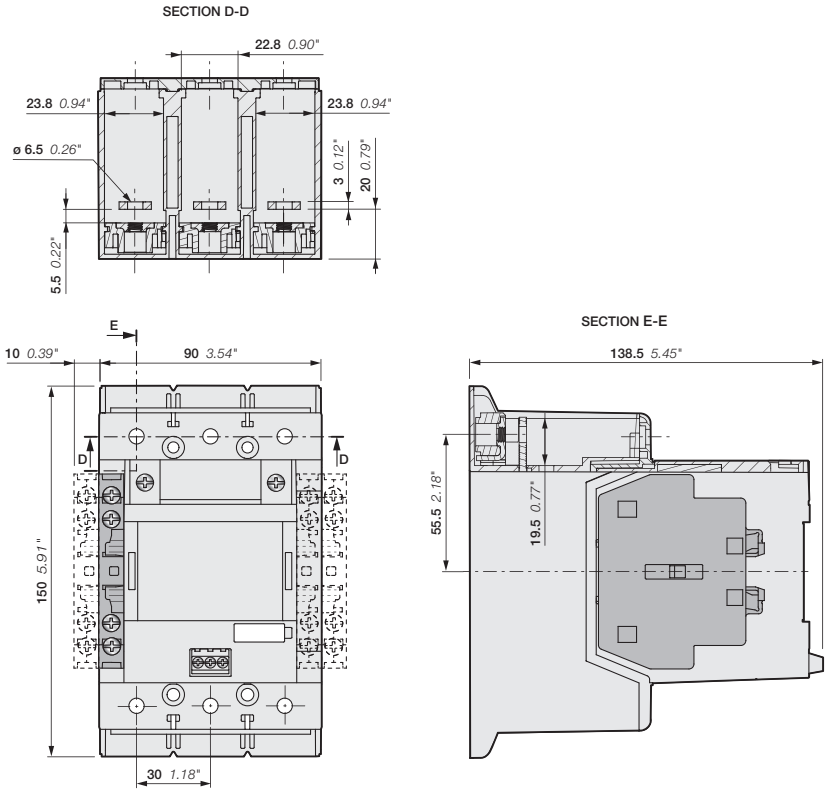
# AF116, AF140, AF146 3-pole contactors With built-in PLC interface (coil code 33, 34)

## Dimensions




AF116, AF140, AF146-30-00 + CAL19 2-pole auxiliary contact block
AF116, AF140, AF146-30-11

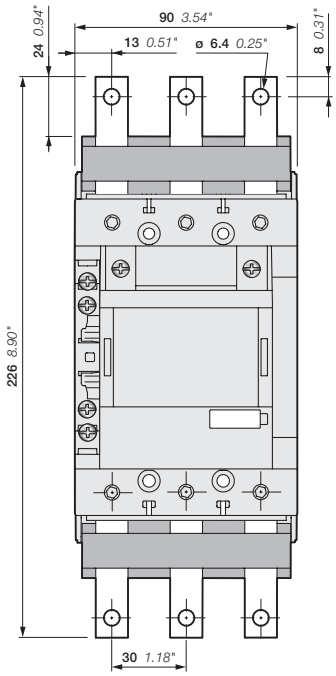
AF116, AF140, AF146-30-..(B)



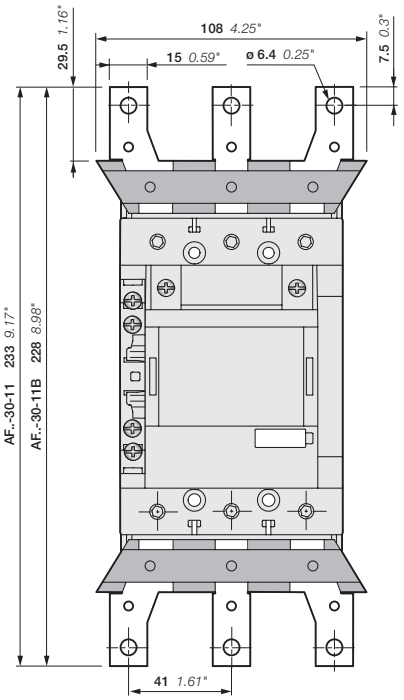

AF116, AF140, AF146-30-00B + CAL19 2-pole auxiliary contact block
AF116, AF140, AF146-30-11B

Main dimensions mm, inches

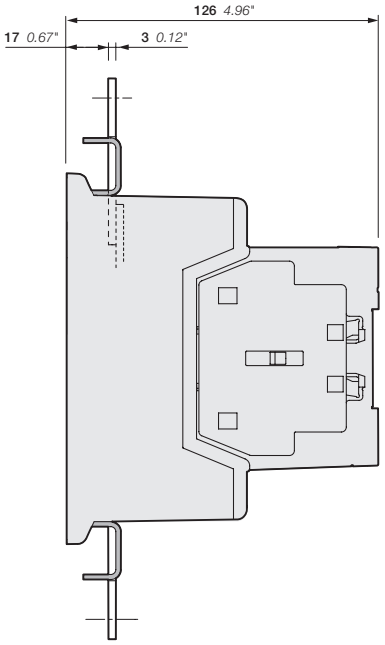
# AF116, AF140, AF146 3-pole contactors
## Dimensions

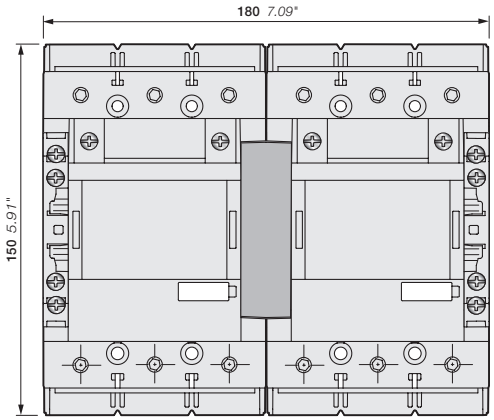


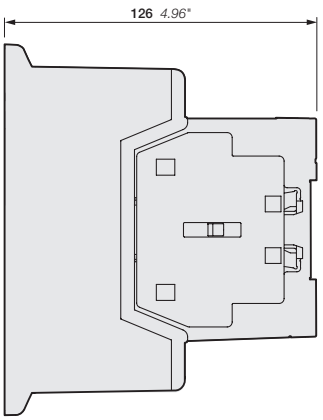

AF116, AF140, AF146-30-11
+ LX140 terminal extension



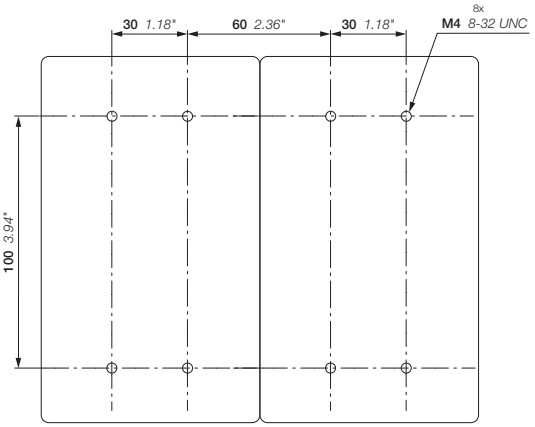

AF116, AF140, AF146-30-11(B)
+ LW140(B) terminal enlargement



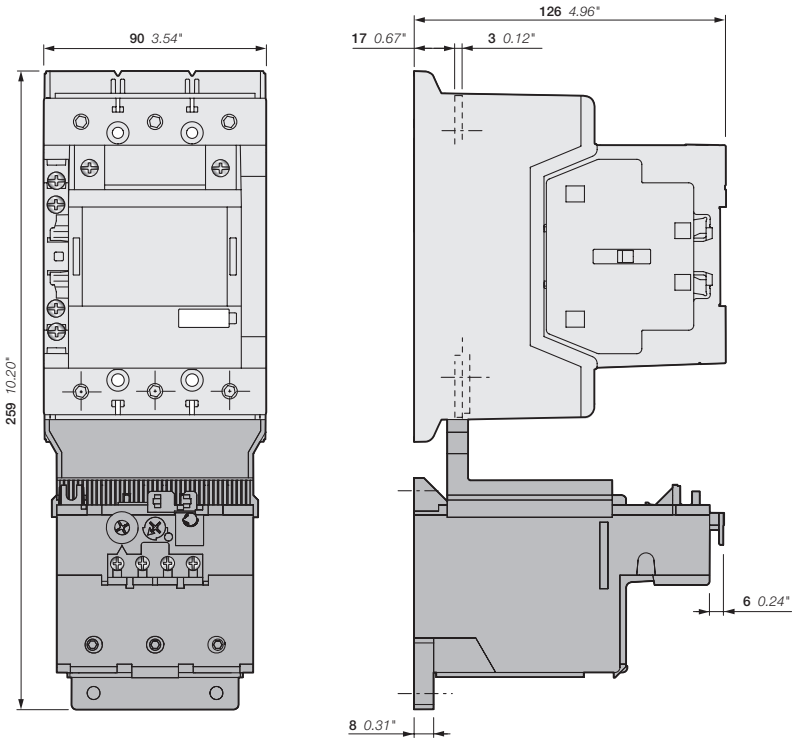

AF116, AF140, AF146-30-11(B)
+ VM19 mechanical interlocking unit



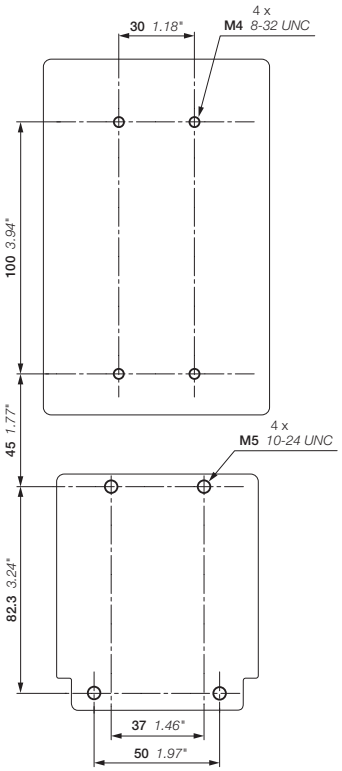

AF116, AF140, AF146-30-11(B)
+ VM19 mechanical interlocking unit

Main dimensions mm, inches

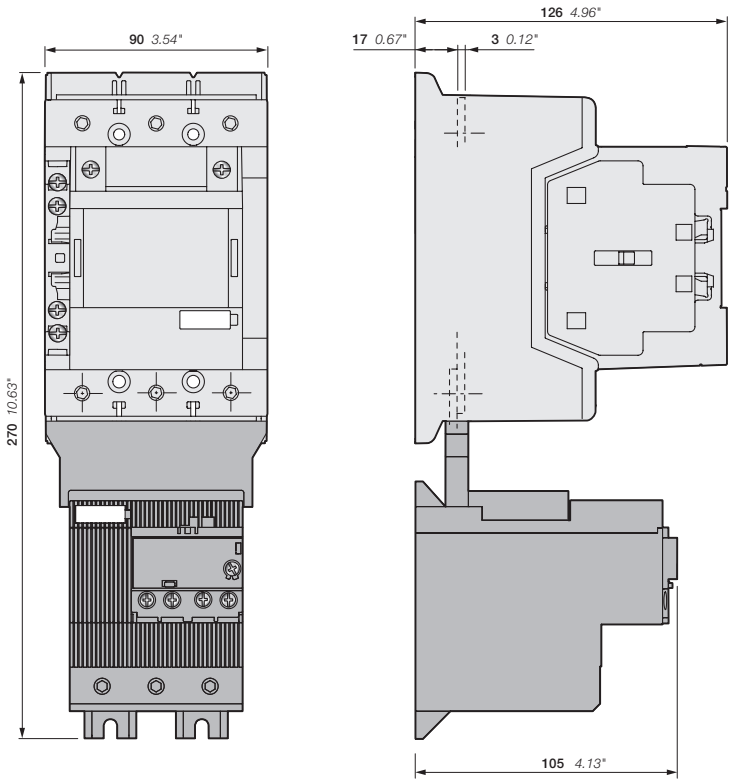
# AF116, AF140, AF146 3-pole contactors
## Dimensions



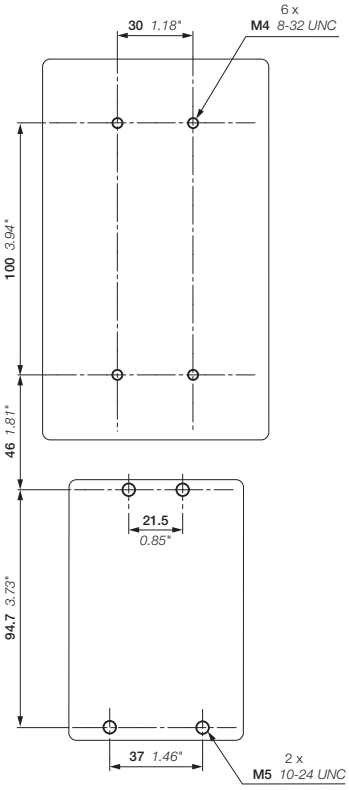

AF116, AF140-30-11(B)
+ TF140 thermal overload relay




AF116, AF140-30-11(B)
+ TF140 thermal overload relay




AF116, AF140, AF146-30-11(B)
+ EF146 electronic overload relay

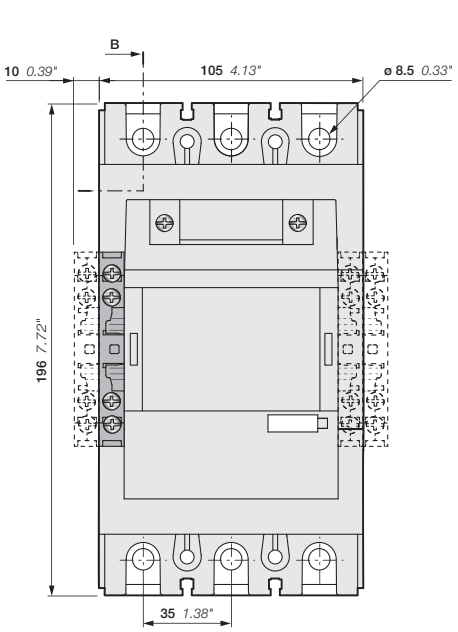


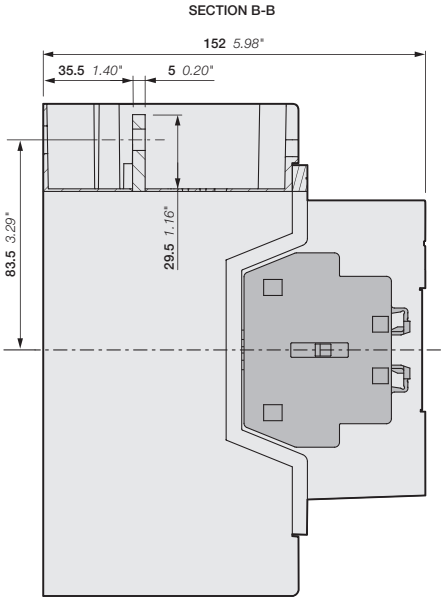

AF116, AF140, AF146-30-11(B)
+ EF146 electronic overload relay

Main dimensions mm, inches

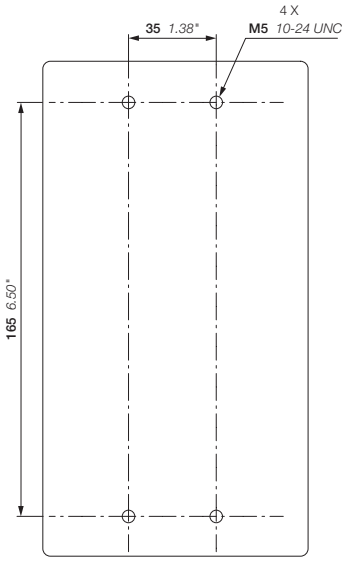
# AF190, AF205 3-pole contactors

## Dimensions

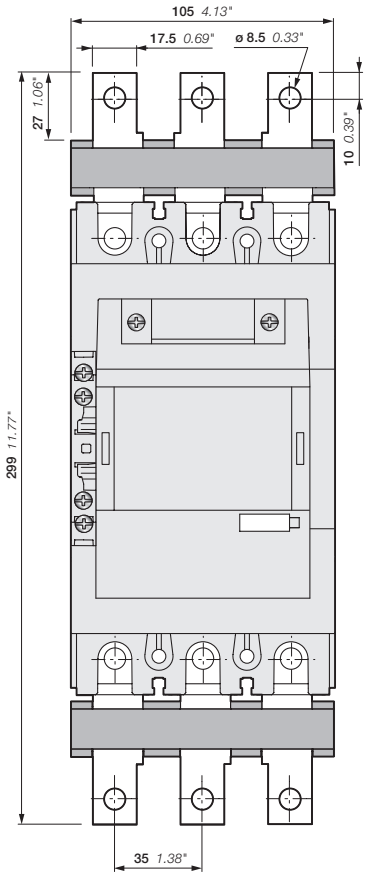


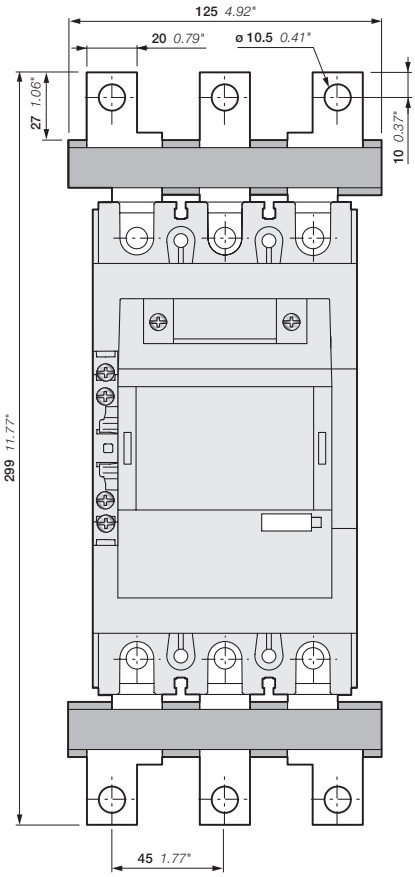

AF190, AF205-30-00 + CAL19 2-pole auxiliay contact block
AF190, AF205-30-11



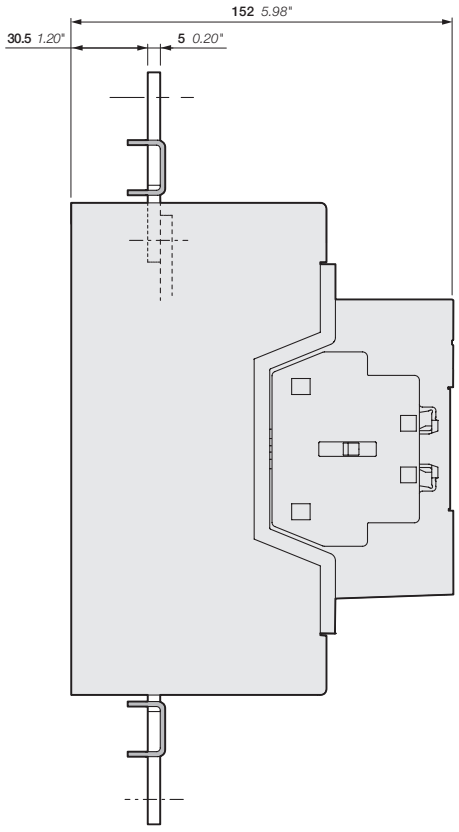

AF190, AF205




AF190, AF205-30-11
+ LX205 terminal extension



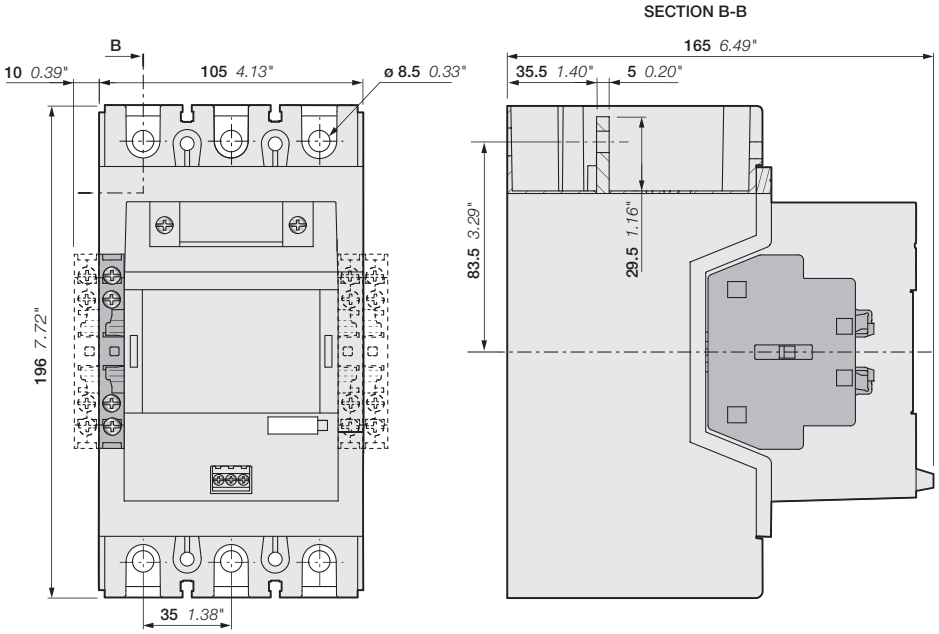

AF190, AF205-30-11
+ LW205 terminal enlargement



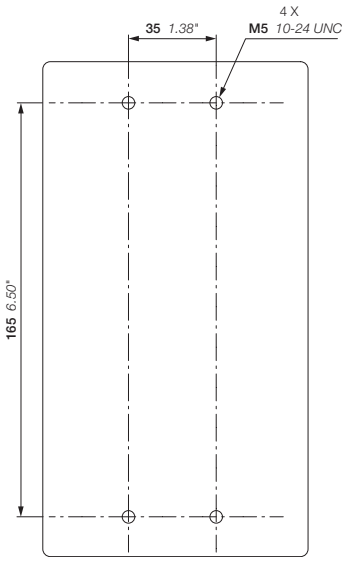

Main dimensions mm, inches

# AF190, AF205 3-pole contactors With built-in PLC interface (coil code 33, 34)

## Dimensions



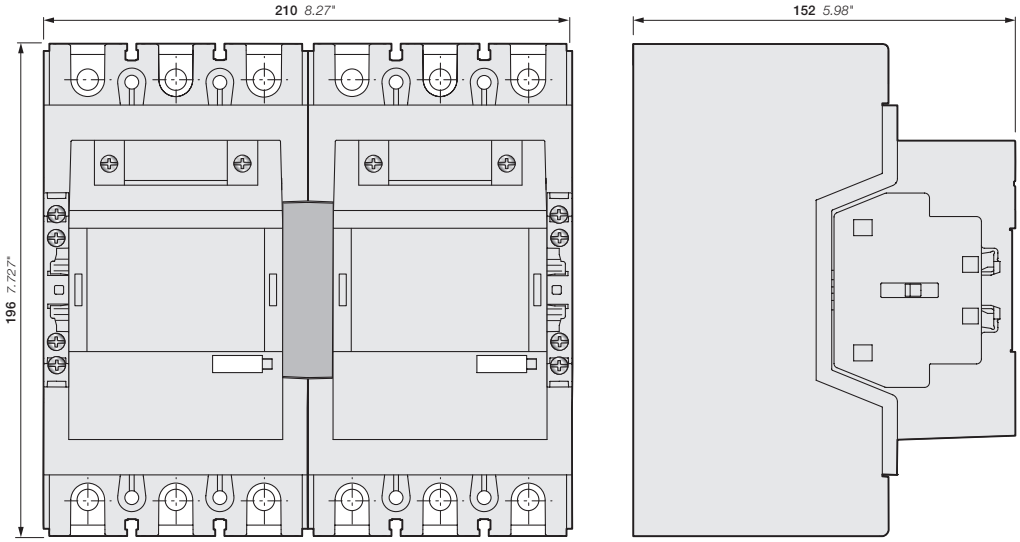

AF190, AF205-30-00 + CAL19 2-pole auxiliay contact block
AF190, AF205-30-11



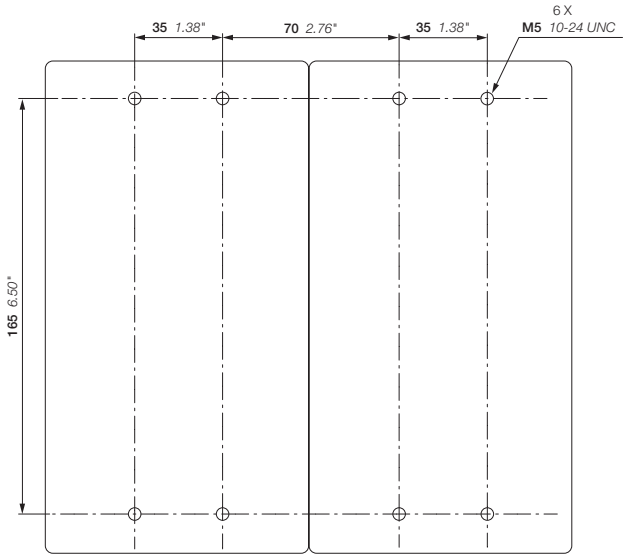

AF190, AF205

Main dimensions mm, inches

# AF190, AF205 3-pole contactors
## Dimensions




AF190, AF205-30-11
+ VM19 mechanical interlocking unit

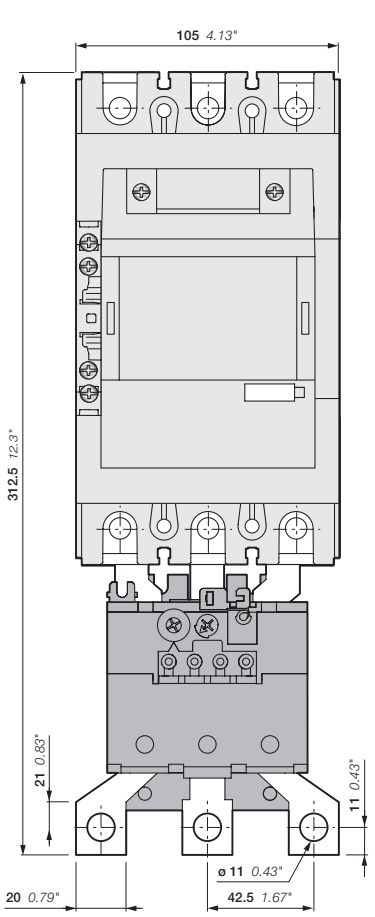


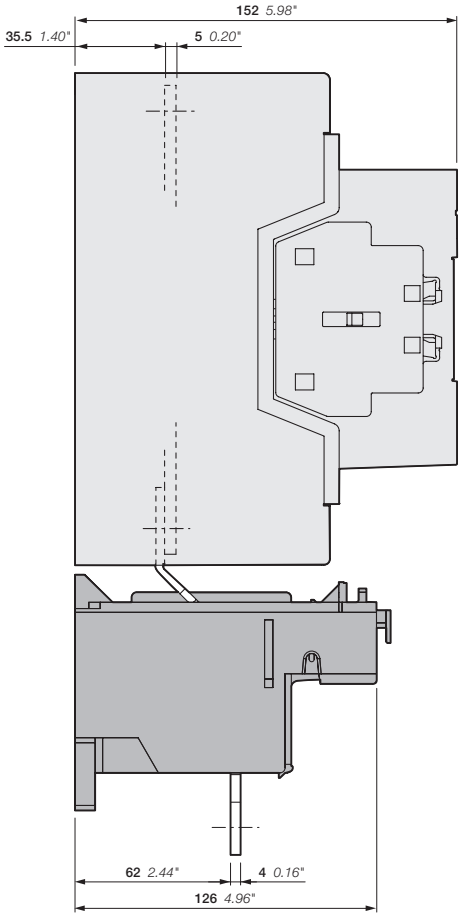

AF190, AF205
+ VM19 mechanical interlocking unit

Main dimensions mm, inches

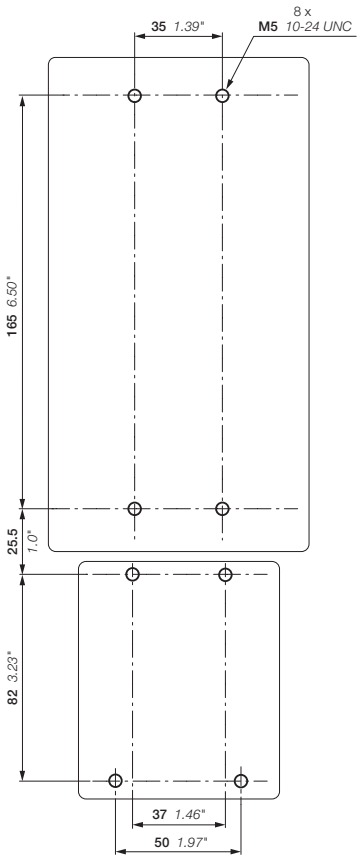
# AF190, AF205 3-pole contactors

## Dimensions




AF190, AF205-30-11
+ TA200DU thermal overload relay

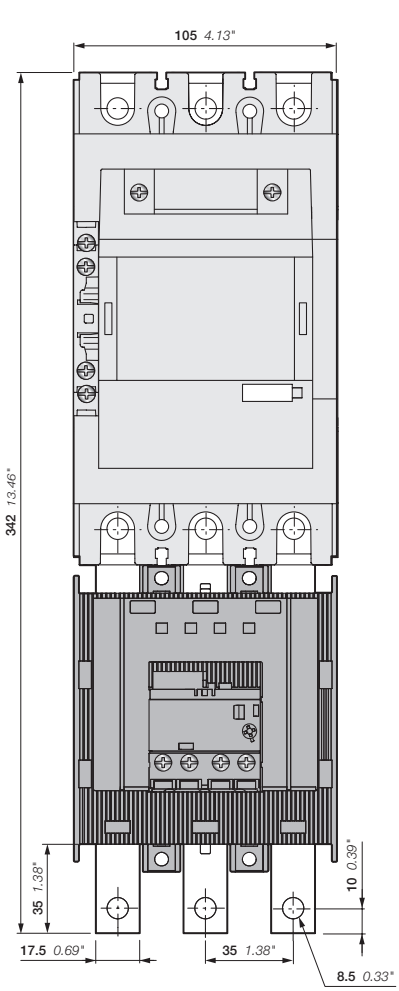


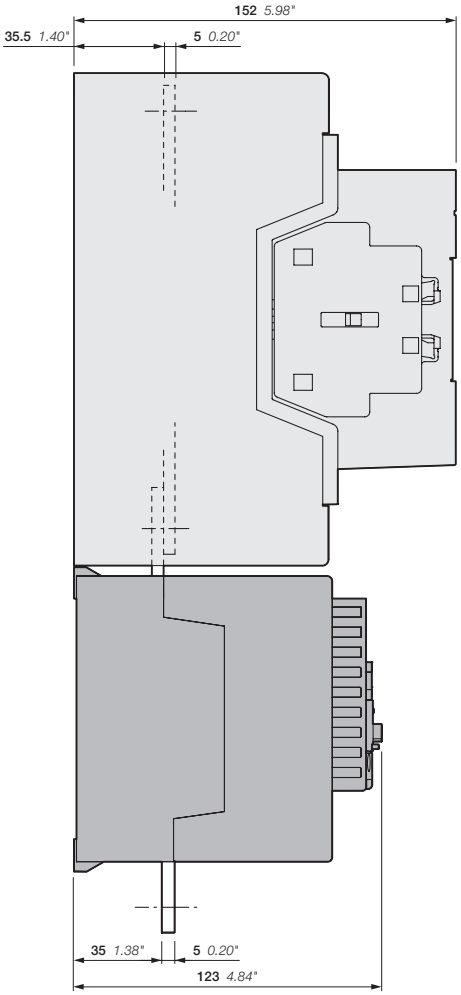

AF190, AF205
+ TA200DU thermal overload relay

Main dimensions mm, inches

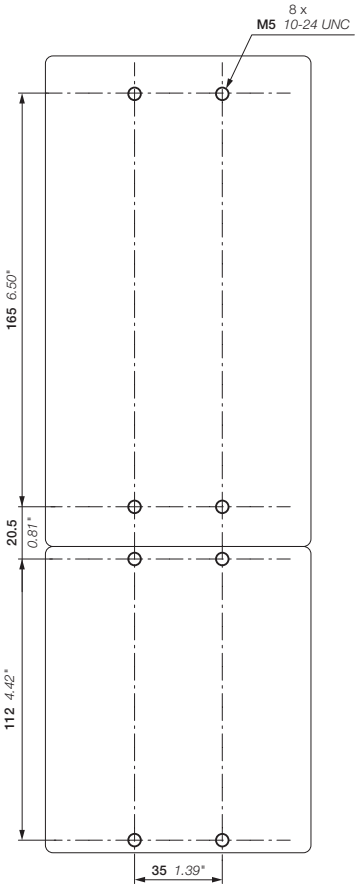
# AF190, AF205 3-pole contactors

## Dimensions



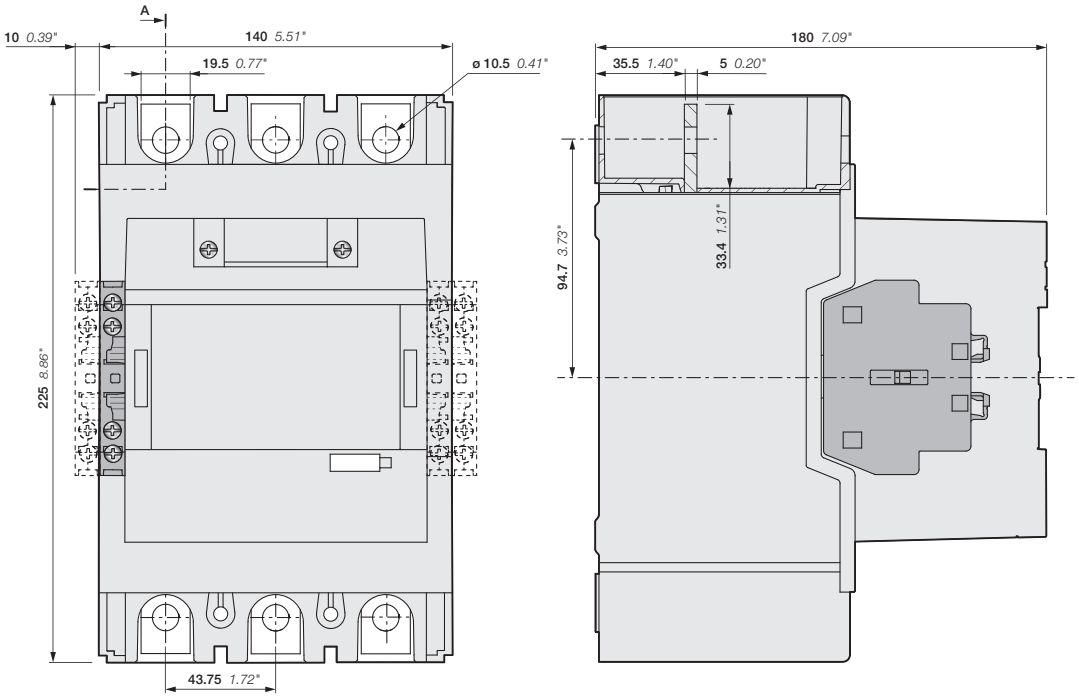

AF190, AF205-30-11
+ EF205 electronic overload relay



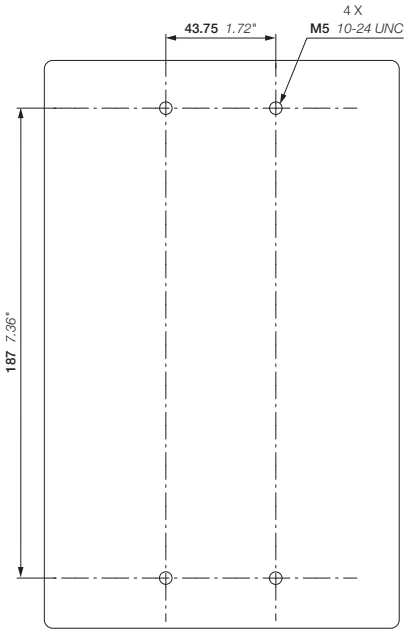

AF190, AF205
+ EF205 electronic overload relay

Main dimensions mm, inches

# AF265, AF305, AF370 3-pole contactors
## Dimensions




AF265, AF305, AF370-30-00 + CAL19 2-pole contact block
AF265, AF305, AF370-30-11

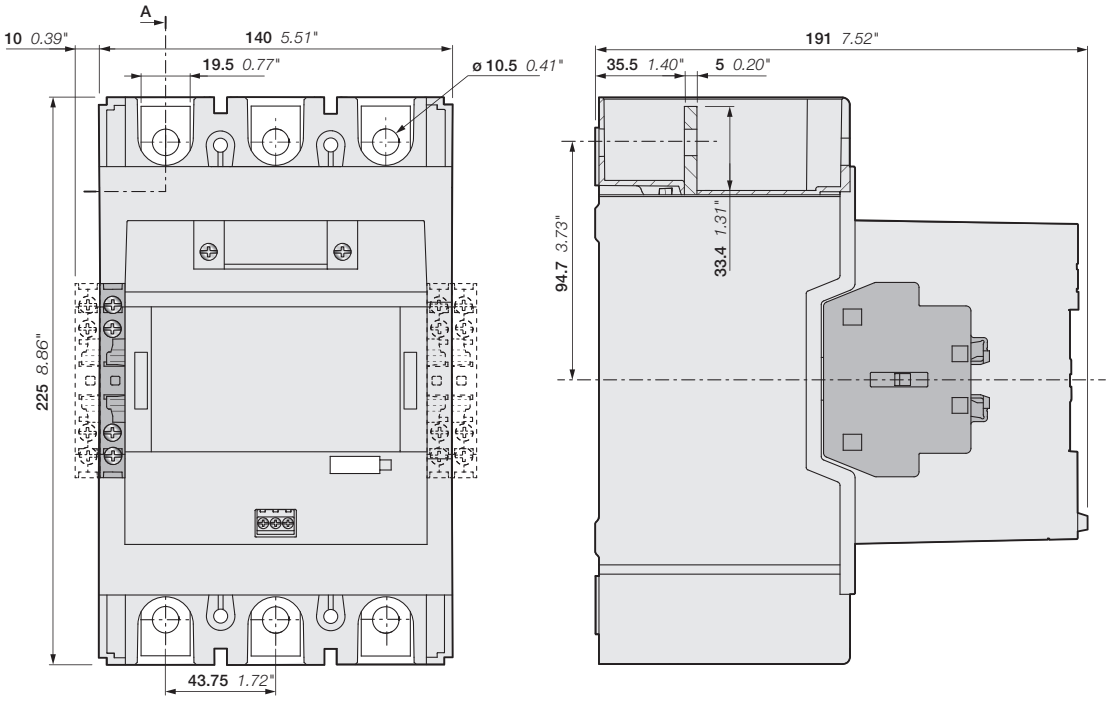



AF265, AF305, AF370

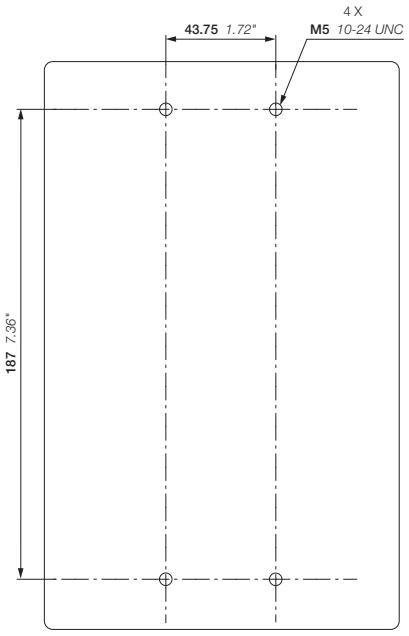
Main dimensions mm, inches

# AF265, AF305, AF370 3-pole contactors with built-in PLC interface (coil code 33, 34)

## Dimensions




AF265, AF305, AF370-30-00 + CAL19 2-pole contact block
AF265, AF305, AF370-30-11

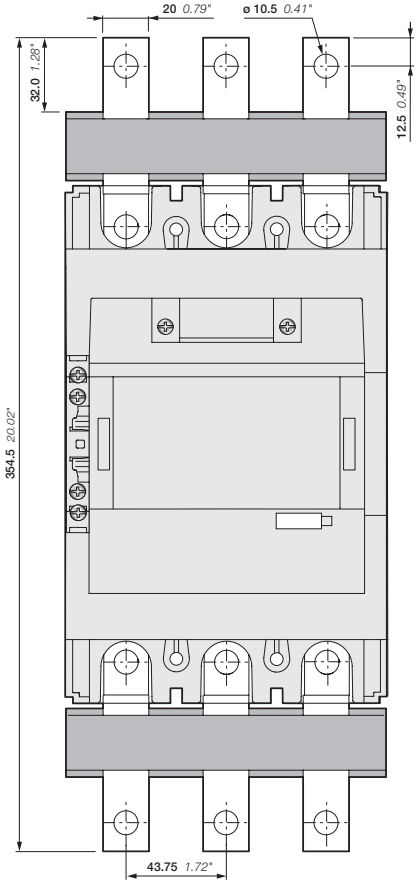



AF265, AF305, AF370

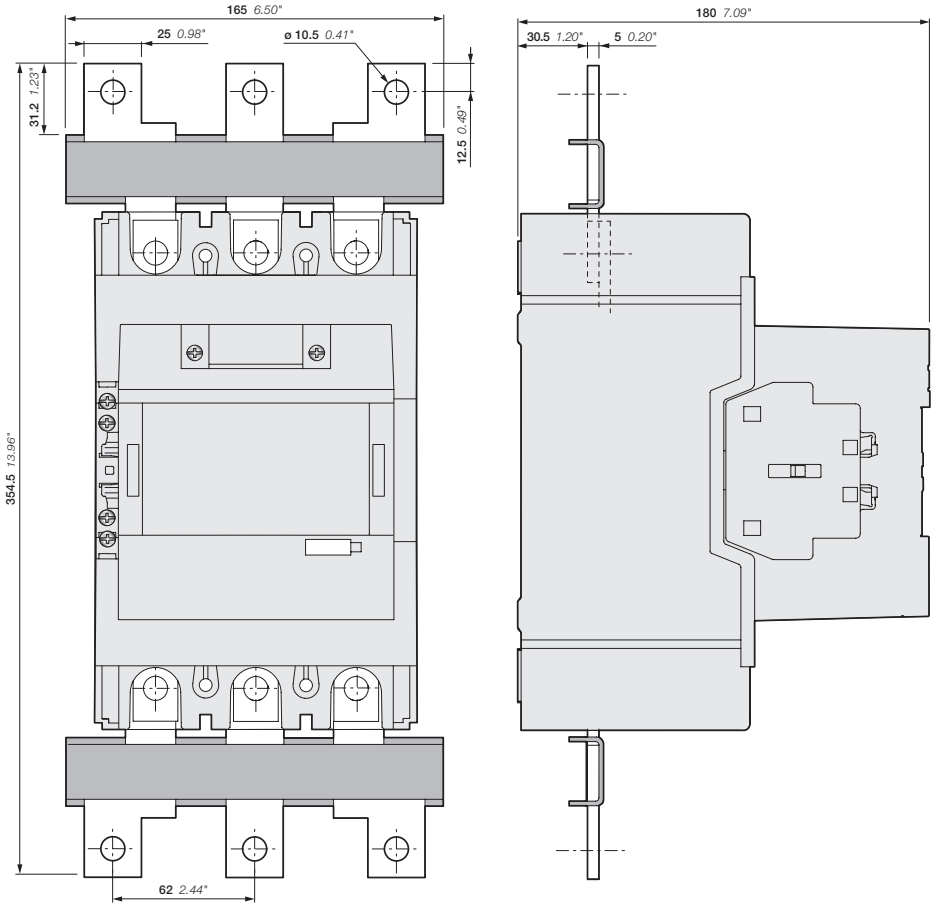
Main dimensions mm, inches

# AF265, AF305, AF370 3-pole contactors

## Dimensions




AF265, AF305, AF370-30-11
+ LX370 terminal extension

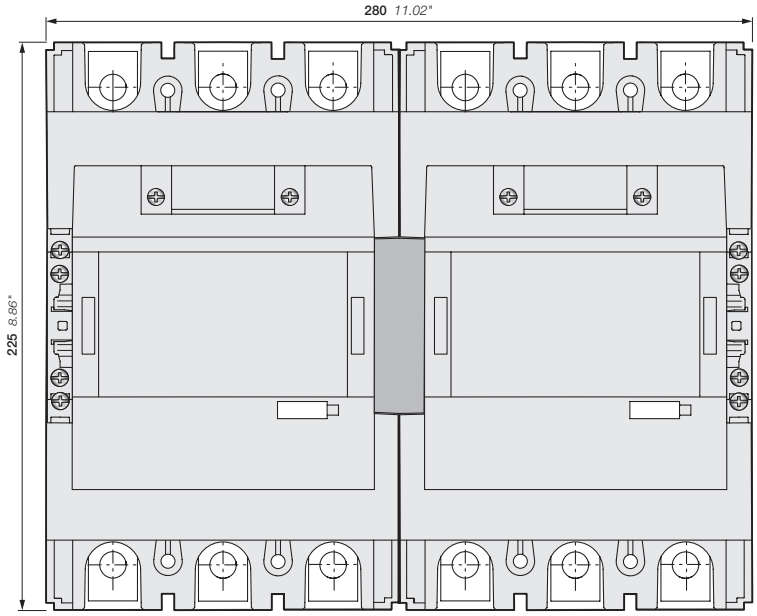


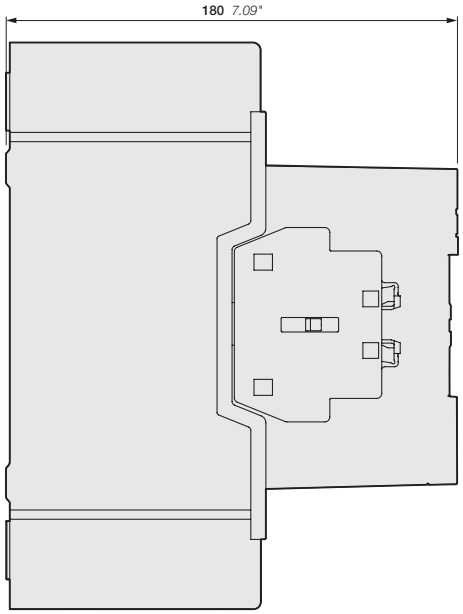

AF265, AF305, AF370-30-11
+ LW370 terminal enlargement

Main dimensions mm, inches

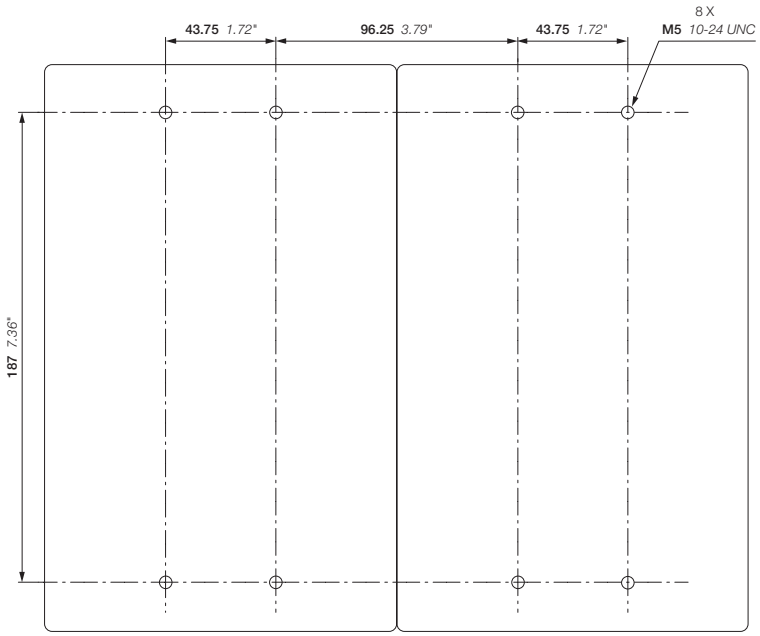
03

# AF265, AF305, AF370 3-pole contactors
## Dimensions




AF265, AF305, AF370-30-11
+ VM19 mechanical interlocking unit

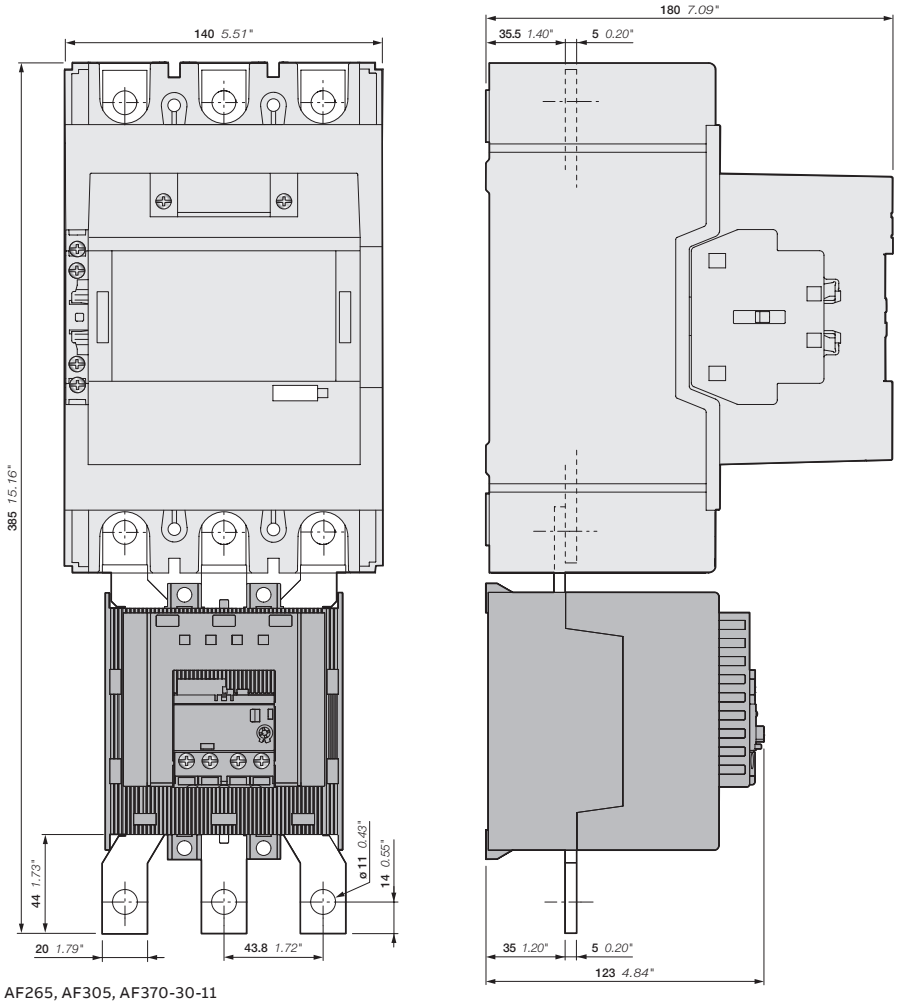



AF265, AF305, AF370
+ VM19 mechanical interlocking unit

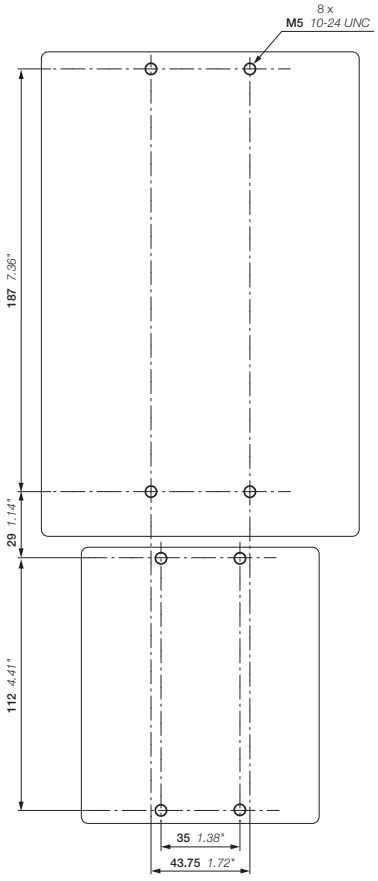
Main dimensions mm, inches

# AF265, AF305, AF370 3-pole contactors

## Dimensions




AF265, AF305, AF370-30-11
+ EF370 electronic overload relay

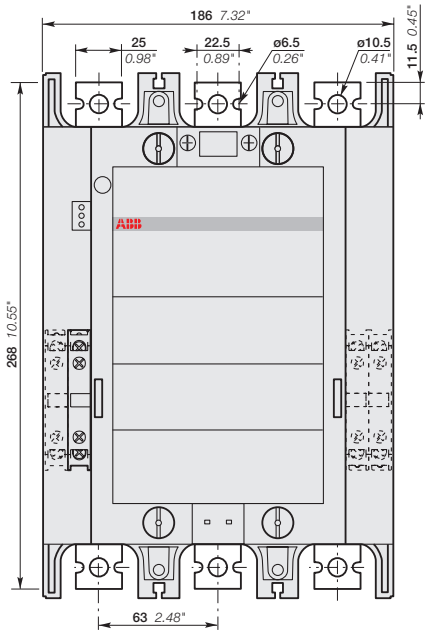


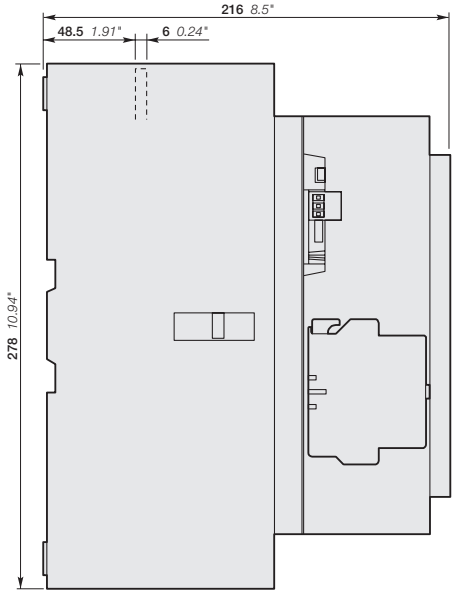

AF265, AF305, AF370
+ EF370 electronic overload relay

Main dimensions mm, inches

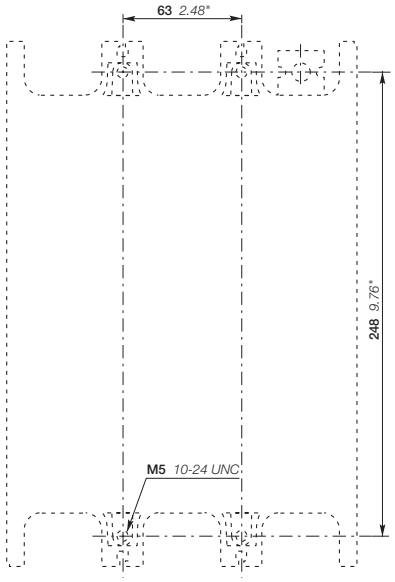
# AF400 and AF460 3-pole contactors

## Dimensions

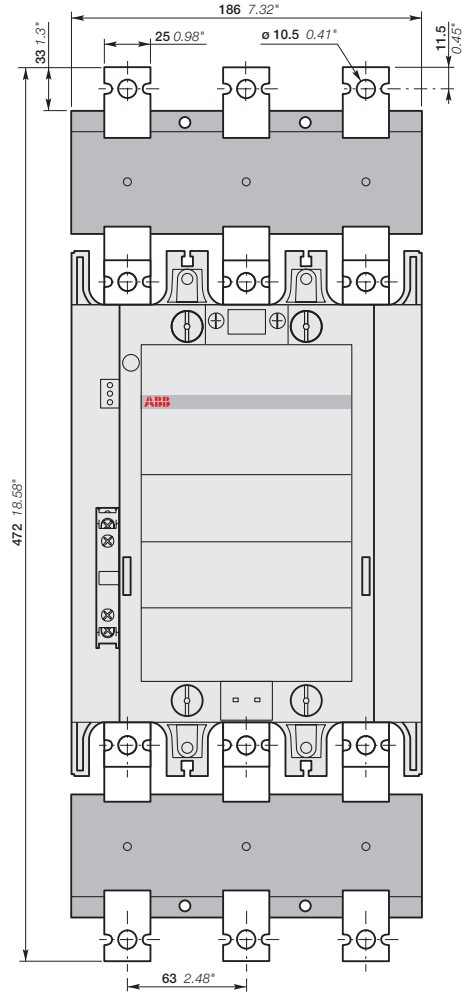


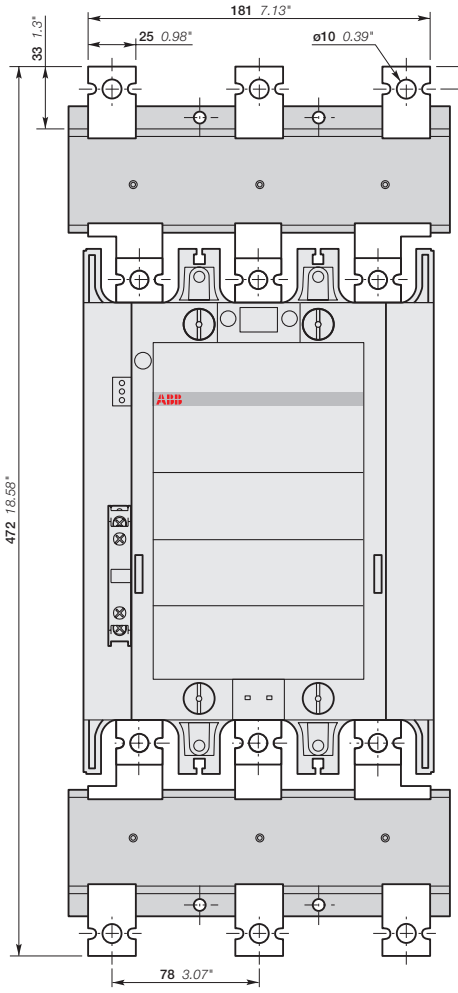

AF400, AF460-30-11



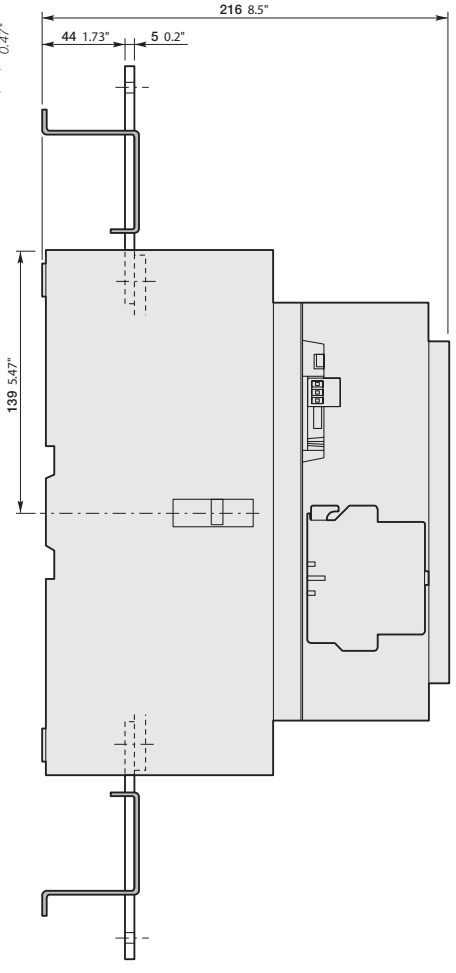

AF400, AF460




AF400, AF460-30-11
+ LX460 terminal extension



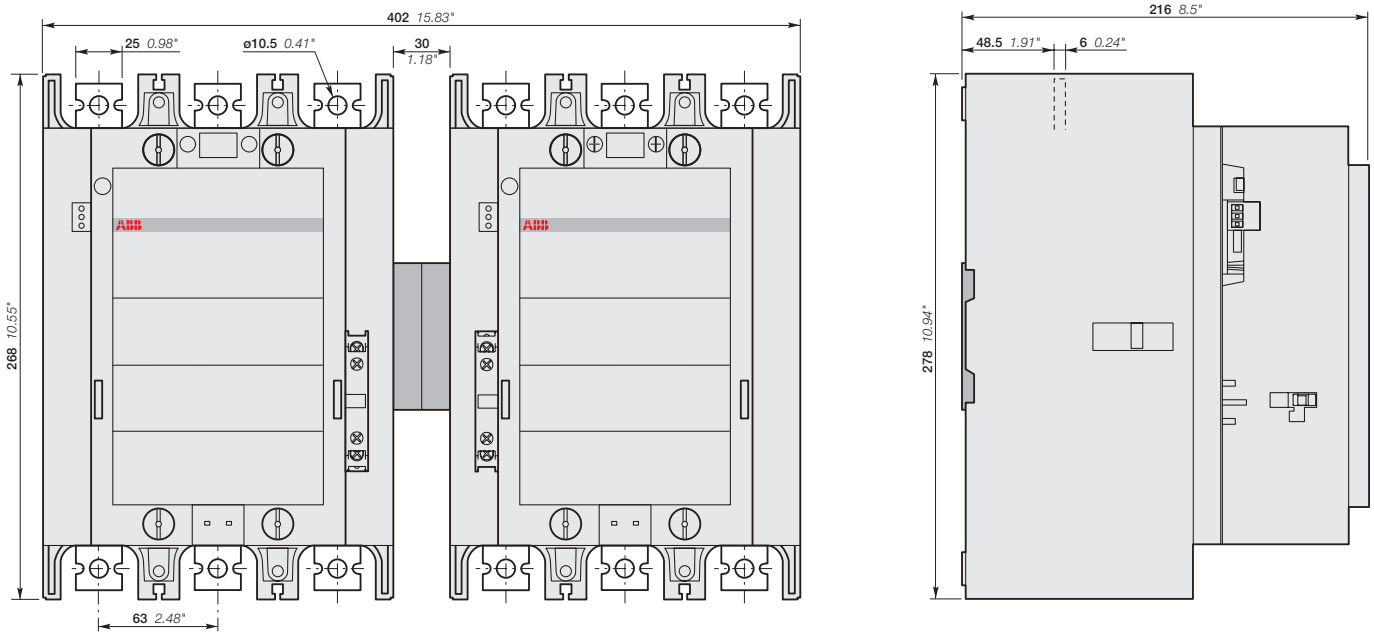

AF400, AF460-30-11
+ LW460 terminal enlargement



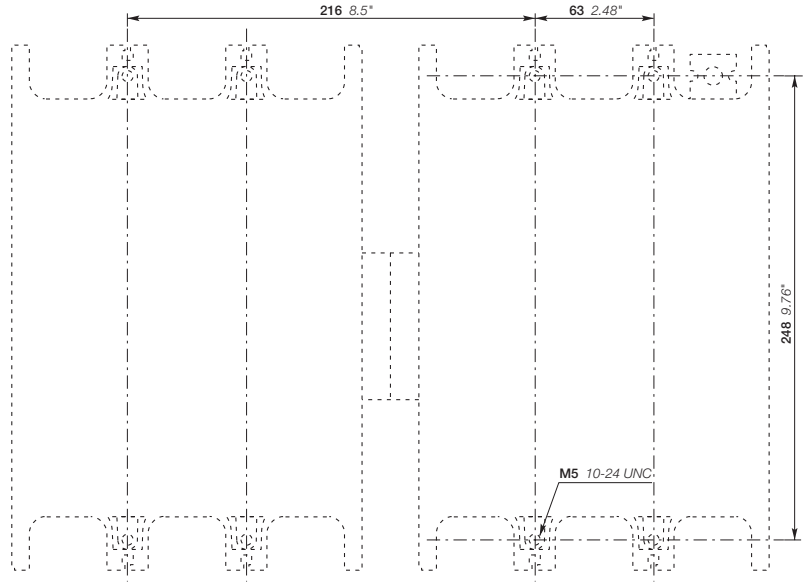

Main dimensions mm, inches

# AF400 and AF460 3-pole contactors

## Dimensions




AF400, AF460-30-11
+ VM750H mechanical interlock unit

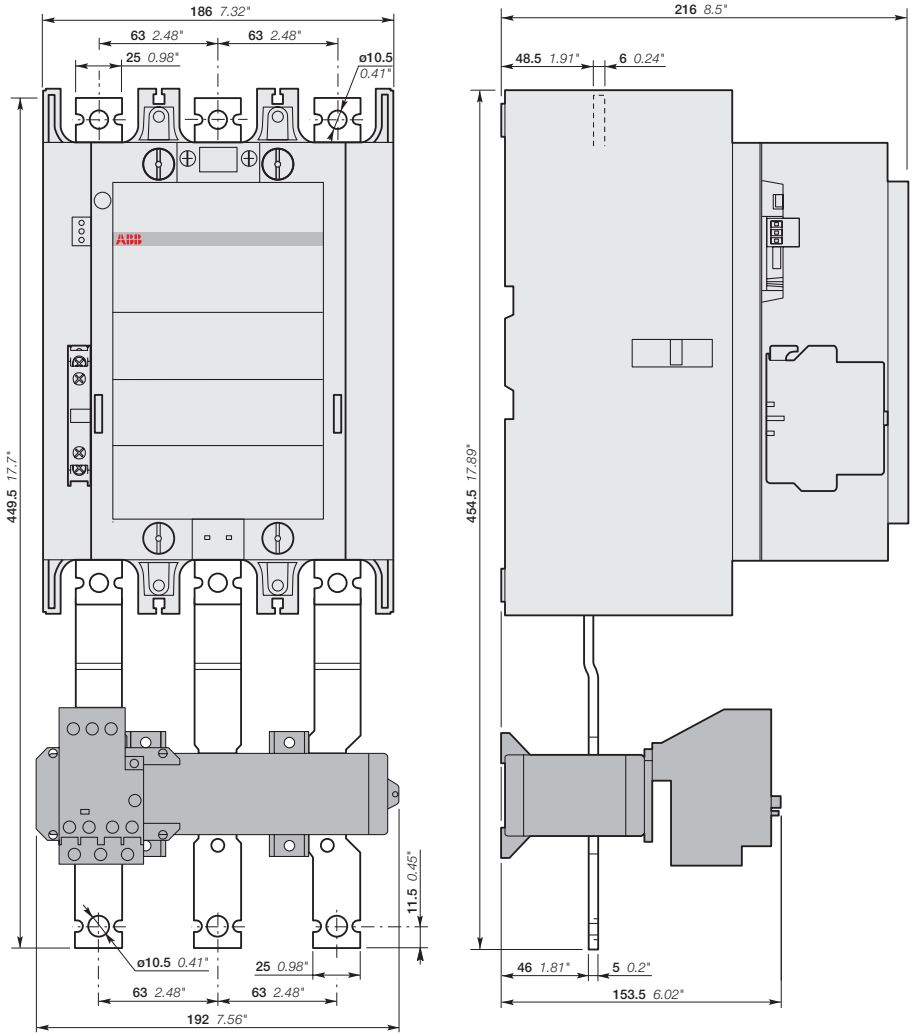



AF400, AF460
+ VM750H mechanical interlock unit

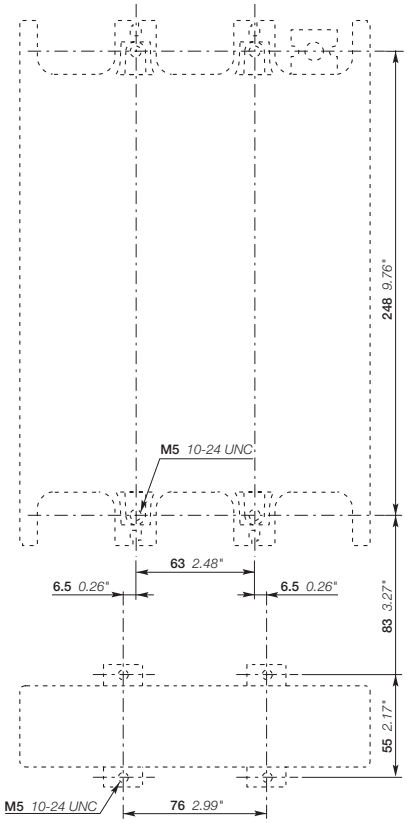
Main dimensions mm, inches

# AF400 and AF460 3-pole contactors

## Dimensions




AF400, AF460-30-11
+ EF460 electronic O/L relay

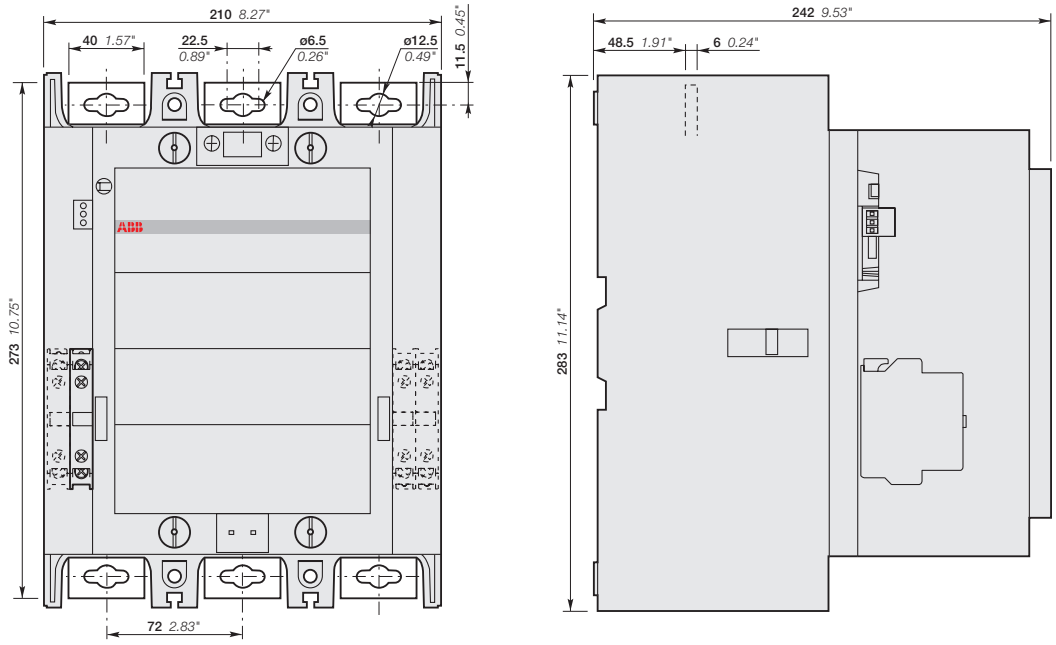



AF400, AF460
+ EF460 electronic O/L relay

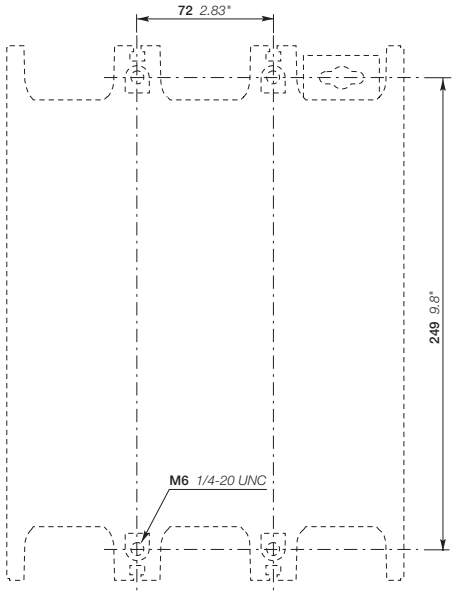
Main dimensions mm, inches

# AF580 and AF750 3-pole contactors

## Dimensions




AF580 and AF750-30-11

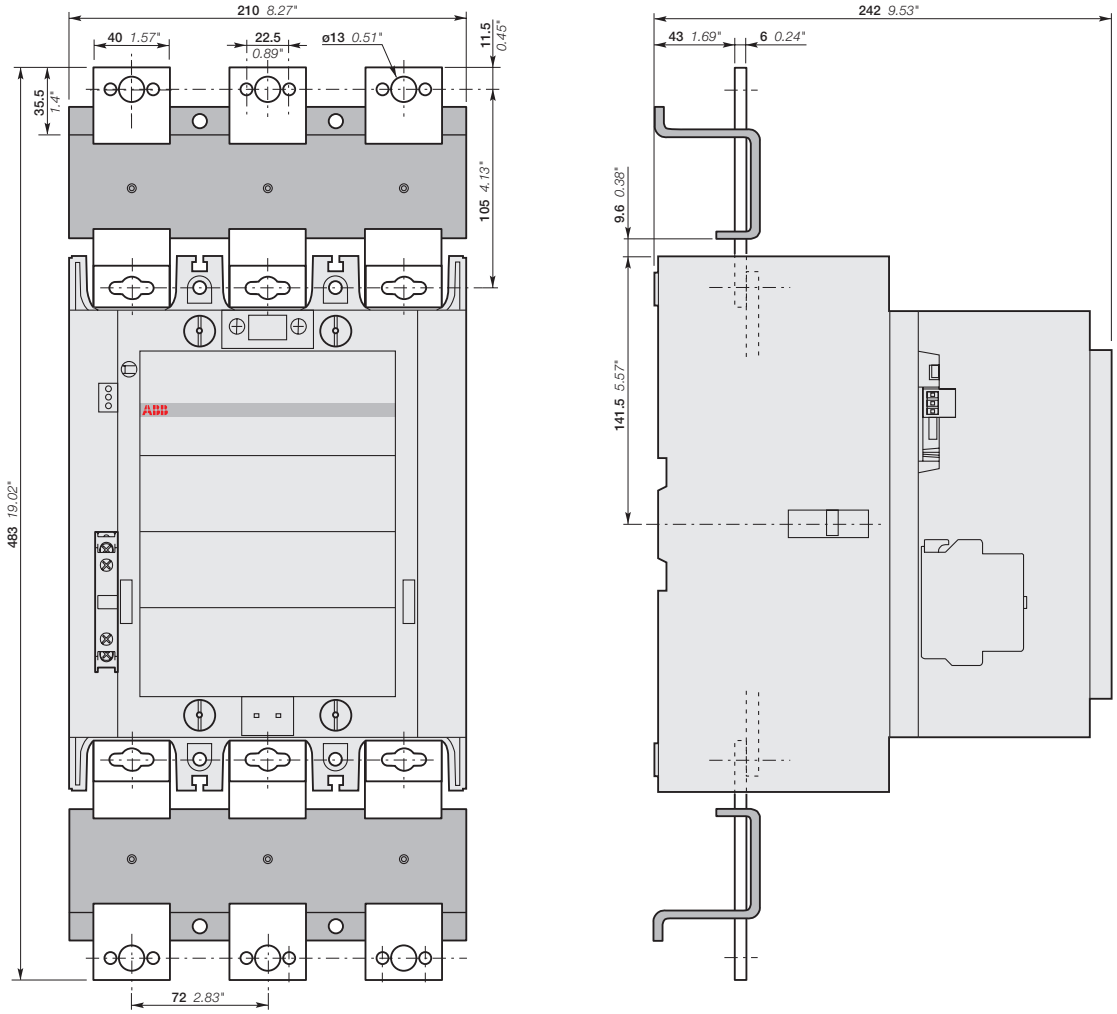



AF580 and AF750

Main dimensions mm, inches

03

# AF580 and AF750 3-pole contactors
## Dimensions

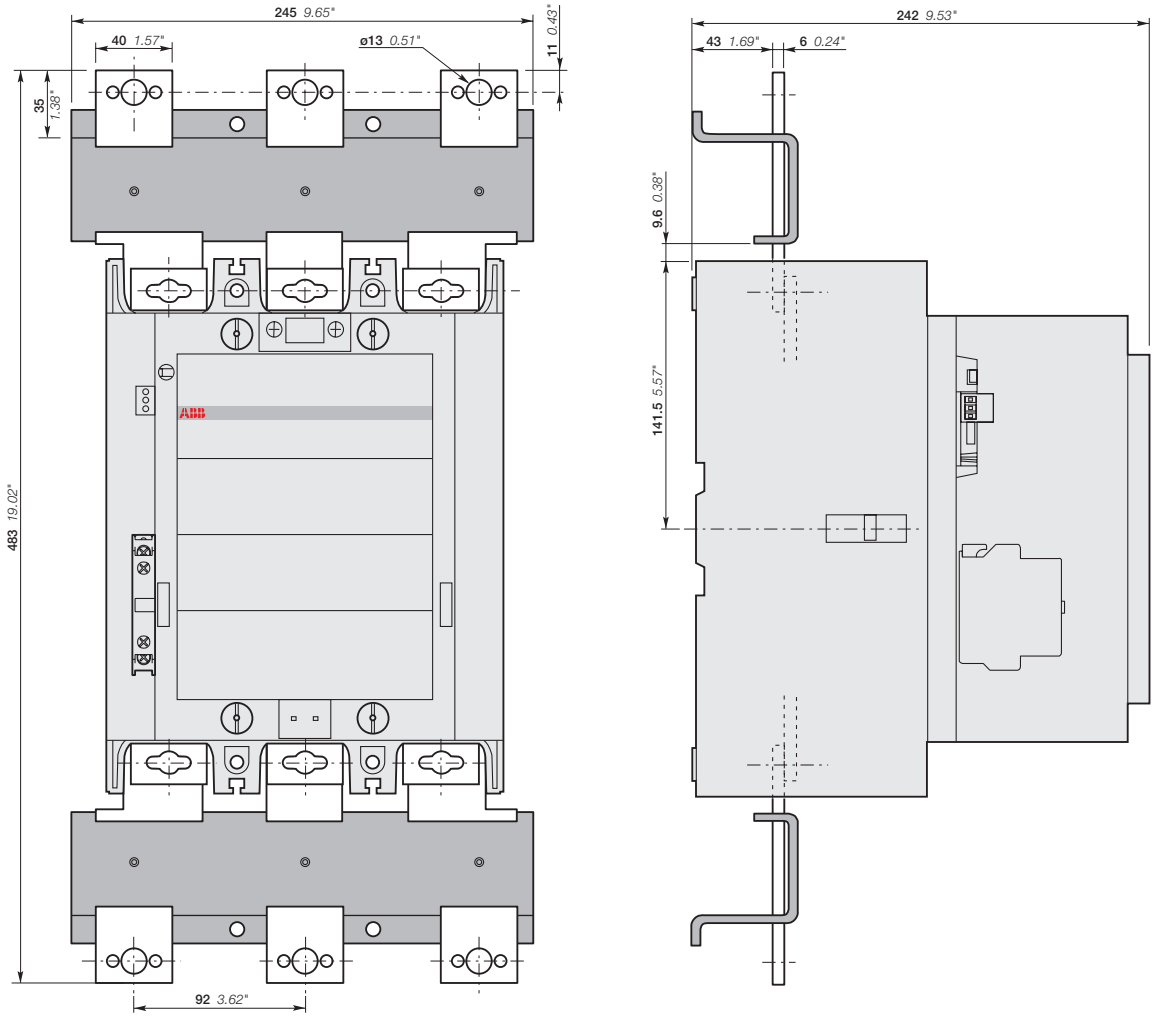



AF580 and AF750-30-11
+ LX750 terminal extension

Main dimensions mm, inches

# AF580 and AF750 3-pole contactors

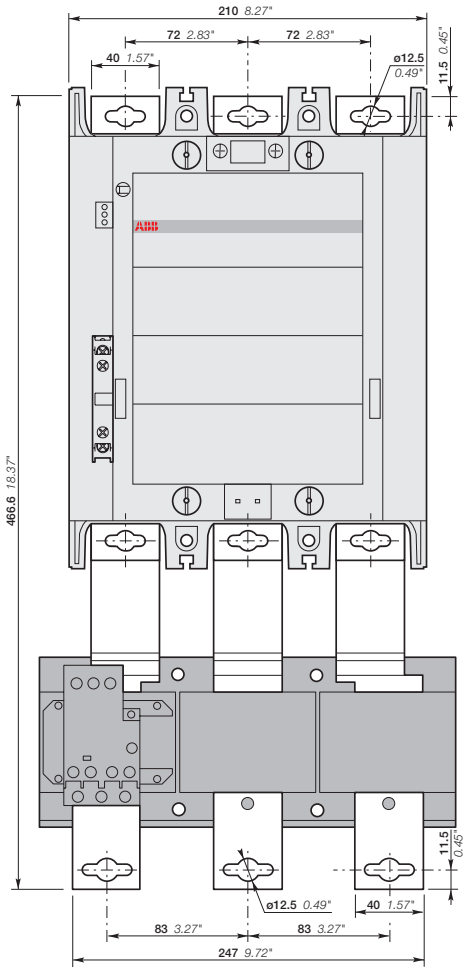
## Dimensions

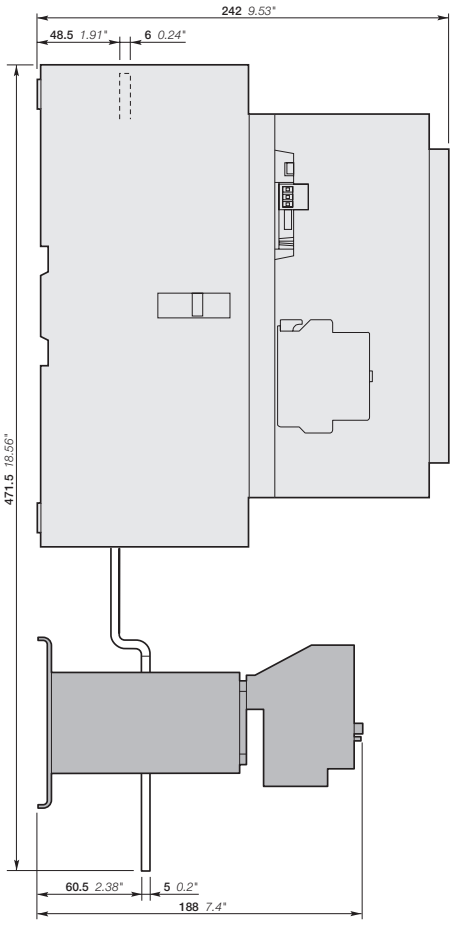



AF580 and AF750-30-11
+ LW750 terminal enlargement

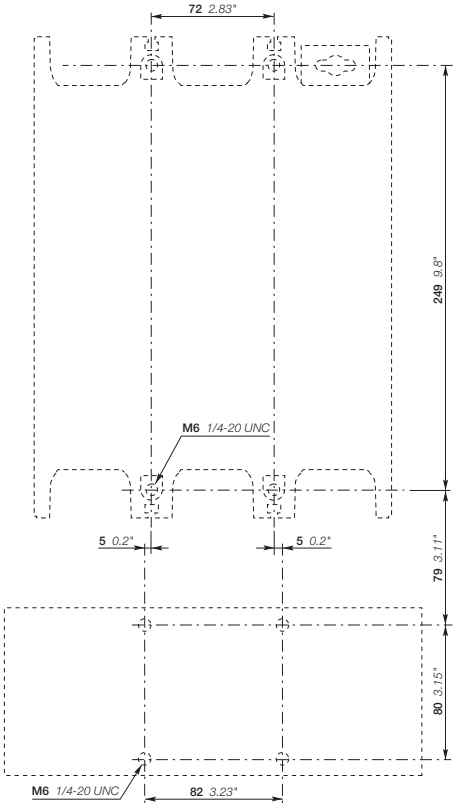
Main dimensions mm, inches

# AF580 and AF750 3-pole contactors
## Dimensions




AF580 and AF750-30-11
+ EF750 electronic O/L relay

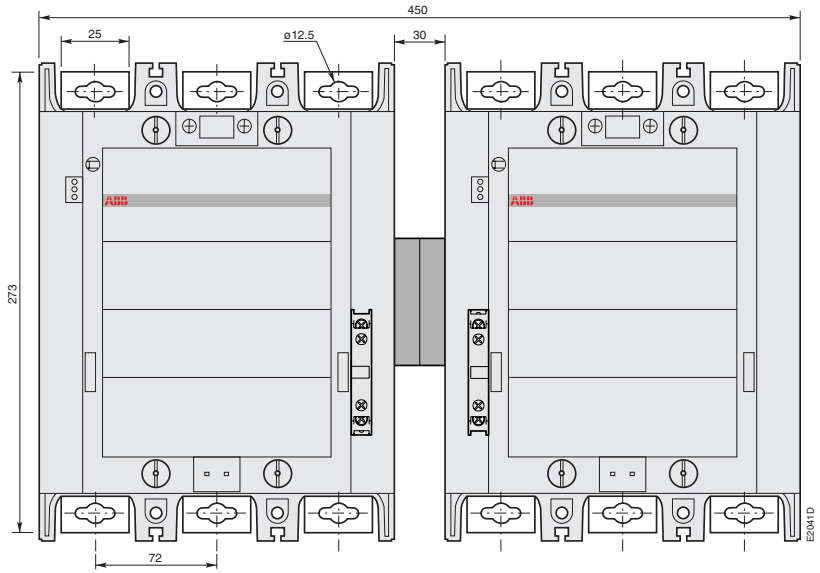


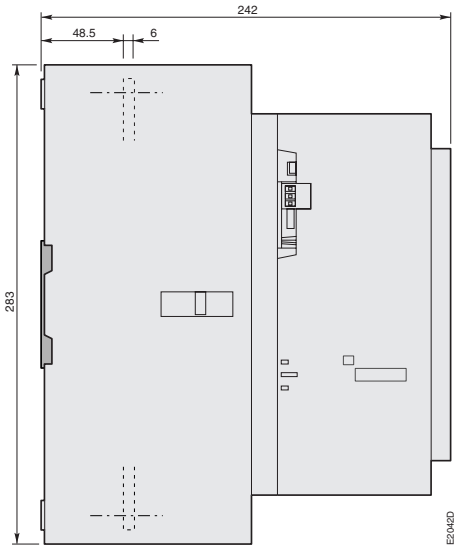

AF580 and AF750
+ EF750 electronic O/L relay

Main dimensions mm, inches

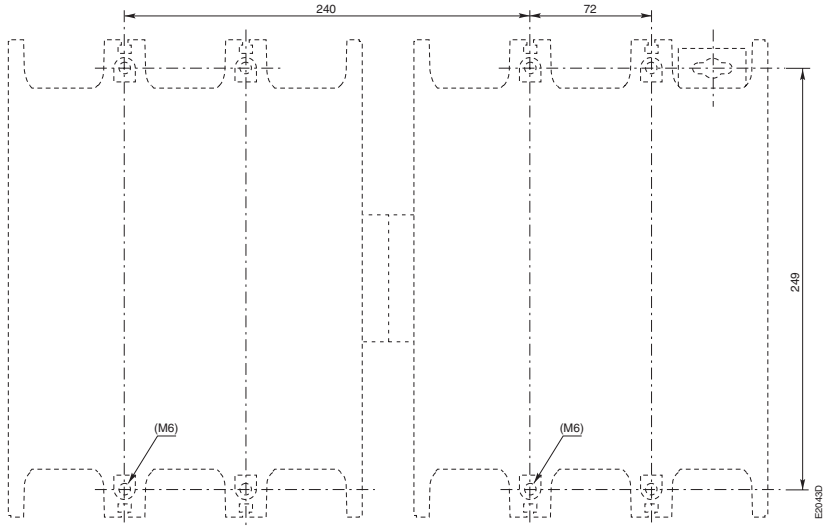
# AF580 and AF750 3-pole contactors

## Dimensions




AF580 and AF750-30-11
+ VM 750H mechanical interlock unit

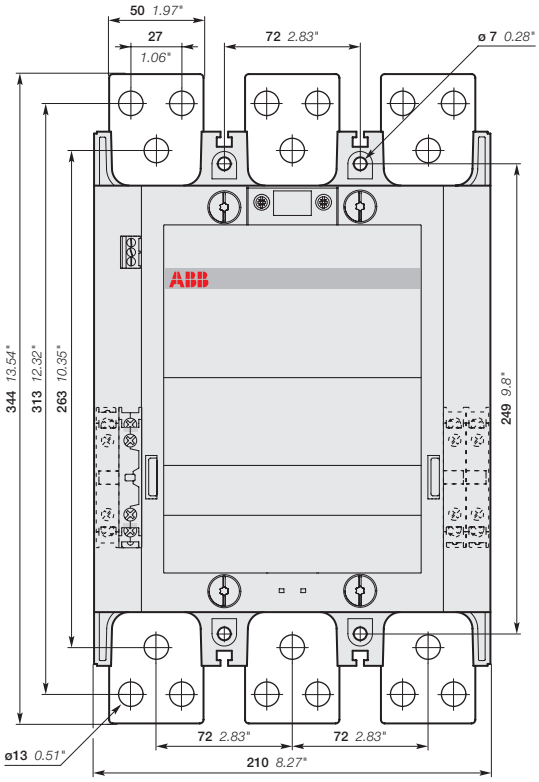


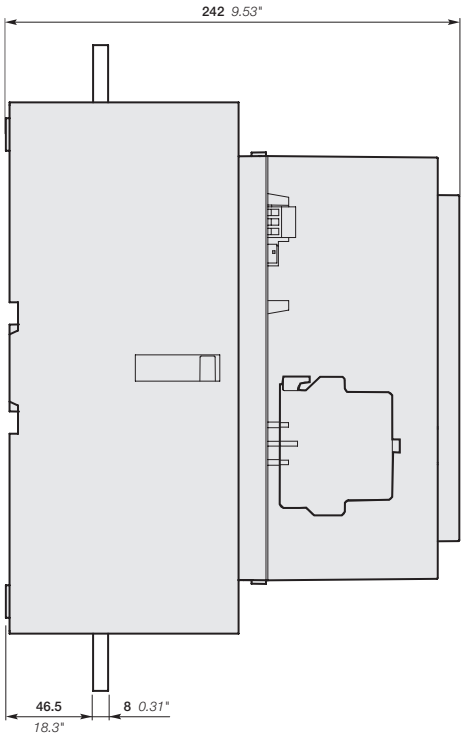

AF580 and AF750
+ VM 750H mechanical interlock unit

Main dimensions mm, inches

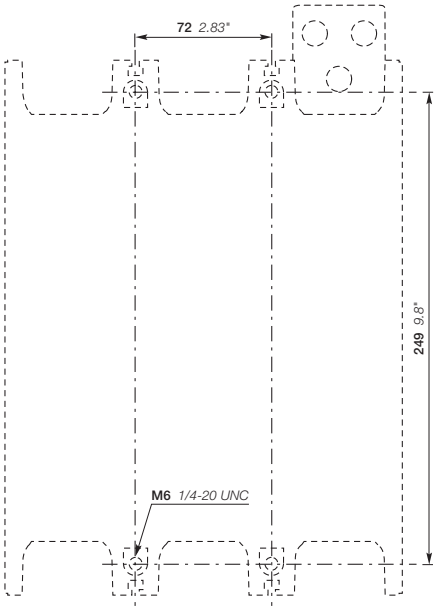
# AF1250 3-pole contactors

## Dimensions




AF1250-30-11

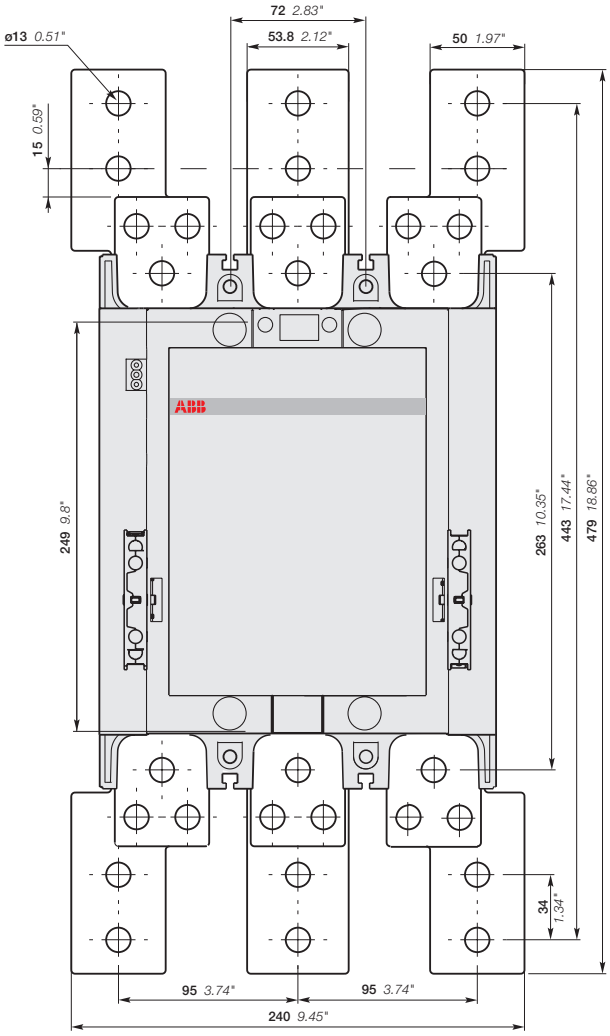


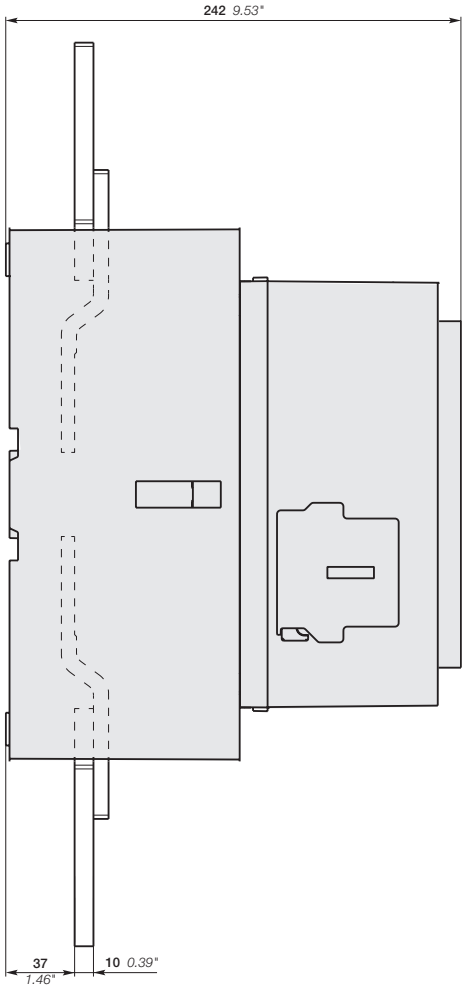

AF1250

Main dimensions mm, inches

# AF1250 3-pole contactors

## Dimensions



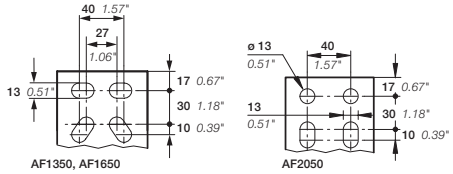



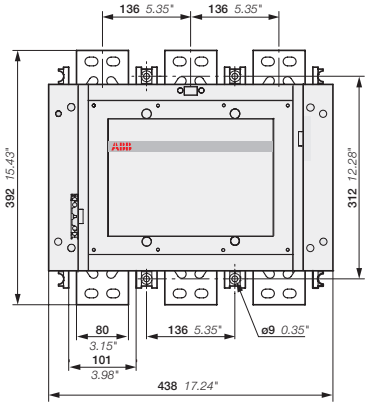

AF1250-30-11
+ LW1250 terminal enlargement

Main dimensions mm, inches

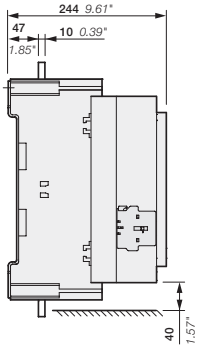
# AF1350, AF1650, AF2050 and AF2850 3-pole contactors

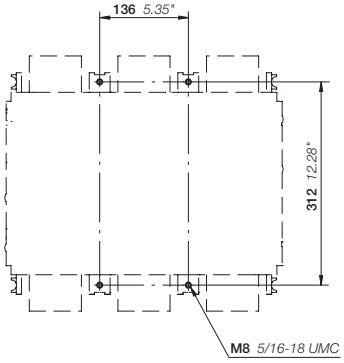
## Dimensions



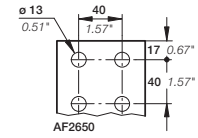



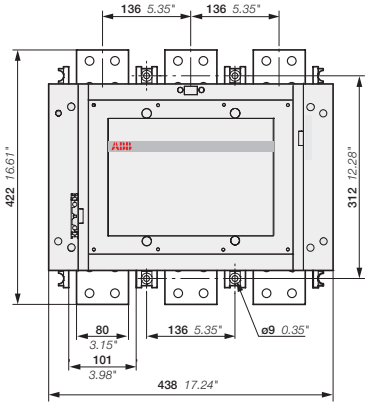

AF1350, AF1650, AF2050-30-11



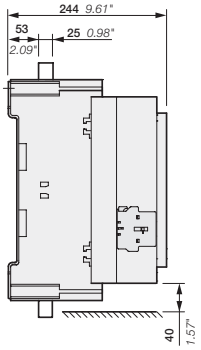



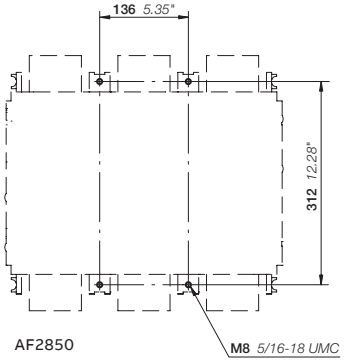

AF1350, AF1650, AF2050




AF2850-30-11



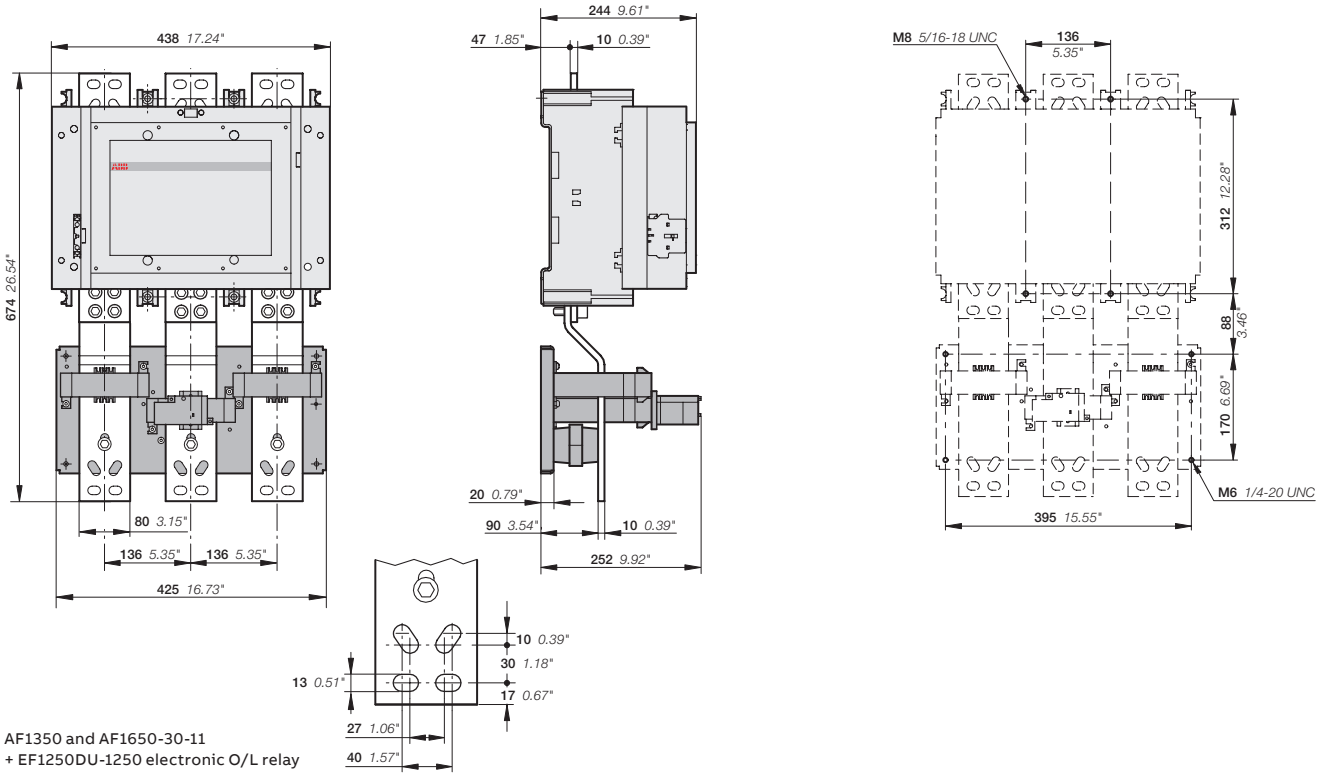




AF2850

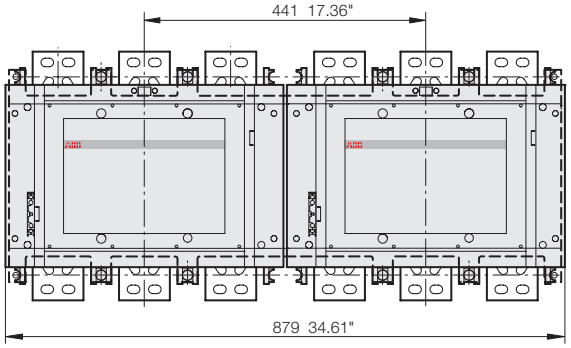
Main dimensions mm, inches

# AF1350, AF1650, AF2050 and AF2850 3-pole contactors

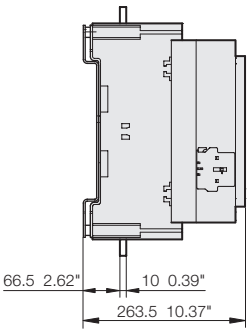
## Dimensions



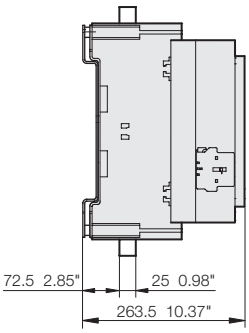

AF1350 and AF1650-30-11
+ EF1250DU-1250 electronic O/L relay



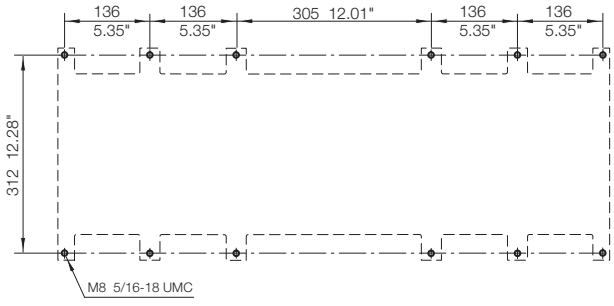

AF1350, AF1650, AF2050, AF2850-30-11
+ VM 1650H mechanical interlock unit




AF1350, AF1650, AF2050




AF2850

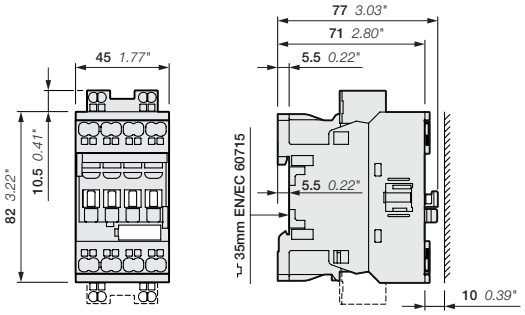



AF1350, AF1650, AF2050, AF2850
+ VM 1650H mechanical interlock unit

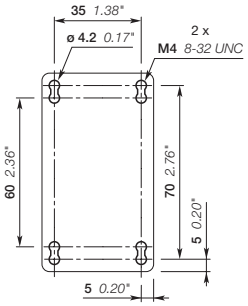
Main dimensions mm, inches

# AF09..K, AF12..K, AF16..K 3-pole contactors - with Push-in Spring terminals

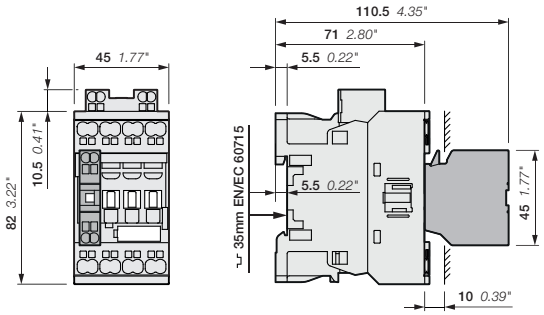
## Dimensions



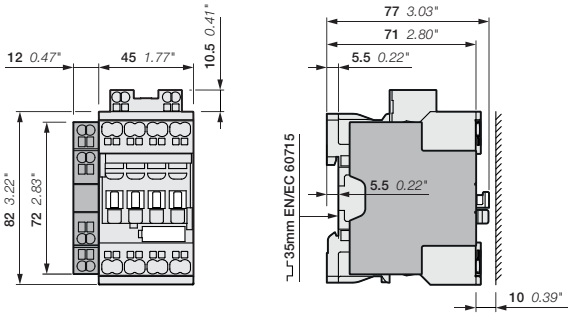

AF09..K, AF12..K, AF16..K



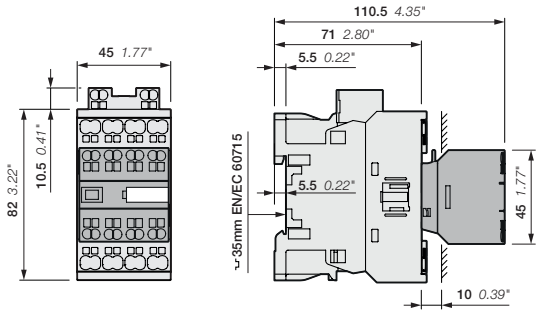

AF09..K, AF12..K, AF16..K



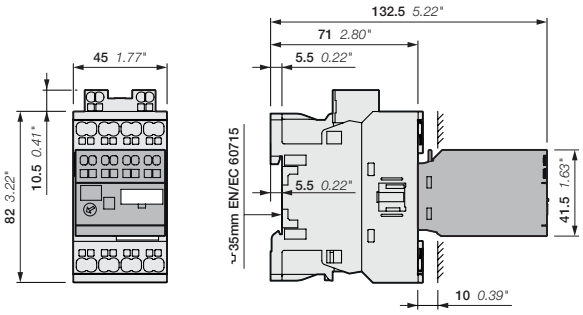

AF09..K, AF12..K, AF16..K
+ CA4..K 1-pole auxiliary contact block



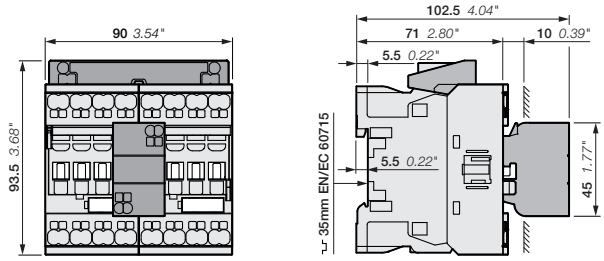

AF09..K, AF12..K, AF16..K
+ CAL4-11K 2-pole auxiliary contact block



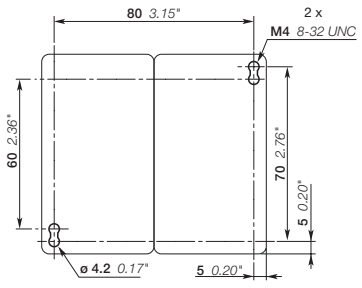

AF09..K, AF12..K, AF16..K
+ CA4..K 4-pole auxiliary contact block




AF09..K, AF12..K, AF16..K
+ TEF4S electronic timer




AF09..K, AF12..K, AF16..K
+ VEM4K mechanical and electrical interlock set



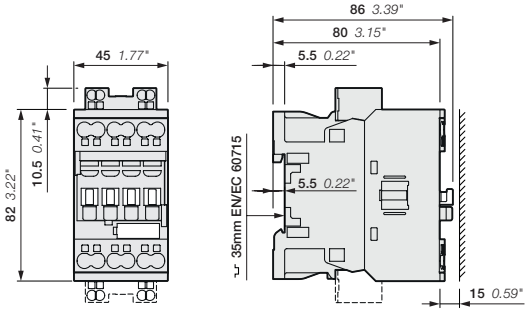

AF09..K, AF12..K, AF16..K
+ VEM4K mechanical and electrical interlock set

Note: For AF09..K ... AF16..K contactors, lateral distance to grounded component 2 mm 0.08" min
24 V DC operated contactor (coil 30) depth + 20 mm (0.79").

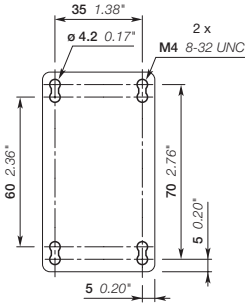
Main dimensions mm, inches

# AF26..K, AF30..K, AF38..K 3-pole contactors - with Push-in Spring terminals

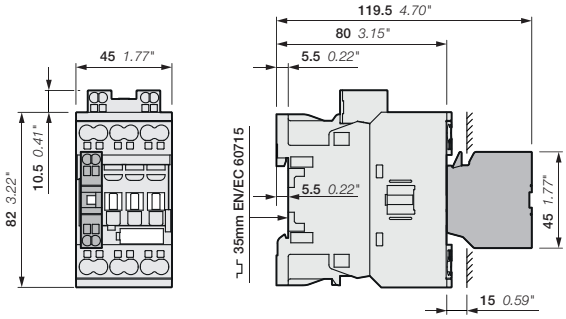
## Dimensions



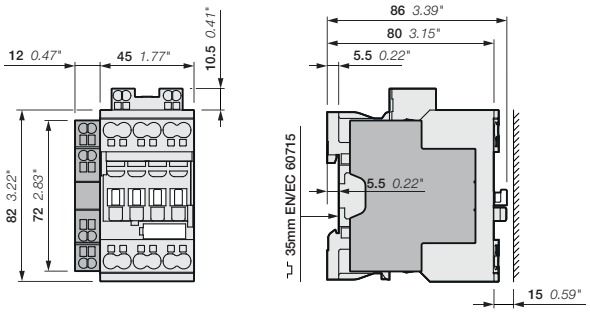

AF26..K, AF30..K, AF38..K



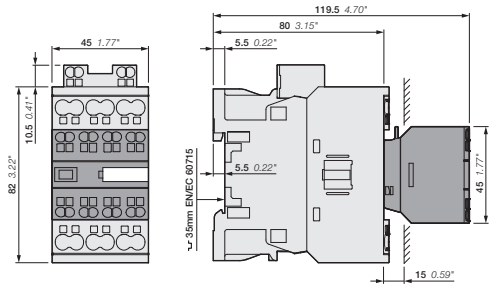

AF26..K, AF30..K, AF38..K



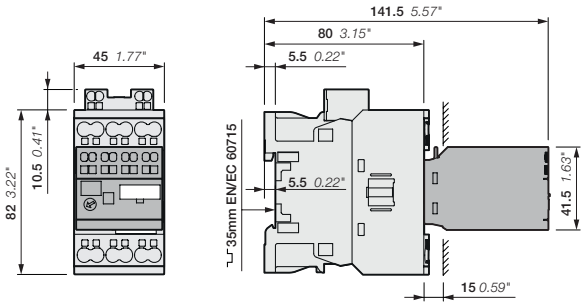

AF26..K, AF30..K, AF38..K
+ CA4..K 1-pole auxiliary contact block



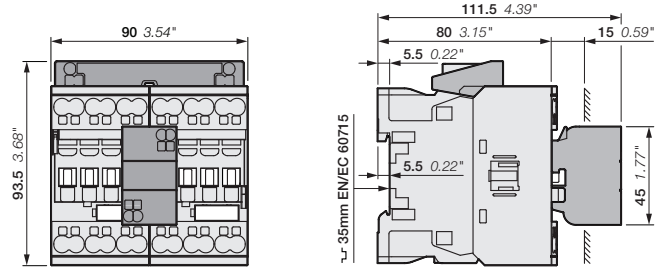

AF26..K, AF30..K, AF38..K
+ CAL4-11K 2-pole auxiliary contact block



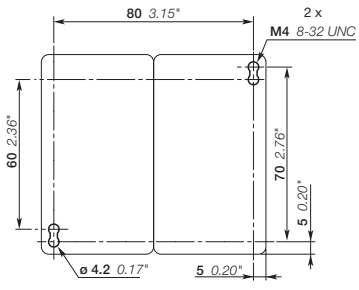

AF26..K, AF30..K, AF38..K
+ CA4..K 4-pole auxiliary contact block




AF26..K, AF30..K, AF38..K
+ TEF4S electronic timer




AF26..K, AF30..K, AF38..K
+ VEM4K mechanical and electrical interlock set

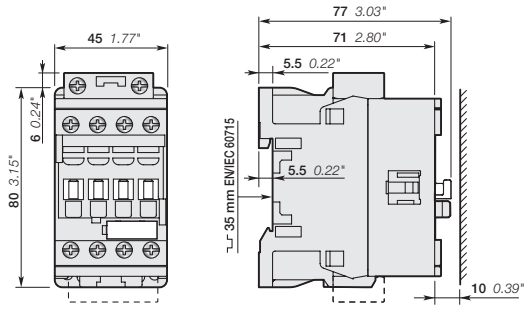



AF26..K, AF30..K, AF38..K
+ VEM4K mechanical and electrical interlock set

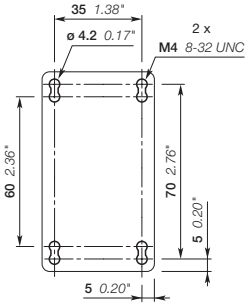
Note: For AF26..K ... AF38..K contactors, lateral distance to grounded component 2 mm 0.08" min
24 V DC operated contactor (coil 30) depth + 20 mm (0.79").

Main dimensions mm, inches

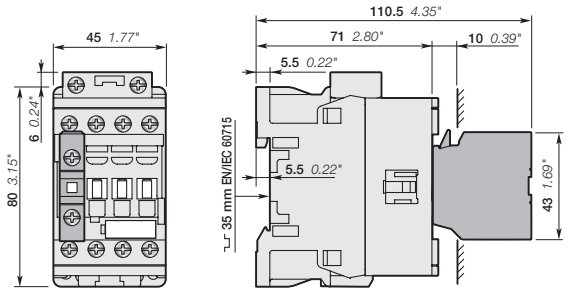
# AF09, AF16 4-pole contactors
## Dimensions



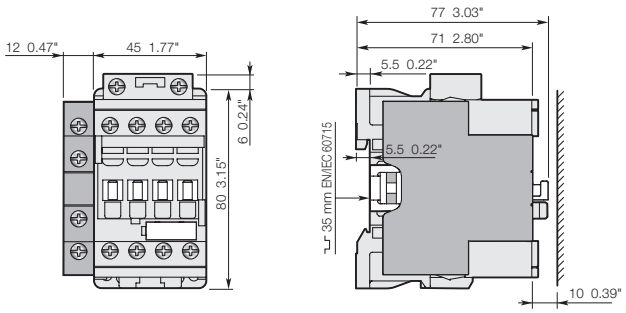

AF09, AF16



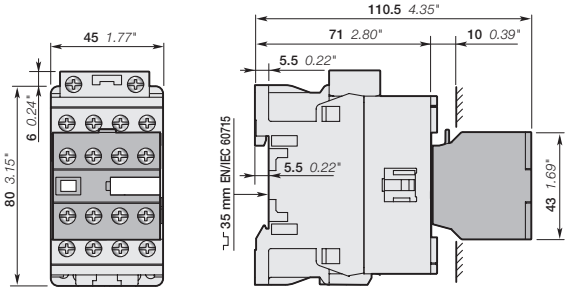

AF09, AF16



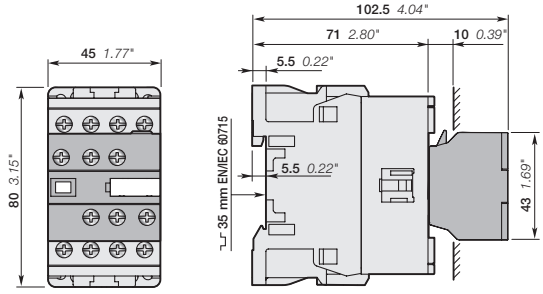

AF09, AF16
+ CA4, CC4 1-pole auxiliary contact block




AF09, AF16
+ CAL4-11 2-pole auxiliary contact block




AF09, AF16
+ CA4 4-pole auxiliary contact block

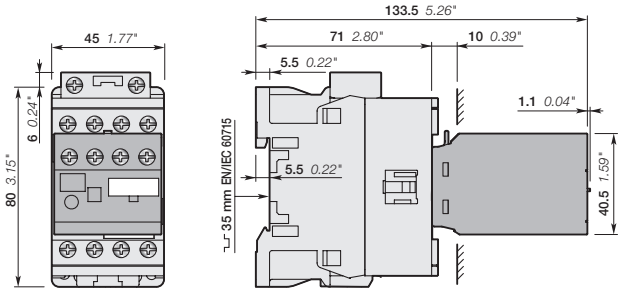



AF09, AF16
+ CAT4 2-pole auxiliary contact and coil terminal block

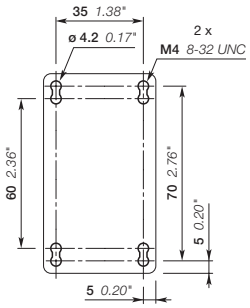
(1) Note: contactor lateral distance to grounded component 2 mm 0.08" min.
24 V DC operated contactor (coil 30) depth + 20 mm 0.79".

Main dimensions mm, inches (1)

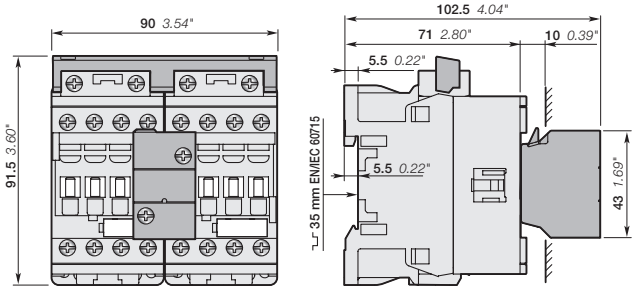
# AF09, AF16 4-pole contactors
## Dimensions



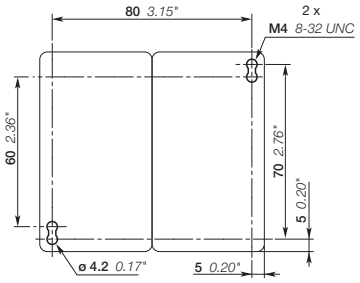

AF09, AF16
+ TEF4 electronic timer




AF09, AF16




AF09..-40-00, AF16..-40-00
+ VEM4 mechanical and electrical interlock set

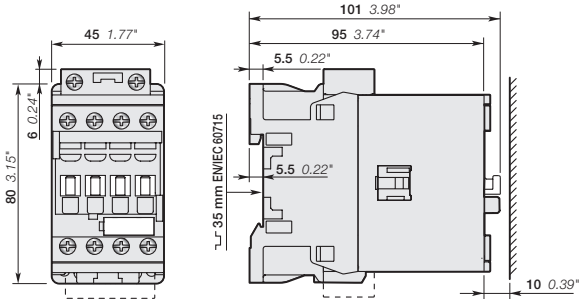



AF09..-40-00, AF16..-40-00
+ VEM4 mechanical and electrical interlock set

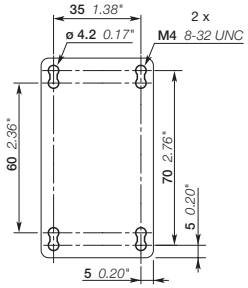
(1) Note: For AF09 and AF16 contactors lateral distance to grounded component 2 mm 0.08" min.
24 V DC operated contactor (coil 30) depth + 20 mm 0.79".

Main dimensions mm, inches (1)

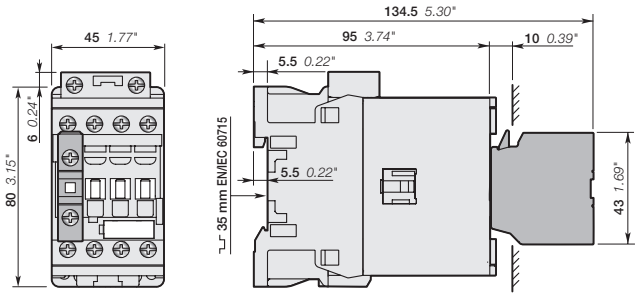
# AF26, AF38 4-pole contactors
## Dimensions



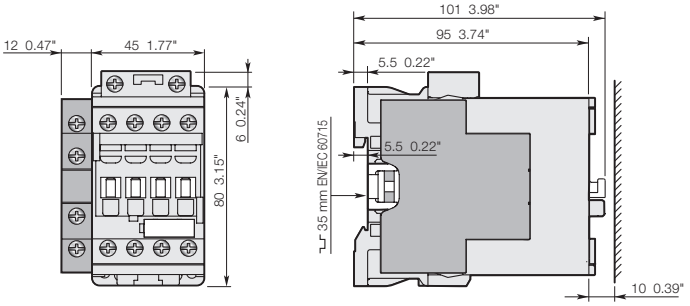

AF26, AF38



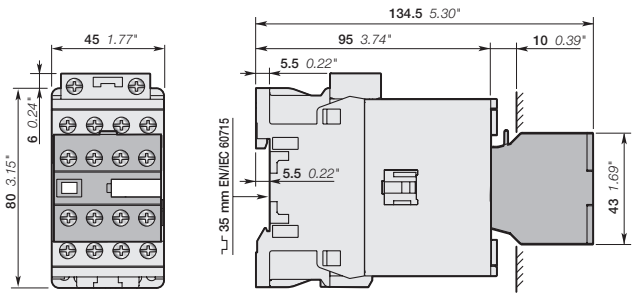

AF26, AF38



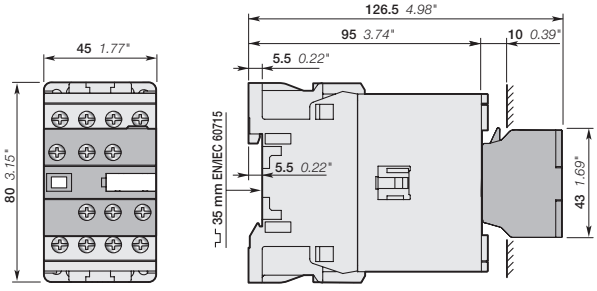

AF26, AF38
+ CA4, CC4 1-pole auxiliary contact block




AF26, AF38
+ CAL4-11 2-pole auxiliary contact block




AF26, AF38
+ CA4 4-pole auxiliary contact block



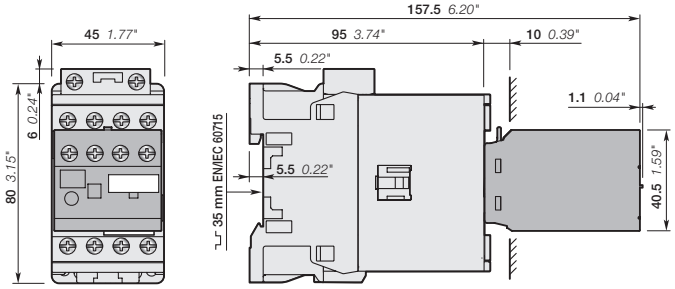

AF26, AF38
+ CAT4 2-pole auxiliary contact and coil terminal block

Note: For AF26 and AF38 contactors, lateral distance to grounded component 2 mm 0.08" min.
24 V DC operated contactor (coil 30) depth + 20 mm 0.79".

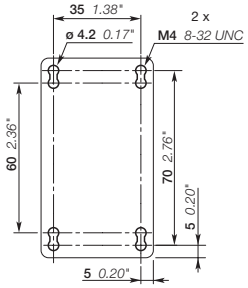
Main dimensions mm, inches

# AF26, AF38 4-pole contactors

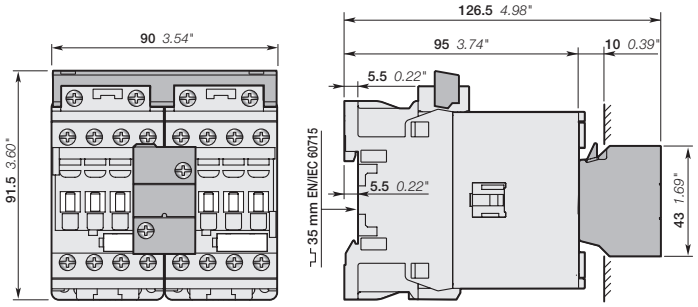
## Dimensions



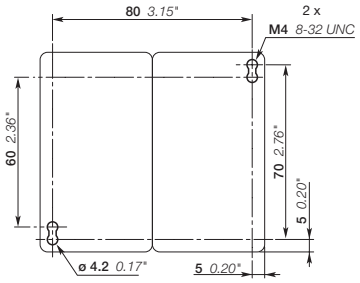

AF26, AF38
+ TEF4 electronic timer




AF26, AF38




AF26..-40-00, AF38..-40-00
+ VEM4 mechanical and electrical interlock set

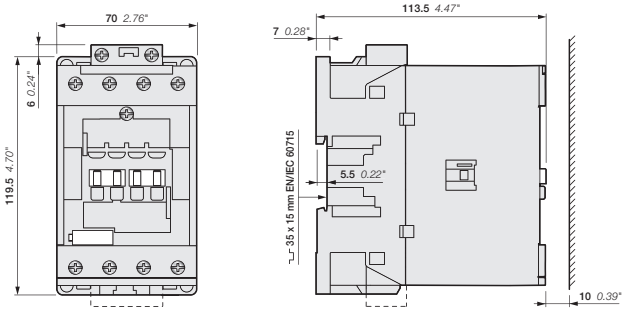



AF26..-40-00, AF38..-40-00
+ VEM4 mechanical and electrical interlock set

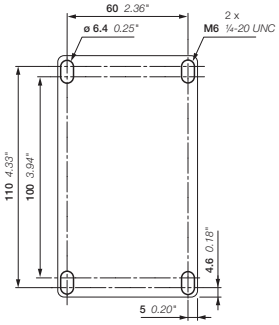
(1) Note: For AF26 and AF38 contactors, lateral distance to grounded component 2 mm 0.08" min.
24 V DC operated contactor (coil 30) depth + 20 mm 0.79".

Main dimensions mm, inches (1)

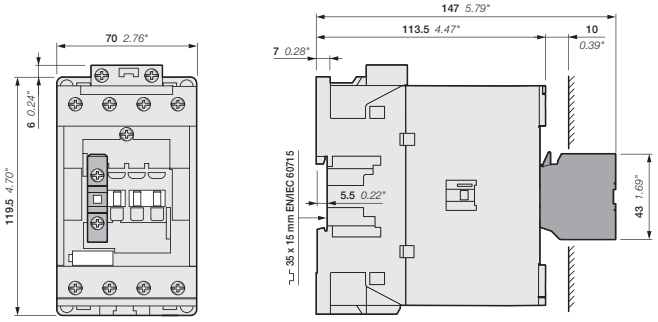
# AF40, AF52 4-pole contactors
## Dimensions



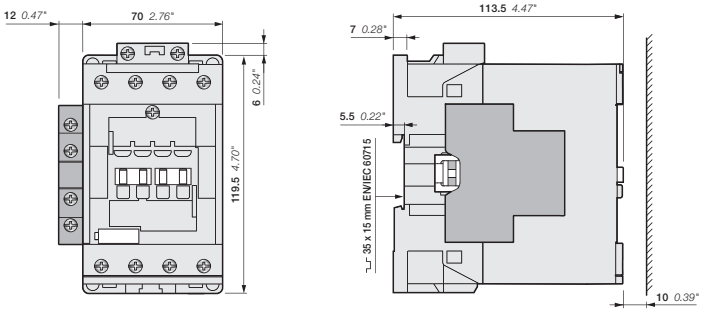

AF40, AF52



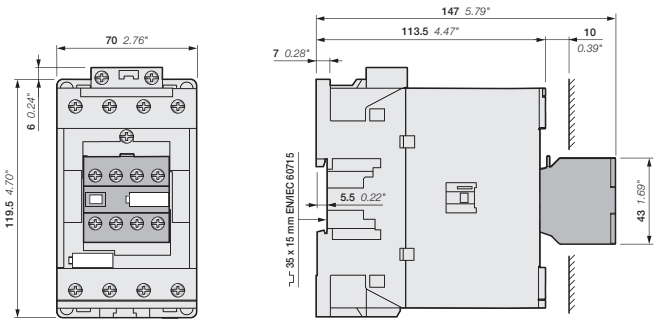

AF40, AF52



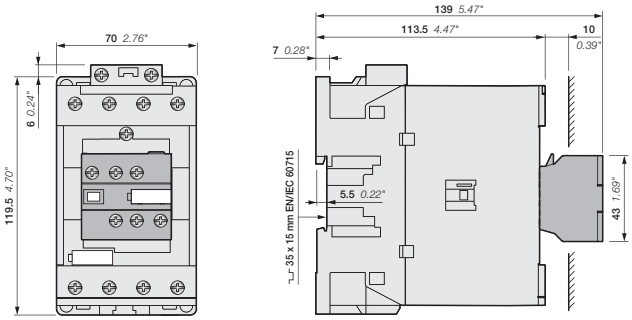

AF40, AF52
+ CA4, CC4 1-pole auxiliary contact block




AF40, AF52
+ CAL4-11 2-pole auxiliary contact block



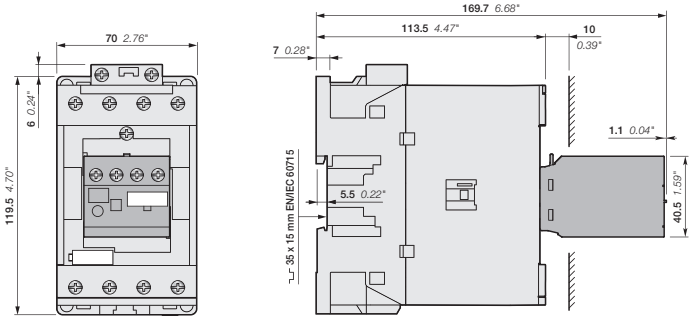

AF40, AF52
+ CA4 4-pole auxiliary contact block



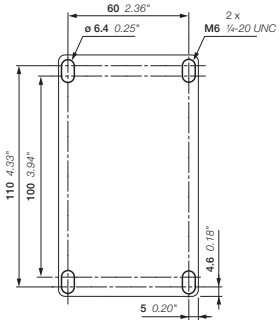

AF40, AF52
+ CAT4 2-pole auxiliary contact and coil terminal block

Main dimensions mm, inches

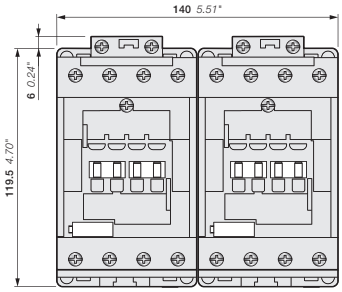
# AF40, AF52 4-pole contactors
## Dimensions



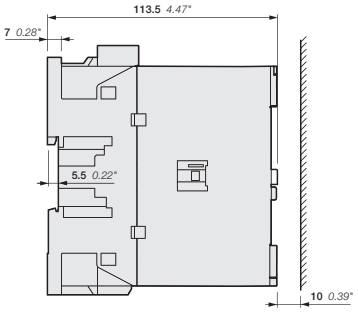

AF40, AF52
+ TEF4 electronic timer

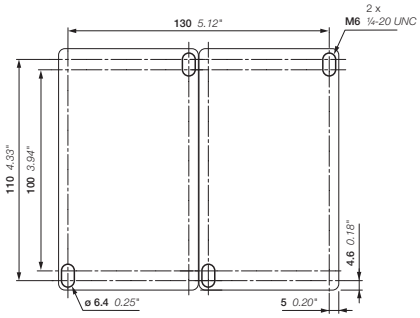



AF40, AF52




AF40, AF52
+ VM96-4 mechanical interlock unit



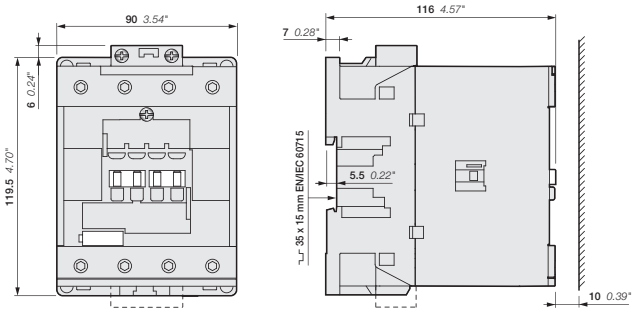




AF40, AF52
+ VM96-4 mechanical interlock unit

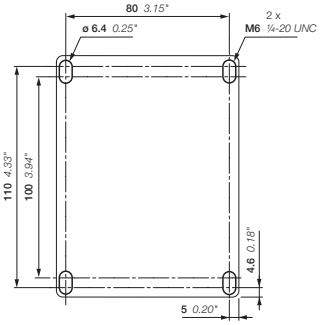
Main dimensions mm, inches

# AF80 4-pole contactors

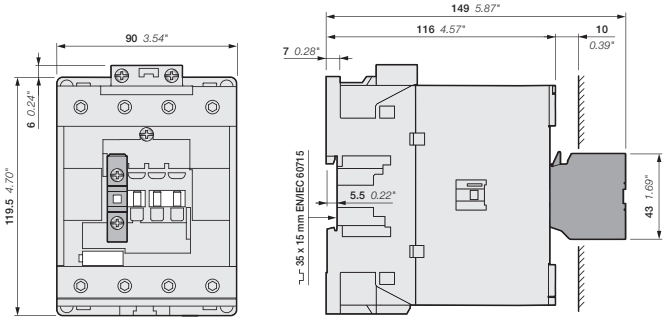
## Dimensions



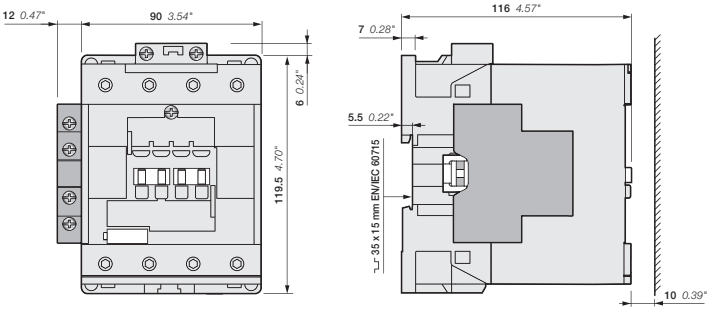

AF80



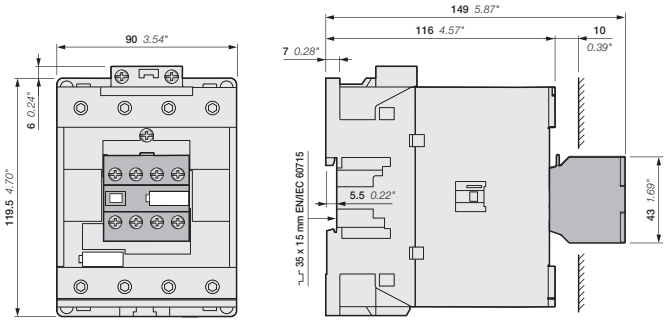

AF80



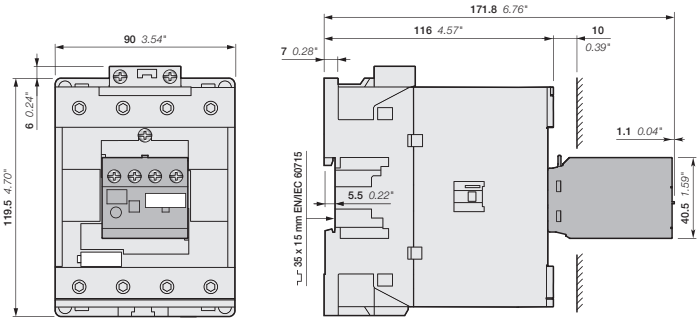

AF80
+ CA4, CC4 1-pole auxiliary contact block




AF80
+ CAL4-11 2-pole auxiliary contact block




AF80
+ CA4 4-pole auxiliary contact block

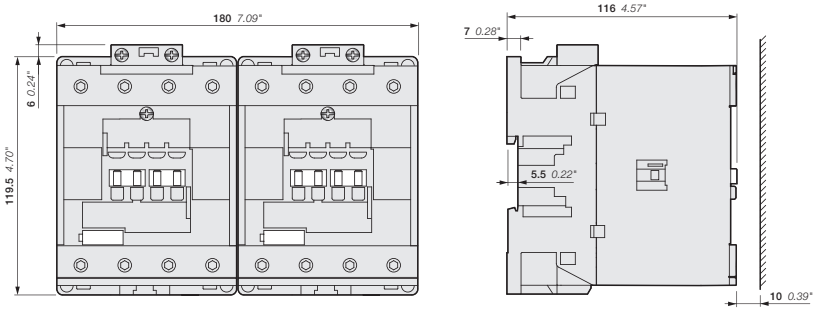



AF80
+ TEF4 Electronic timer

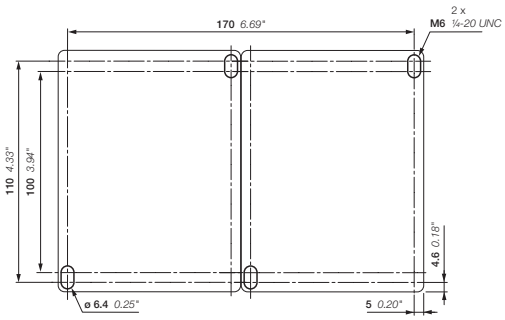
Main dimensions mm, inches

# AF80 4-pole contactors

## Dimensions



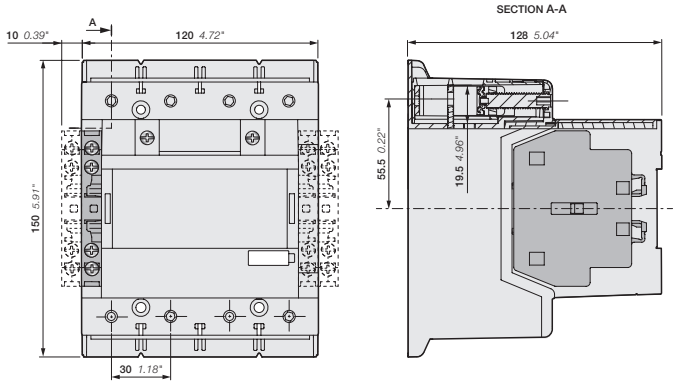

AF80
+ VM96-4 mechanical interlock unit



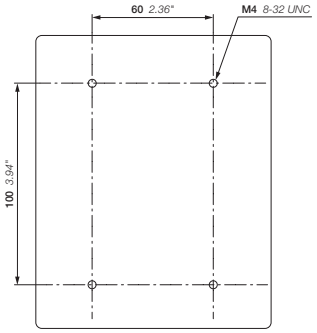

AF80
+ VM96-4 mechanical interlock unit

Main dimensions mm, inches

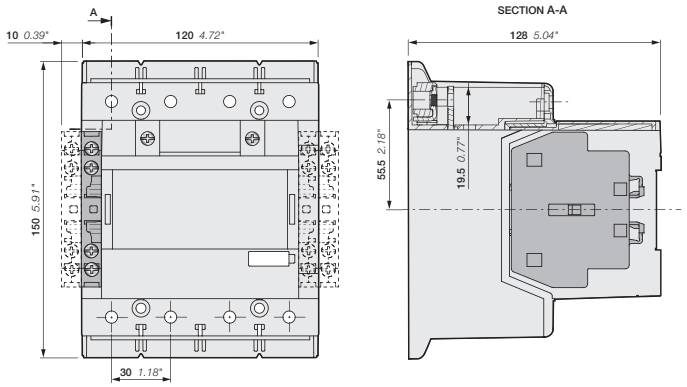
# AF116, AF140 4-pole contactors
## Dimensions



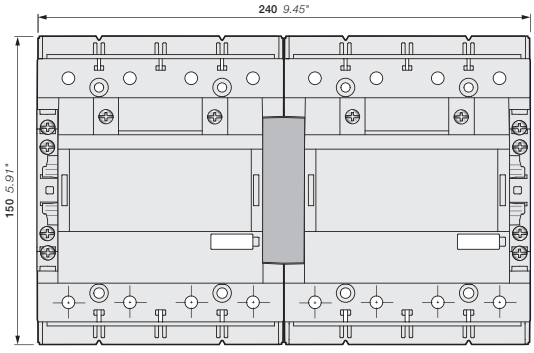

AF116, AF140-40-00 + CAL19 2-pole auxiliary contact block
AF116, AF140-40-11

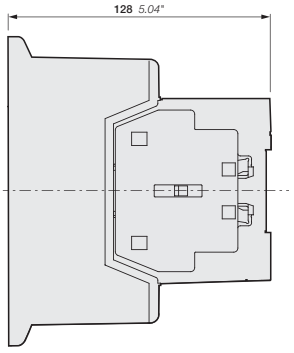



AF116, AF140-40-..(B)

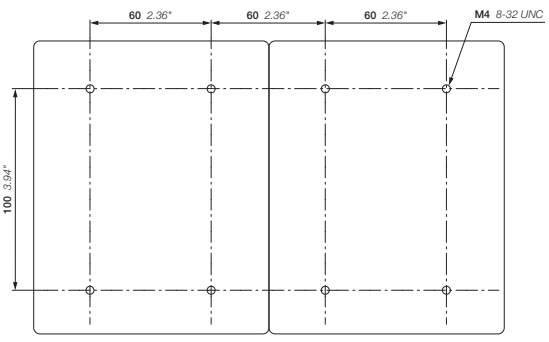



AF116, AF140-40-00B + CAL19 2-pole auxiliary contact block
AF116, AF140-40-11B




AF116, AF140-40-11
+ VM19 mechanical interlocking unit

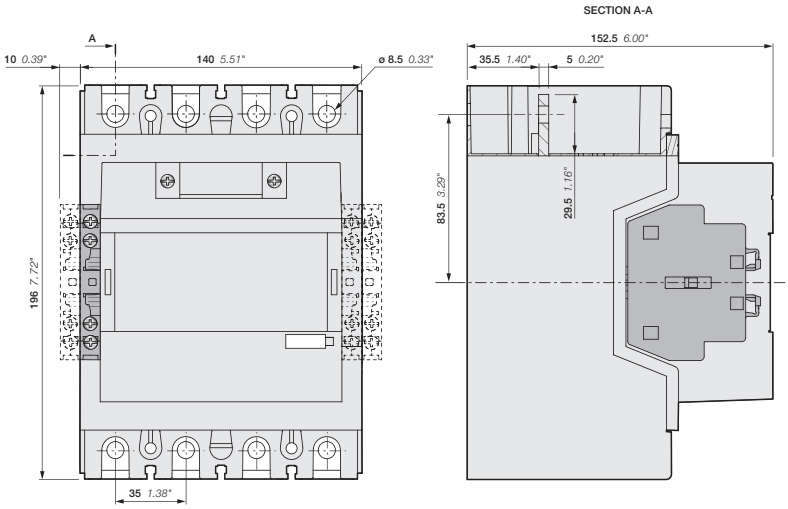



AF116, AF140
+ VM19 mechanical interlocking unit

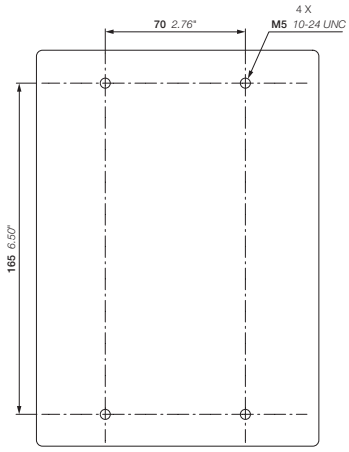
Main dimensions mm, inches

# AF190, AF205 4-pole contactors

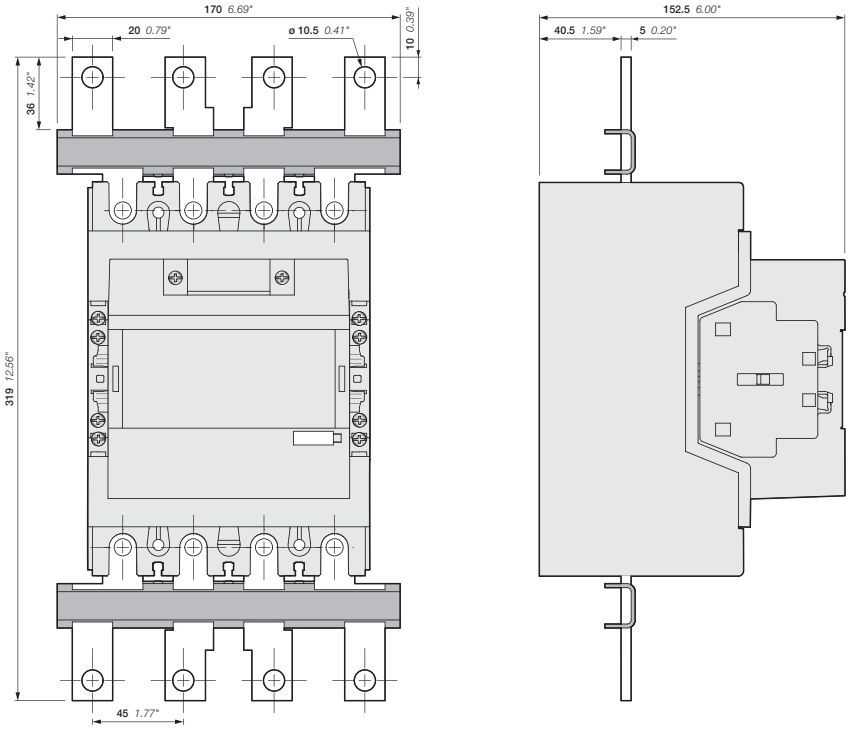
## Dimensions




AF190, AF205-40-00 + CAL19 2-pole auxiliary contact block
AF190, AF205-40-11



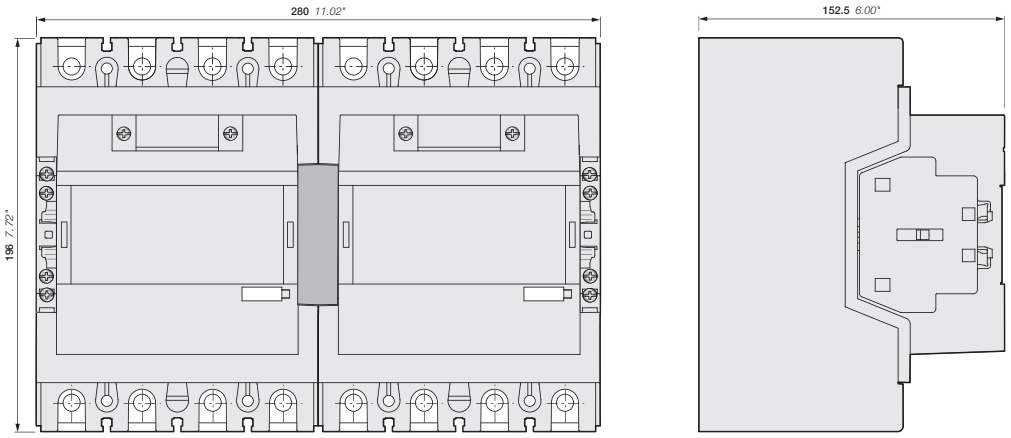

AF190, AF205-40



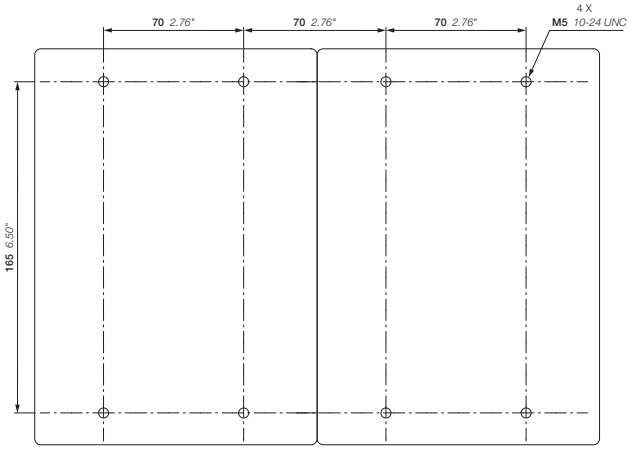

AF190, AF205-40-11
+ LW205-40 terminal enlargement

Main dimensions mm, inches

# AF190, AF205 4-pole contactors
## Dimensions




AF190, AF205-40-11
+ VM19 mechanical interlocking unit

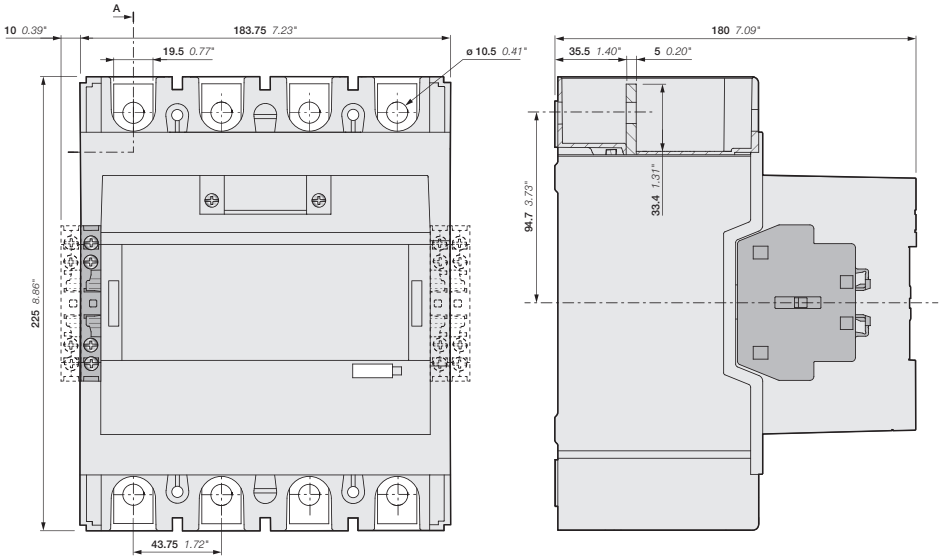



AF190, AF205
+ VM19 mechanical interlocking unit

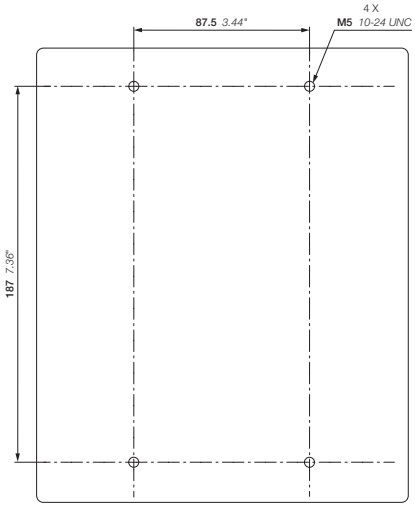
Main dimensions mm, inches

# AF265, AF305, AF370 4-pole contactors

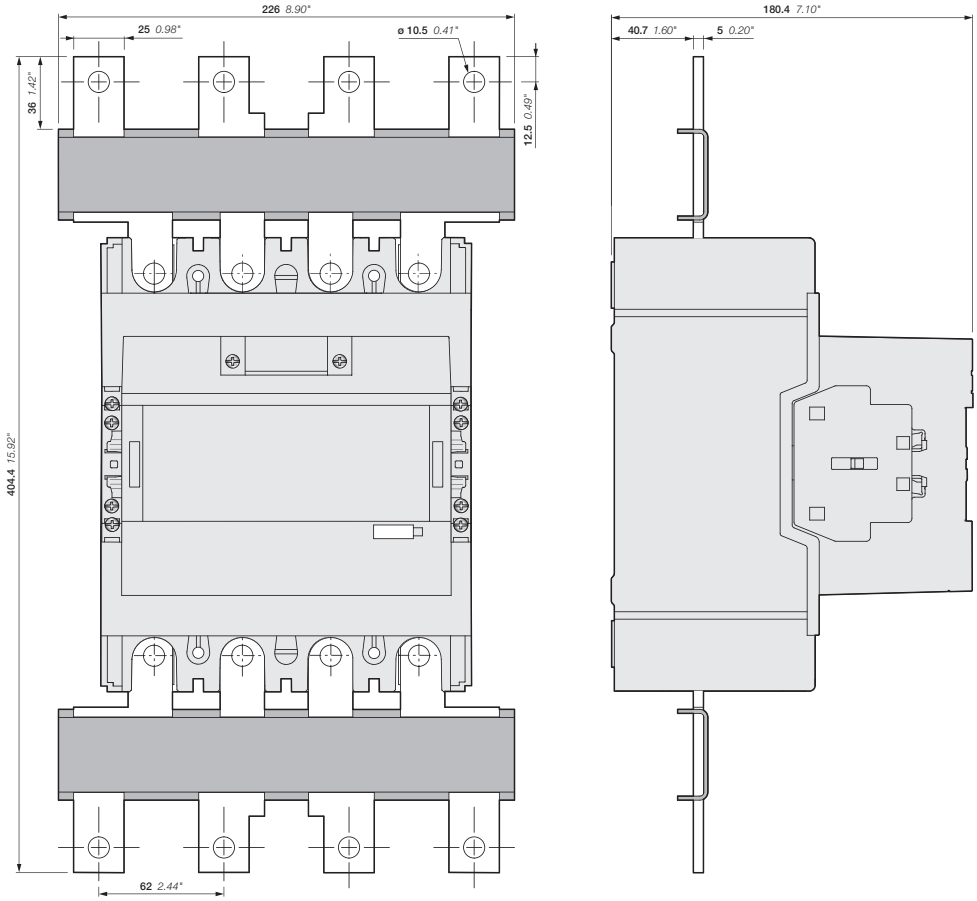
## Dimensions




AF265, AF305, AF370-40-00 + CAL19 2-pole auxiliary contact block
AF265, AF305, AF370-40-11



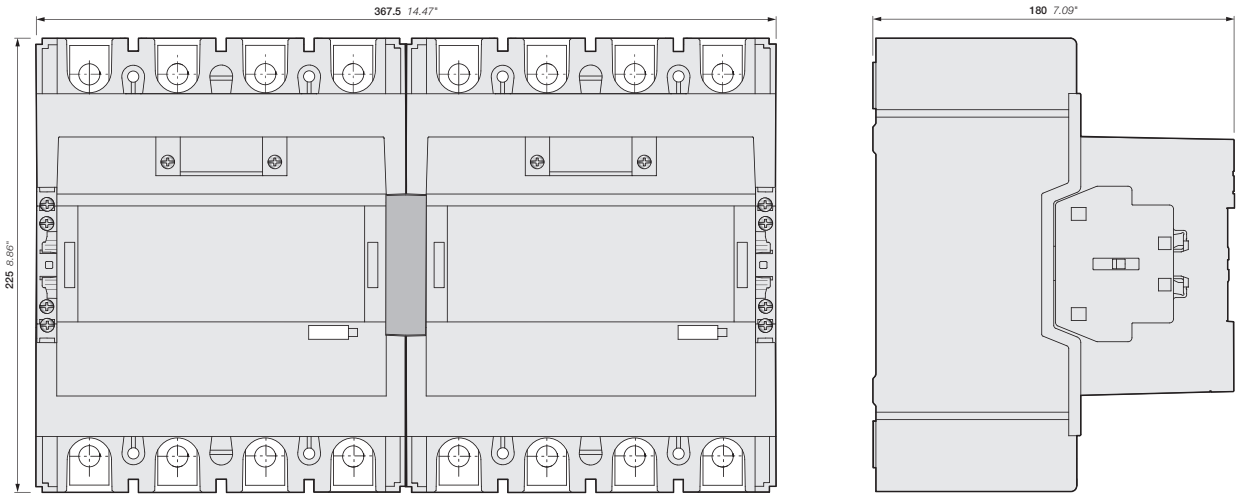

AF265, AF305, AF370



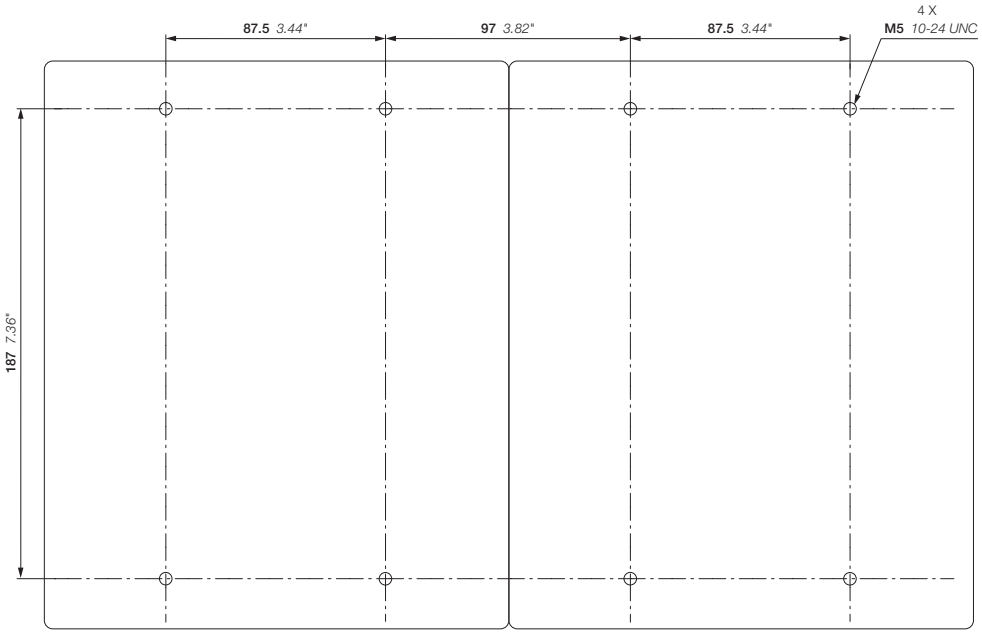

AF265, AF305, AF370-40-11
+ LW370-40 terminal enlargement

Main dimensions mm, inches

# AF265, AF305, AF370 4-pole contactors
## Dimensions




AF265, AF305, AF370-40-11
+ VM19 mechanical interlocking unit

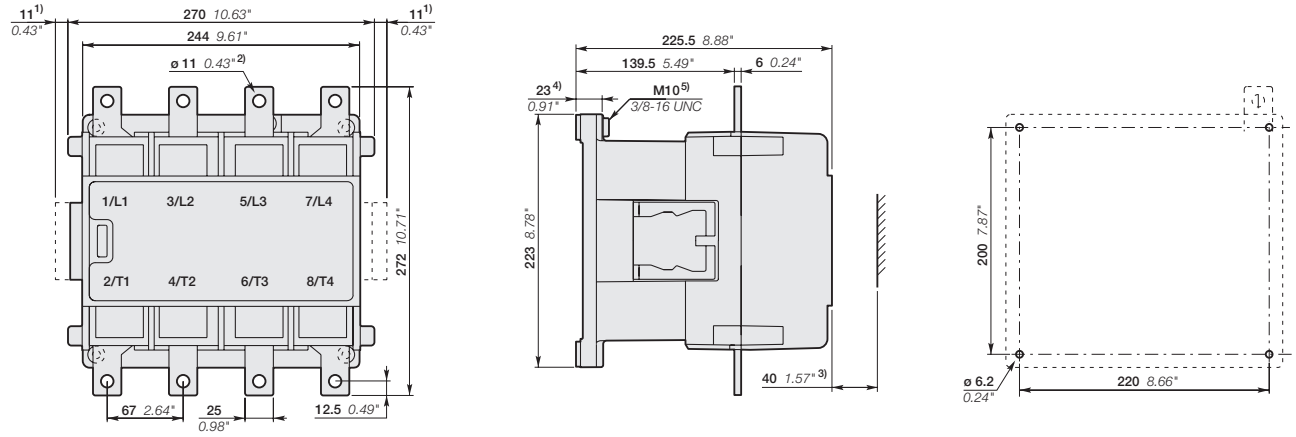



AF265, AF305, AF370
+ VM19 mechanical interlocking unit

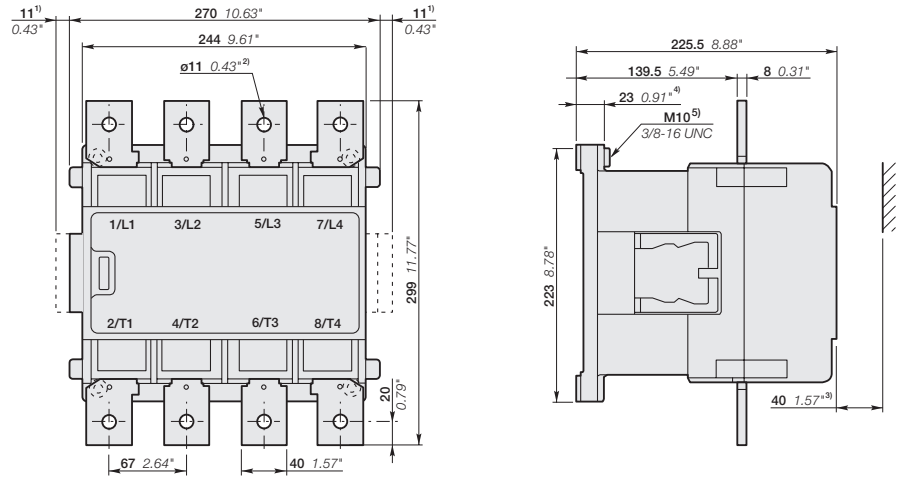
Main dimensions mm, inches

# EK550, EK1000 4-pole contactors AC operated

## Dimensions

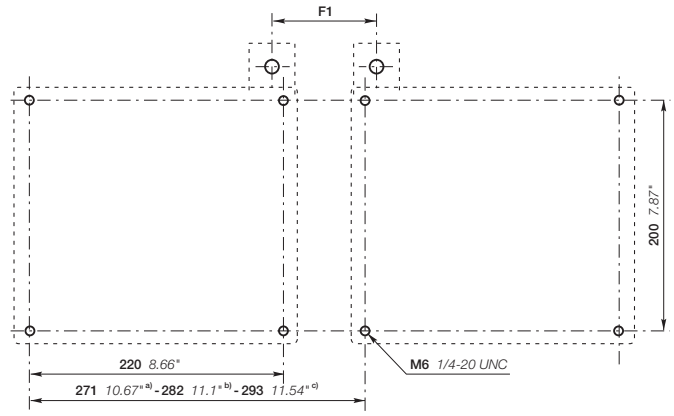



EK550




EK1000

1) Dimension for extra auxiliary contact block
2) Screw, nut and washer by-packed
3) Min. distance to uninsulated wall
4) Damping elements are included
5) Earthing screw



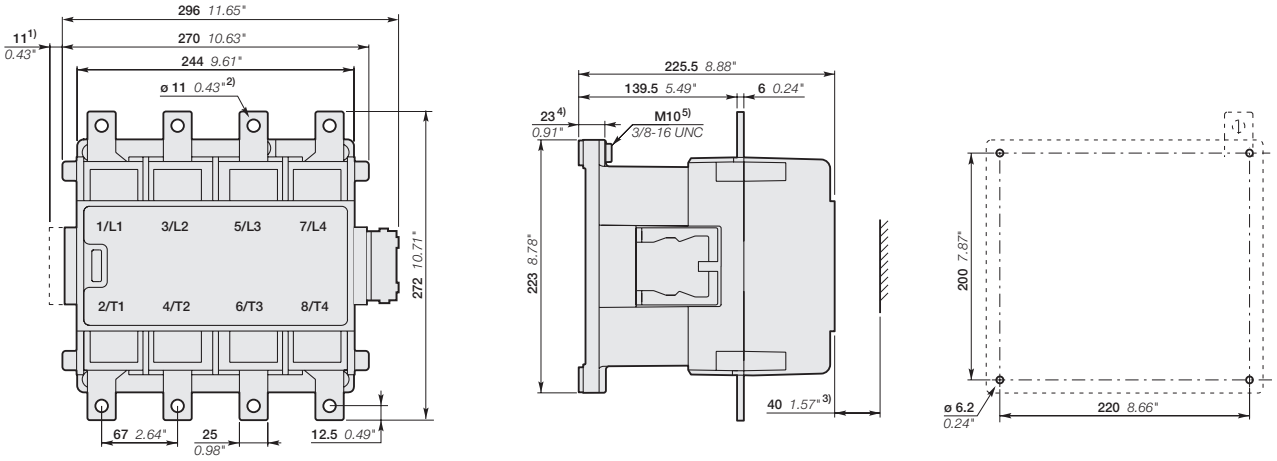

EK1000

a) Min. dim Makes distance F1 = 70
b) Includes space for three auxiliary contact blocks between the contactors
c) Includes space for four auxiliary contact blocks between the contactors

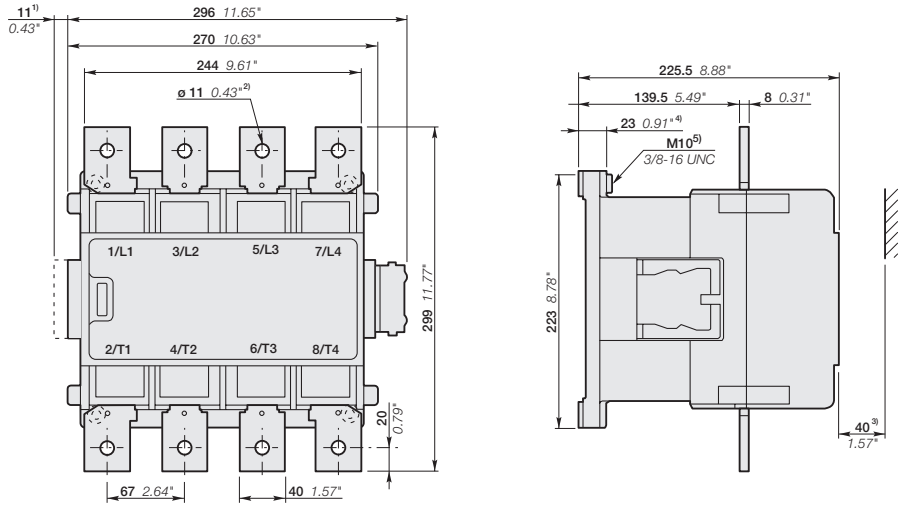
Main dimensions mm, inches

# EK550, EK1000 4-pole contactors DC operated

## Dimensions

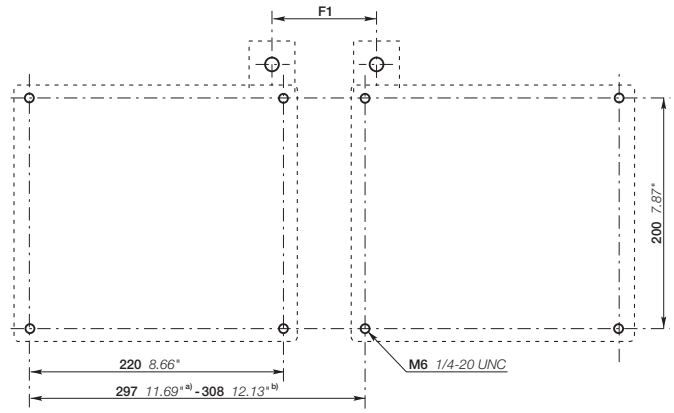



EK550




EK1000

1) Dimension for extra auxiliary contact block
2) Screw, nut and washer by-packed
3) Min. distance to uninsulated wall
4) Damping elements are included
5) Earthing screw



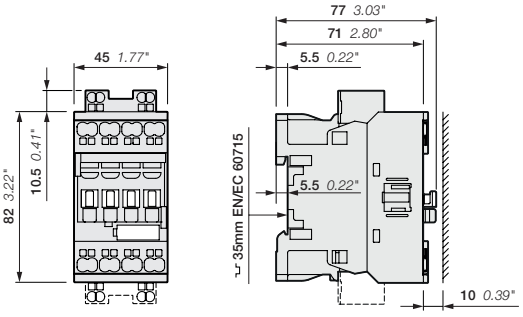

EK1000

a) Min. dim.
b) Includes space for two auxiliary contact blocks and the dc-unit between the contactors

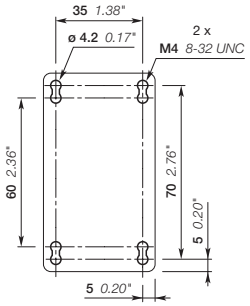
Main dimensions mm, inches

# AF09..K ... AF16..K 4-pole contactors - with Push-in Spring terminals

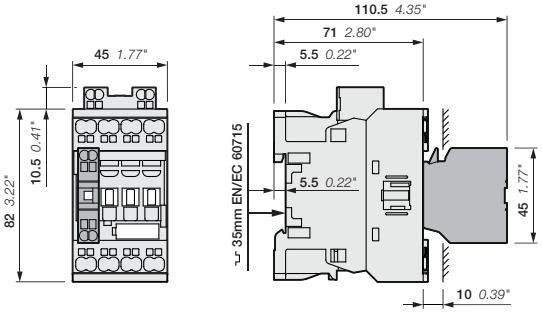
## Dimensions



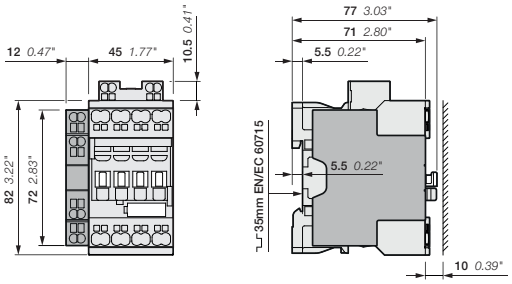

AF09..K ... AF16..K



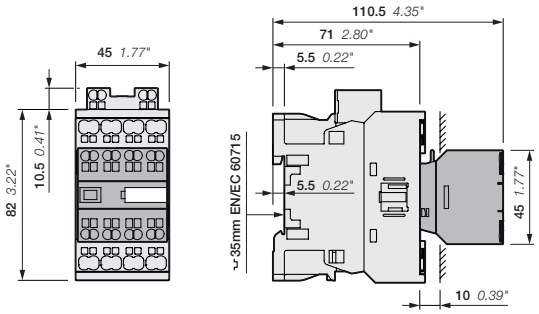

AF09..K ... AF16..K



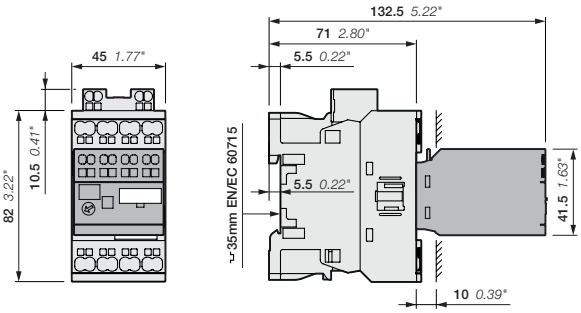

AF09..K ... AF16..K
+ CA4..K 1-pole auxiliary contact block



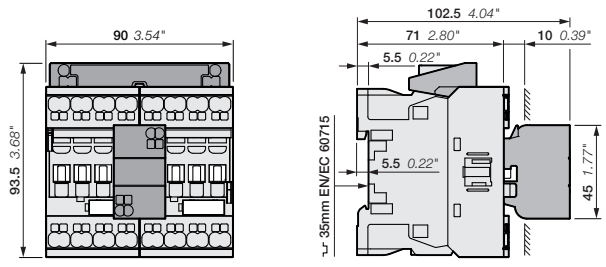

AF09..K ... AF16..K
+ CAL4-11K 2-pole auxiliary contact block



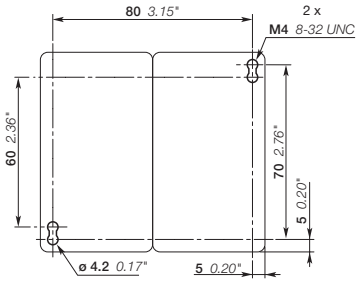

AF09..K ... AF16..K
+ CA4..K 4-pole auxiliary contact block




AF09..K ... AF16..K
+ TEF4S electronic timer




AF09..-40-00K, AF16..-40-00K
+ VEM4K mechanical and electrical interlock set




AF09..-40-00K, AF16..-40-00K
+ VEM4K mechanical and electrical interlock set

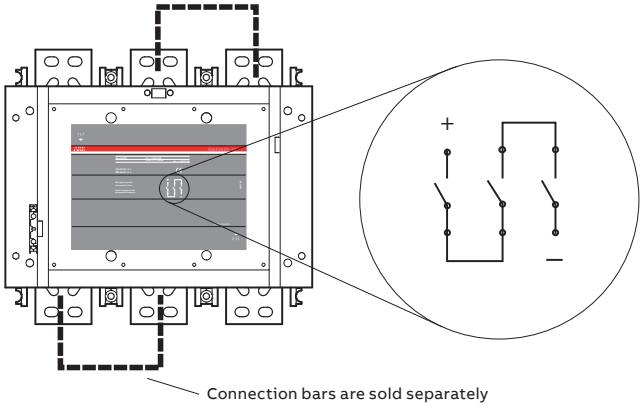
Note: For AF09..K and AF16..K contactors, lateral distance to grounded component 2 mm 0.08" min.

Main dimensions mm, inches

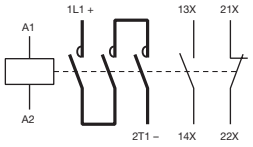
# GAF460 ... GAF2050 contactors
## Terminal marking and positioning



### GAF460 ... GAF2050 contactors - AC / DC operated



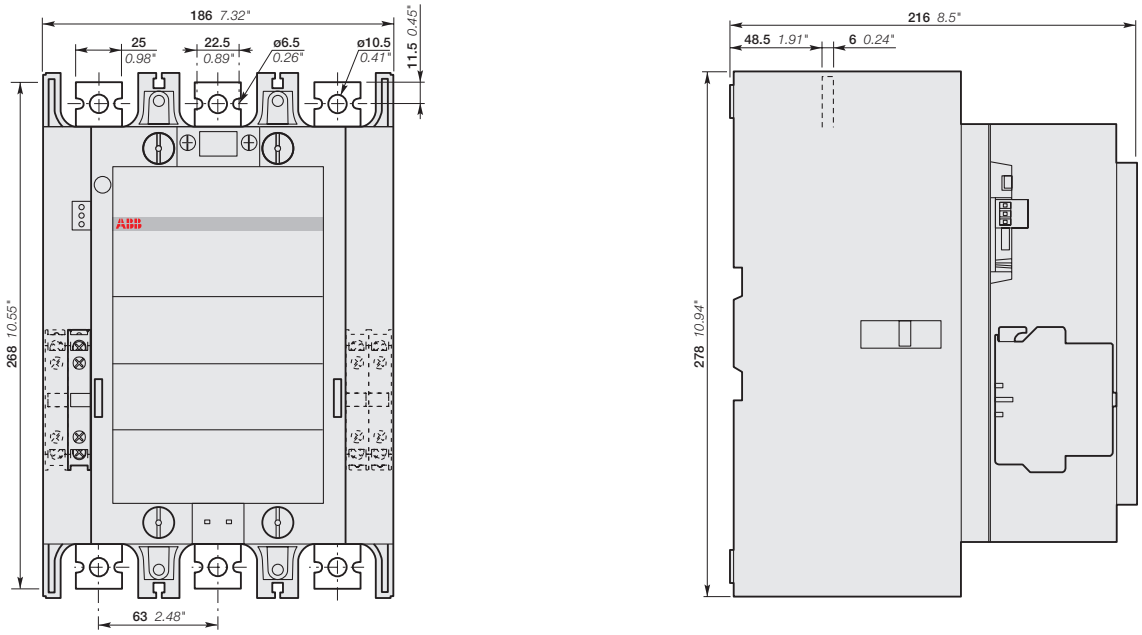

GAF460 ... GAF2050-10-11



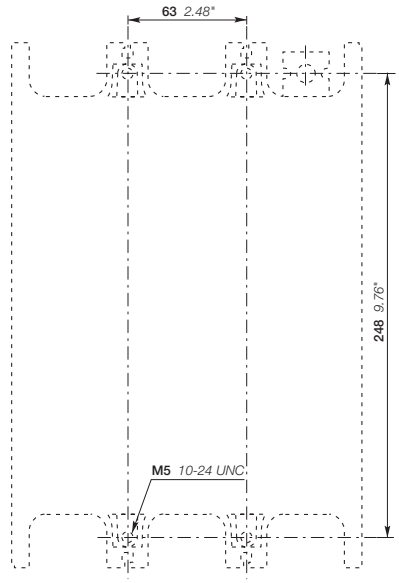

GAF460 ... GAF2050-10-11

# GAF460 3-pole contactor

## Dimensions



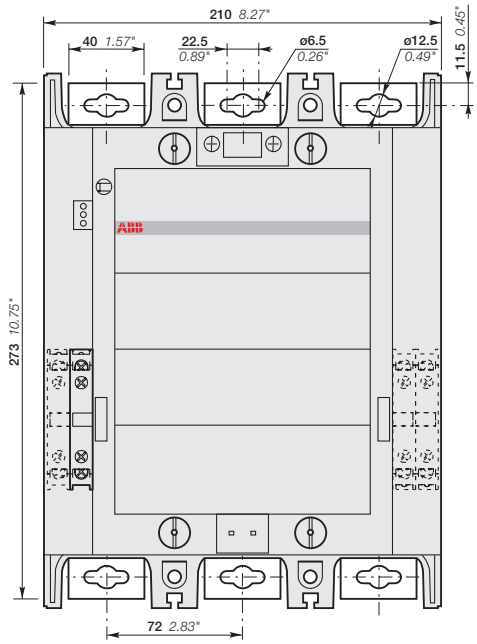

GAF460-30-11



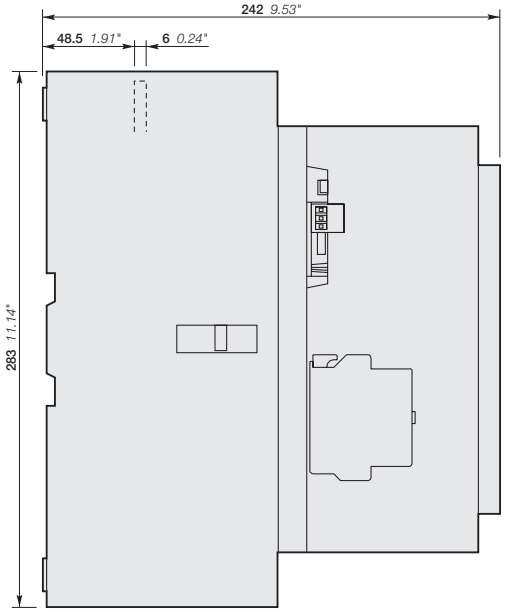

Main dimensions mm, inches

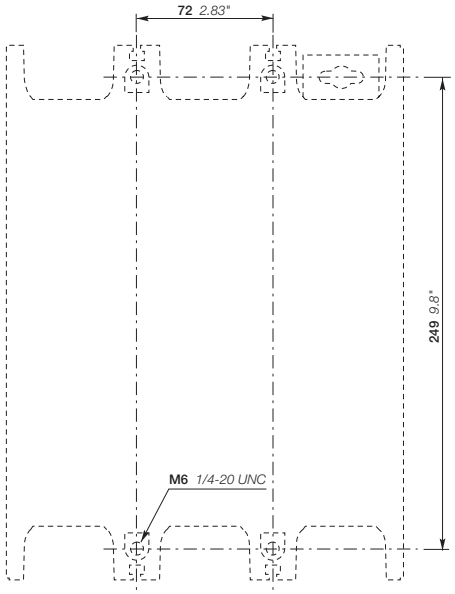
# GAF750 3-pole contactor

## Dimensions




GAF750-30-11

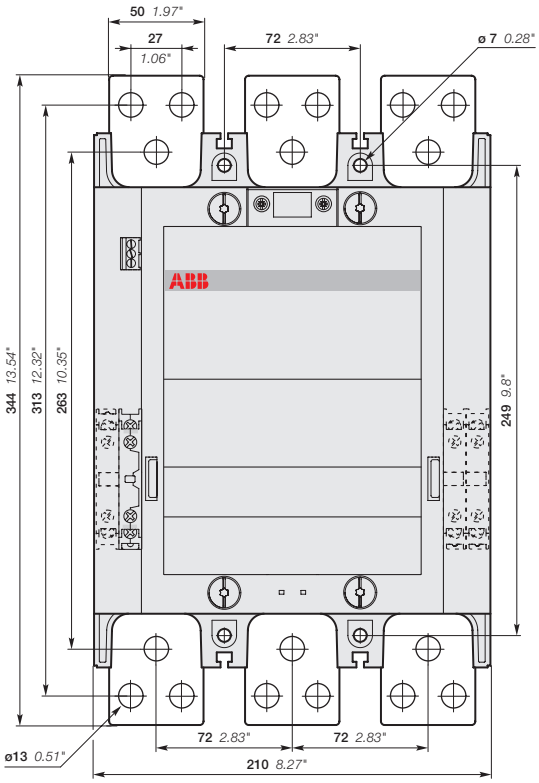


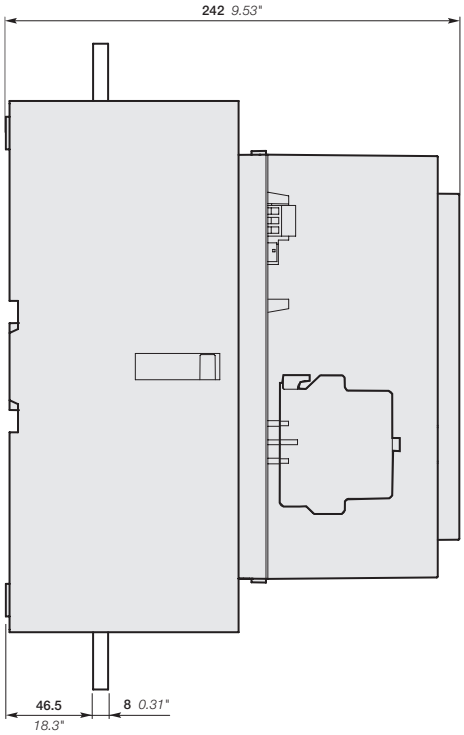

Main dimensions mm, inches

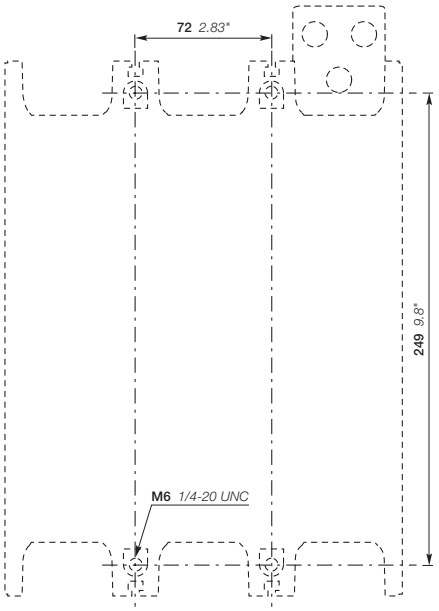
# GAF1250 3-pole contactor

## Dimensions




GAF1250-30-11

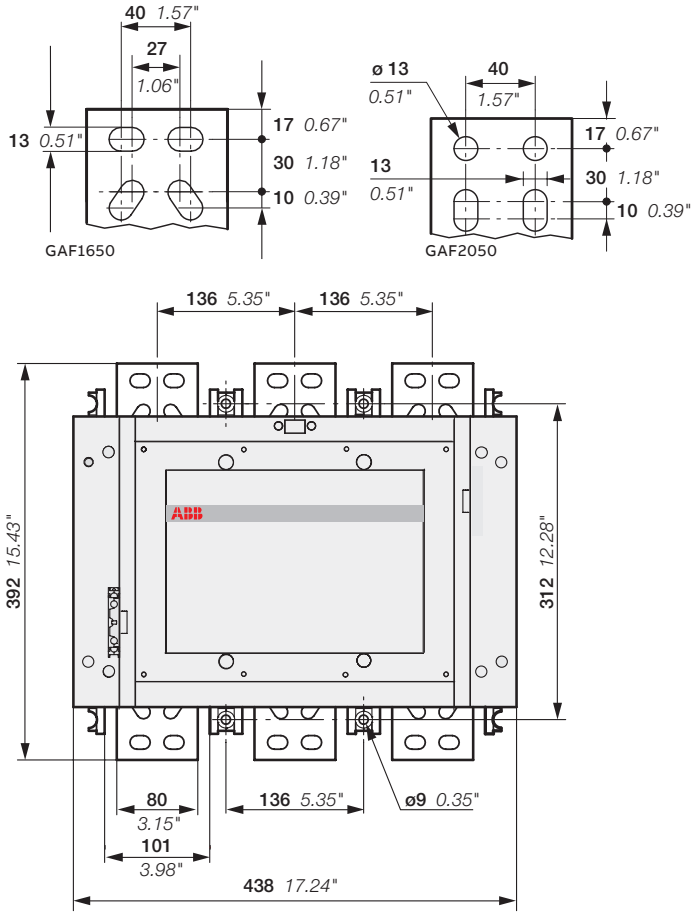


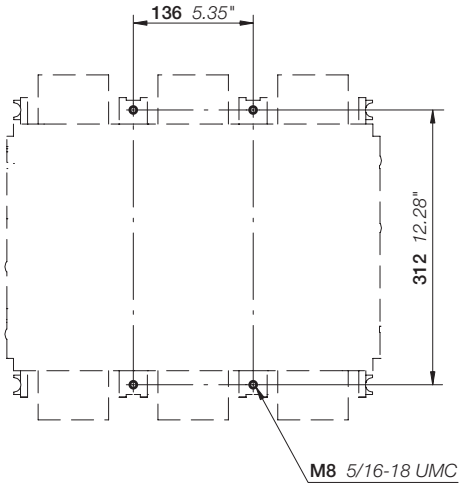

Main dimensions mm, inches

# GAF1650, GAF2050 3-pole contactor

## Dimensions



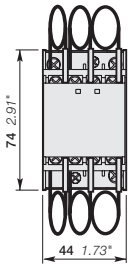

GAF1650, GAF2050-30-11

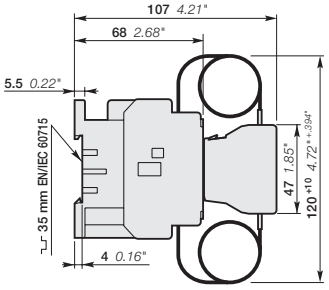


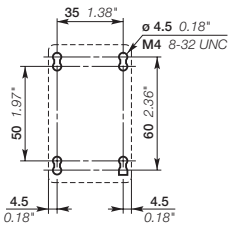

Main dimensions mm, inches

# UA..RA 3-pole contactors for capacitor switching

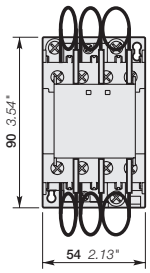
## Unlimited peak current Î

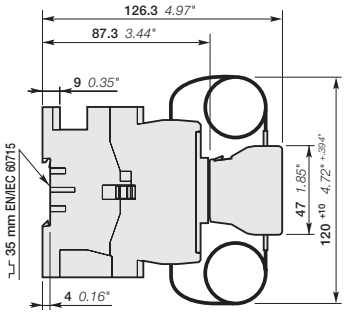


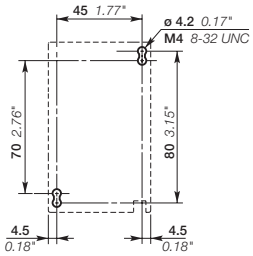



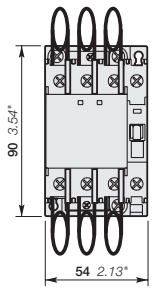

UA16..RA

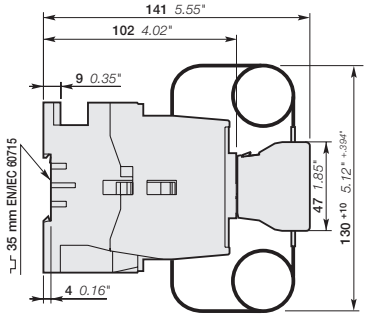


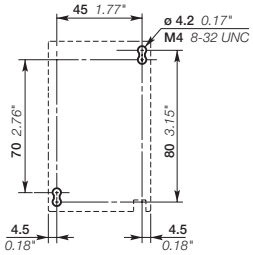



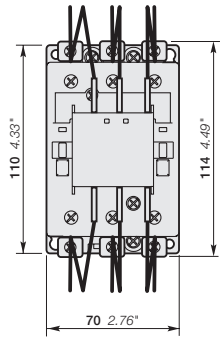

UA26..RA

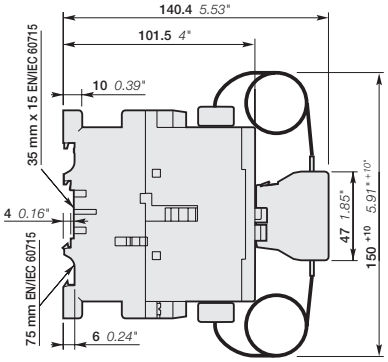


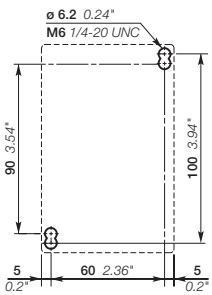




UA30..RA



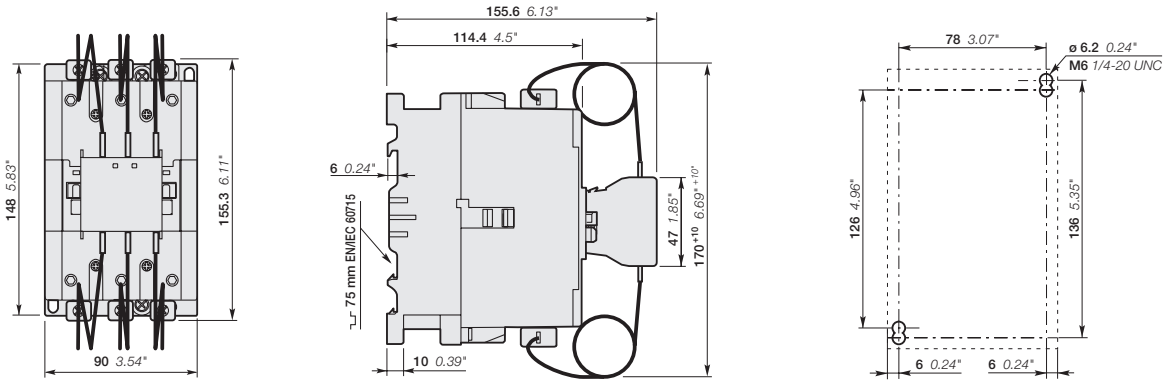




UA50..RA, UA63..RA, UA75..RA

Main dimensions mm, inches

# UA..RA 3-pole contactors for capacitor switching

## Unlimited peak current Î

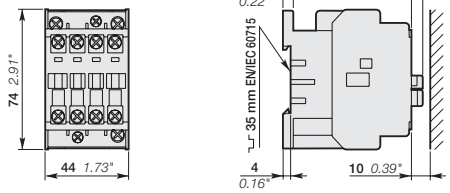



UA95..RA, UA110..RA

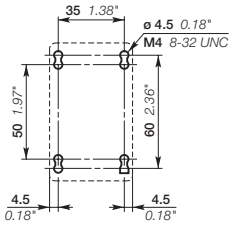
Main dimensions mm, inches

# UA.. 3-pole contactors for capacitor switching

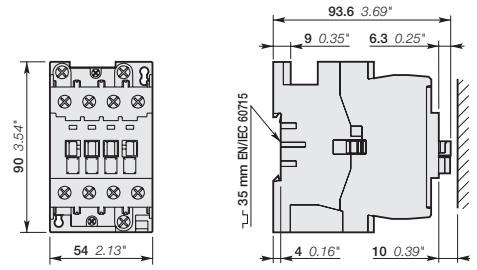
## Dimensions



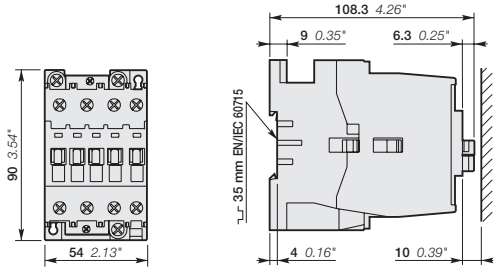

UA16



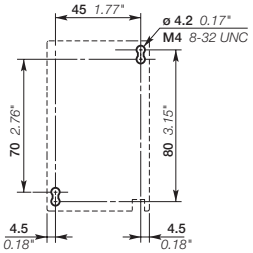

UA16 drilling plan



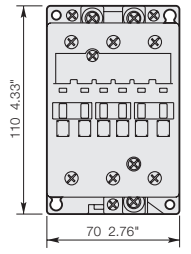

UA26



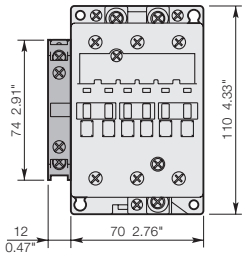

UA30



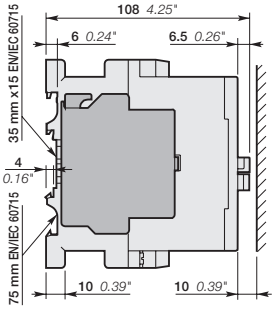

UA26, UA30 drilling plan

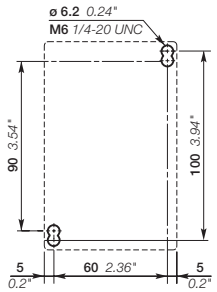



UA50, UA63, UA75-30-00

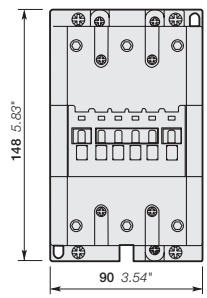



UA50, UA63, UA75-30-11

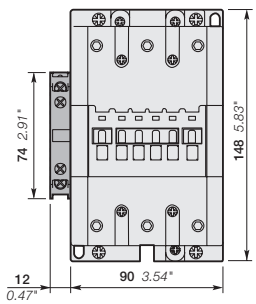


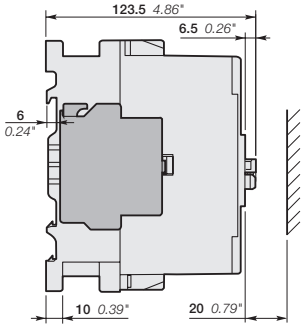

Drilling plan

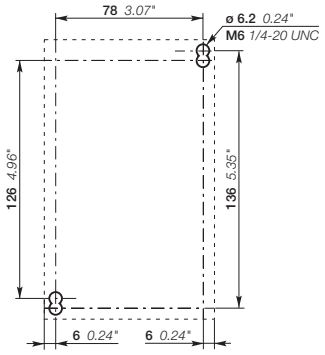



UA95, UA110-30-00




UA95, UA110-30-11



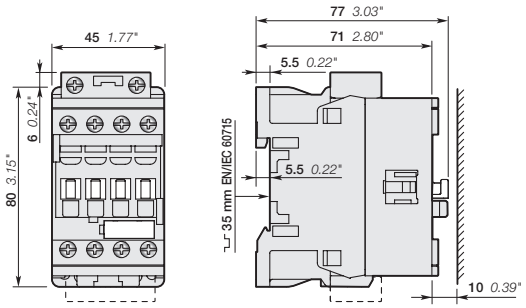




Drilling plan

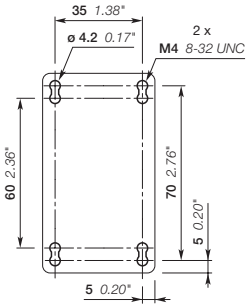
Main dimensions mm, inches

03

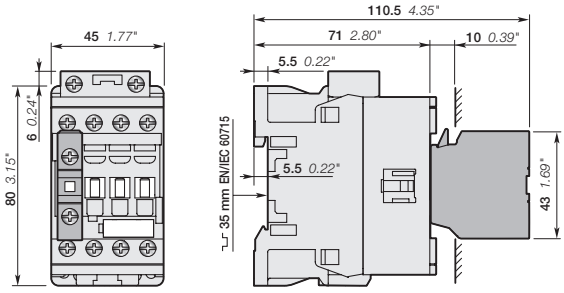
# NF contactor relays
## Dimensions



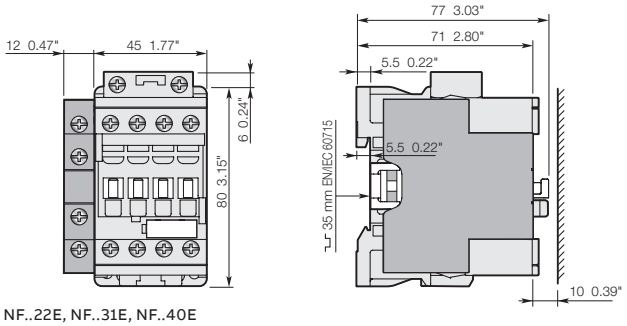

NF..22E, NF..31E, NF..40E



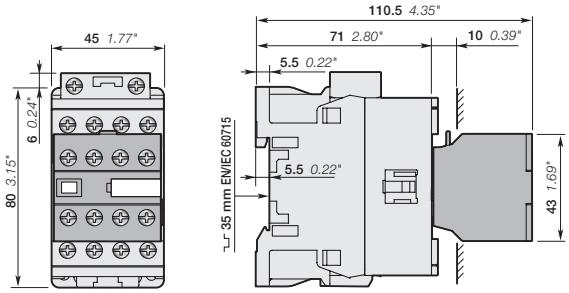

NF



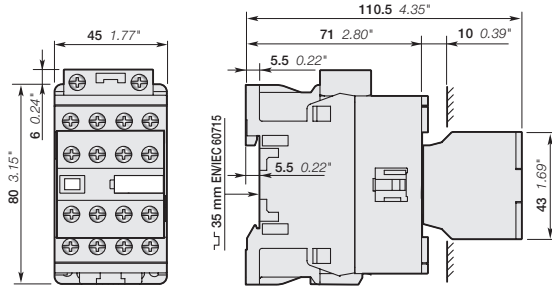

NF..22E, NF..31E, NF..40E
+ CA4, CC4 1-pole auxiliary contact block



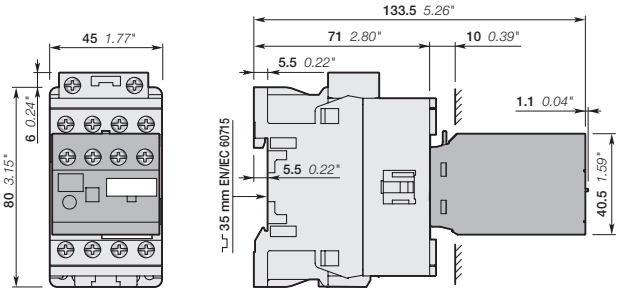

NF..22E, NF..31E, NF..40E
+ CAL4-11 2-pole auxiliary contact block




NF..22E, NF..31E, NF..40E
+ CA4 4-pole auxiliary contact block




NF..44E, NF..53E, NF..62E, NF..71E, NF..80E, NF..33/11, NF..51/11



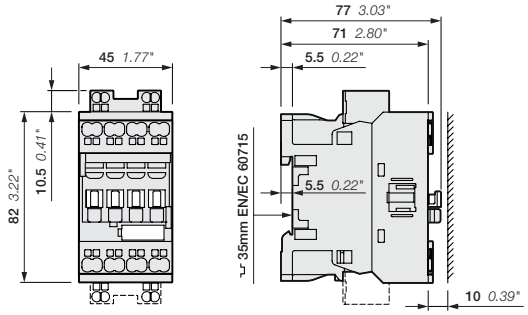

NF..22E, NF..31E, NF..40E
+ TEF4 electronic timer

(1) Note: contactor relay lateral distance to grounded component 2 mm 0.08" min.
24 V DC operated contactor relay (coil 30) depth + 20 mm 0.79".

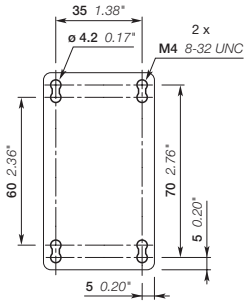
Main dimensions mm, inches (1)

# NF..K contactor relays - with Push-in Spring terminals

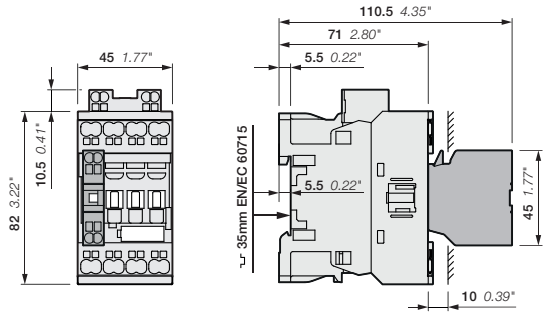
## Dimensions



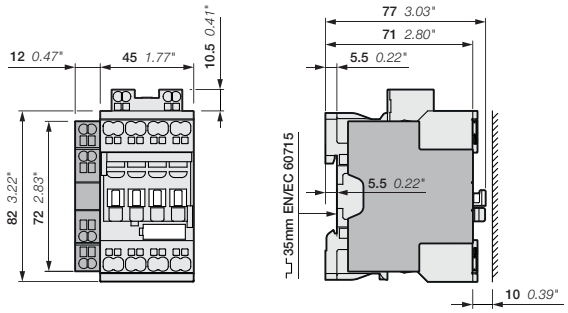

NF22EK, NF31EK, NF40EK



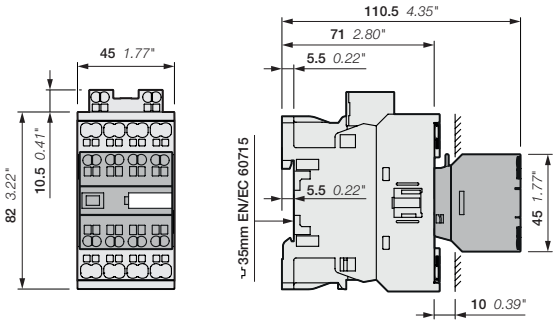

NF22EK, NF31EK, NF40EK



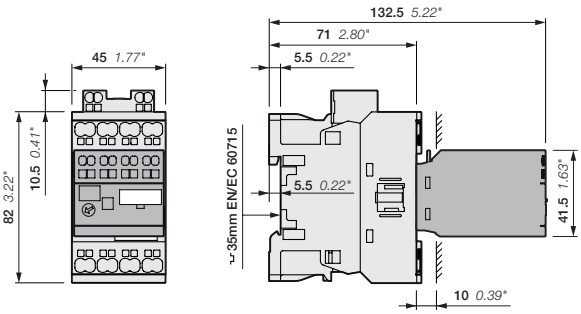

NF22EK, NF31EK, NF40EK
+ CA4..K 1-pole auxiliary contact block



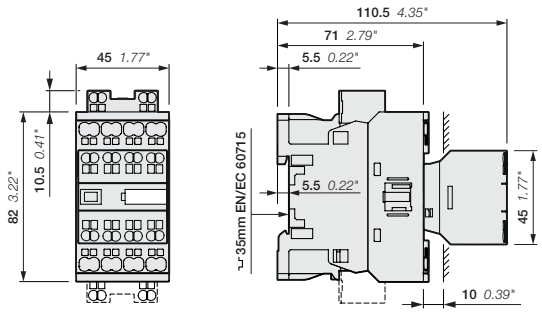

NF22EK, NF31EK, NF40EK
+ CAL4-11K 2-pole auxiliary contact block




NF22EK, NF31EK, NF40EK
+ CA4..K 4-pole auxiliary contact block




NF22EK, NF31EK, NF40EK
+ TEF4S electronic timer




NF44EK, NF53EK, NF62EK, NF71EK, NF80EK

Note: contactor relay lateral distance to grounded component 2 mm 0.08" min.
24 V DC operated contactor (coil 30) depth + 20 mm (0.79").

Main dimensions mm, inches



**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**1SBL137001R1310**

# Other contactor application data



**Contactor selection**
**3/**458 Control of three-phase slip-ring motors
**3/**460 Autotransformer starters
**3/**461 Three-phase transformer switching
**3/**463 Lighting circuit switching
**3/**472 Parallel connection of main poles
**3/**473 Temporary or intermittent duty
**3/**474 Influence of the length of conductors used in contactor control circuit

**3/**476 **Voltage code table**

**3/**482 **Questionnaire for product specifications**

# Control of three-phase slip-ring motors
## Contactor selection



### General

Three kinds of contactors are used to control three-phase slip-ring motors: the stator contactor, the acceleration contactor(s) and the rotor short-circuit contactor. Refer to the diagram opposite.
The selection tables below concern complete smooth starting, excluding specific cases, such as: intermittent operation, regenerative current, controlled slipping, etc. for which you need to consult our specialised departments.
The starting and breaking technical data for slip-ring motors are defined in standard IEC 60947-4-1 in the AC-2 utilization category.
The load factor is defined by the equation:

$$\text{L.F. (\%)} = \frac{\text{Operating cycle}}{\text{Cycle time (Operating cycle + Rest cycle)}} \times 100$$

### Stator contactor

Closing of the starting current, conditioned by the value of the rotor resistances: it may reach 1.5 to 4 times rated motor operational current.
Breaking of the rated operational current, or of the starting current, with possible regenerative current.
The following table gives the permissible values of the Ie / AC-2 rated operational stator current, as a function of load factor.
Temperature of 60 °C for AF09 ... AF370 and 55 °C for AF400 ... AF1650 maximum near the contactor.
Maximum switching frequency and electrical durability in AC-2 category: see "Technical data".

| Contactor types | | | | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Load factor | 15 % | Ie / AC-2 | A | 18 | 24 | 33 | 52 | 64 | 76 | 79 | 106 | 124 | 154 | 184 |
| | 25 % | Ie / AC-2 | A | 15 | 20 | 31 | 44 | 54 | 65 | 68 | 90 | 111 | 136 | 163 |
| | 40 % | Ie / AC-2 | A | 13 | 17 | 26 | 38 | 46 | 55 | 58 | 77 | 94 | 116 | 139 |
| | 60 % | Ie / AC-2 | A | 11 | 14 | 22 | 31 | 38 | 46 | 48 | 64 | 78 | 96 | 115 |
| S7 acc. to IEC 60034-1: periodical continuous duty with electrical breaking | | | A | 9 | 12 | 18 | 26 | 32 | 38 | 40 | 53 | 65 | 80 | 96 |

### Acceleration contactors

The sizing of these contactors is based on the AC-1 rated operational current (see "Technical data") that we recall below for the maximum ambient temperature of 60 °C for AF09 to AF370 and 55 °C for AF400 to AF1650.
The table below lists the factors to be applied to the AC-1 current of the contactors in order to obtain the maximal permissible value of the rotor current after contactor closing for star connection. If delta connection is used, increase by 50 % this current. This table takes into account the number of cycles an hour (without inching) and the current flow time per cycle, in the contactor.

| **Number of cycles an hour** | **1** | **3** | **6** | **12** | **20** | **30** | **60** | **120** |
|---|---|---|---|---|---|---|---|---|
| **Current flow time per cycle** | **Factors applicable to Ie / AC-1** | | | | | | | |
| 5 s | 5.2 | 4.9 | 4.7 | 4.3 | 4.0 | 3.7 | 3.4 | 2.8 |
| 10 s | 3.8 | 3.6 | 3.4 | 3.1 | 3.0 | 2.8 | 2.6 | 2.2 |
| 20 s | 2.8 | 2.7 | 2.6 | 2.5 | 2.4 | 2.2 | 2.0 | 1.6 |
| 30 s | 2.4 | 2.3 | 2.2 | 2.1 | 2.1 | 1.9 | 1.7 | - |
| 40 s | 2.2 | 2.1 | 2.0 | 1.9 | 1.9 | 1.7 | 1.5 | - |
| 60 s | 1.9 | 1.8 | 1.8 | 1.7 | 1.7 | 1.5 | - | - |

| **Contactors** | | **AF09** | **AF12** | **AF16** | **AF26** | **AF30** | **AF38** | **AF40** | **AF52** | **AF65** | **AF80** | **AF96** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational current Ie / AC-1 for air temperature near the contactor ≤ 60 °C | A | 25 | 28 | 30 | 40 | 42 | 42 | 60 | 80 | 90 | 100 | 105 |

### Rotor short-circuit contactor

The duty of this contactor is characterized by small closing stresses. The decisive factor is the thermal stress. Delta connection of the contactor is considered (reduce currents by 35 % if star connection is used).
The following table gives the permissible values of the rated operational rotor current, as a function of load factor.
Temperature: 60 °C for AF09 to AF370 and 55 °C for AF400 to AF1650 maximum near the contactor.

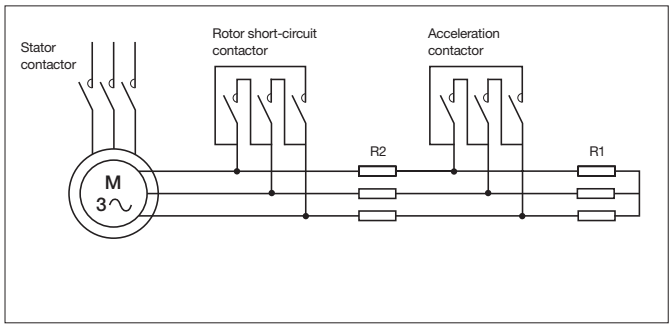
| **Contactor types** | | | | **AF09** | **AF12** | **AF16** | **AF26** | **AF30** | **AF38** | **AF40** | **AF52** | **AF65** | **AF80** | **AF96** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Load factor | 15 % | Ie | A | 63 | 71 | 76 | 102 | 107 | 107 | 152 | 203 | 228 | 254 | 266 |
| | 25 % | Ie | A | 57 | 64 | 69 | 92 | 96 | 96 | 137 | 183 | 206 | 229 | 241 |
| | 40 % | Ie | A | 49 | 55 | 59 | 78 | 82 | 82 | 117 | 157 | 176 | 196 | 206 |
| | 60 % | Ie | A | 43 | 48 | 51 | 68 | 72 | 72 | 103 | 137 | 154 | 171 | 180 |
| S7 acc. to IEC 60034-1: periodical continuous duty with electrical breaking | | | A | 36 | 41 | 44 | 58 | 61 | 61 | 87 | 116 | 131 | 145 | 152 |
| Rated operational rotor voltage: | | | | | | | | | | | | | | |
| - Maximum values for starting and breaking | | | V | 1380 (1600 in star connection) | | | | | | | | | 2000 (2300 in star connection) | |
| - Maximum values for starting and electrical braking | | | V | 690 (730 in star connection) | | | | | | | | | 690 (730 in star connection) | |

# Control of three-phase slip-ring motors

## Contactor selection

**Example of a three-stroke starter**

- The first stroke corresponds to energization of the motor by the stator contactor: all the resistances are operational in the rotor circuit
- At the second stroke, the acceleration contactor short-circuits the first resistance stack
- At the third stroke, the rotor short-circuit contactor is activated by eliminating the last resistance stack, thus completing the starting period.




| Contactor types | | | | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | AF400 | AF460 | AF580 | AF750 | AF1350 | AF1650 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Load factor | 15 % | Ie / AC-2 | A | 220 | 335 | 360 | 425 | 530 | 625 | 750 | 850 | 950 | 1150 | 1500 | 1720 | 2100 |
| | 25 % | Ie / AC-2 | A | 185 | 270 | 300 | 350 | 440 | 515 | 620 | 680 | 780 | 975 | 1250 | 1430 | 1750 |
| | 40 % | Ie / AC-2 | A | 150 | 215 | 250 | 300 | 370 | 430 | 515 | 580 | 650 | 800 | 1050 | 1200 | 1470 |
| | 60 % | Ie / AC-2 | A | 135 | 180 | 220 | 255 | 315 | 370 | 430 | 480 | 550 | 700 | 900 | 1030 | 1250 |
| S7 acc. to IEC 60034-1: periodical continuous duty with electrical breaking | | | A | 116 | 140 | 190 | 210 | 265 | 305 | 370 | 400 | 460 | 580 | 750 | 860 | 1050 |

| Contactors | | | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | AF400 | AF460 | AF580 | AF750 | AF1350 | AF1650 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational current Ie / AC-1 for air temperature near the contactor ≤ 60 °C (AF116-AF370) ≤ 55 °C (AF400-AF1650) | | A | 145 | 175 | 250 | 300 | 350 | 400 | 500 | 500 | 600 | 700 | 800 | 1150 | 1450 |

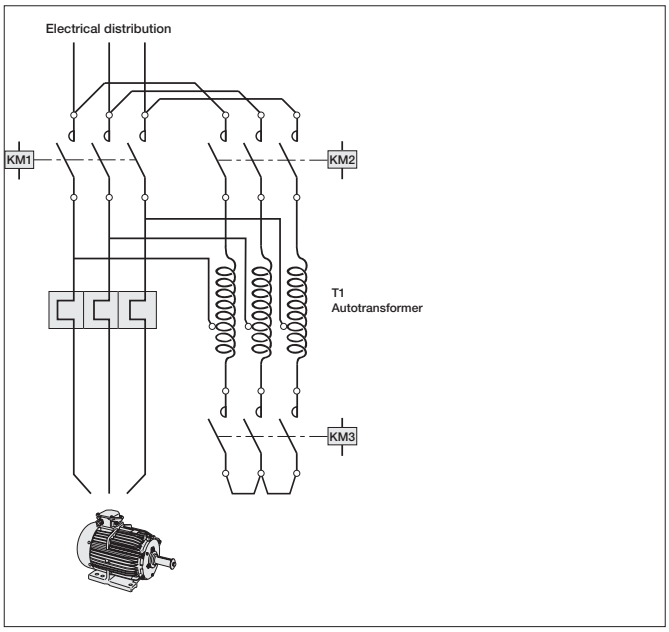
| Contactor types | | | | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | AF400 | AF460 | AF580 | AF750 | AF1350 | AF1650 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Load factor | 15 % | Ie | A | 330 | 540 | 580 | 750 | 830 | 950 | 1050 | 1200 | 1400 | 1650 | 1900 | 2400 | 2800 |
| | 25 % | Ie | A | 300 | 490 | 530 | 650 | 725 | 830 | 915 | 1050 | 1250 | 1450 | 1650 | 2100 | 2500 |
| | 40 % | Ie | A | 260 | 425 | 460 | 575 | 630 | 720 | 800 | 950 | 1100 | 1300 | 1450 | 1850 | 2200 |
| | 60 % | Ie | A | 230 | 375 | 400 | 500 | 575 | 650 | 700 | 810 | 975 | 1150 | 1300 | 1650 | 1950 |
| S7 acc. to IEC 60034-1: periodical continuous duty with electrical breaking | | | A | 200 | 300 | 350 | 380 | 480 | 550 | 640 | 700 | 840 | 980 | 1150 | 1500 | 1800 |
| Rated operational rotor voltage: | | | | | | | | | | | | | | | | |
| - Maximum values for starting and breaking | | | V | 2200 (2600 in star connection) | | | | 3000 (3600 in star connection) | | | | | | | | |
| - Maximum values for starting and electrical braking | | | V | 690 (730 in star connection) | | | | | | | | | | | | |

# Autotransformer starters
## Contactor selection



### General

An autotransformer starter allows to start a squirel cage motor with a reduced starting current due to the reduced voltage within the accelerating duration.
Unlike the star-delta wiring, this autotransformer starting method needs three wires and three terminals on the motor. At the starting period, the motor is wired to the autotransformer taps: the star contactor "KM3" and the autotransformer contactor "KM2" are closed, the motor is under reduced voltage. Consequently, the torque is reduced as the square of the applied voltage. The autotransformers are generally equipped of three taps at each phase in order to adapt the starting parameters to the field requirements. When the motor reaches 80...95 % of its nominal speed, the star contactor opens. Then, the line contactor "KM1" is making and the autotransformer contactor is opening. This starting process is done without any network interruption.




**Selection Table (Id starting current / In nominal current < 8 - Acceleration time ≤ 20s - 30 cycles / h max.)**

| kW motor ratings 50/60 Hz | | | | | Contactors | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | KM1 | KM2 | | | | KM3 |
| | | | | | line | autotransformer taps: | | | | star |
| 220/240 V | 380/400 V | 415 V | 440 V | 690 V | | 90 % | 80 % | 70 % | 60 % | |
| 4 | 7.5 | 7.5 | 7.5 | 9 | AF16 | AF16 | AF12 | AF09 | AF09 | AF09 |
| 6.5 | 11 | 11 | 11 | 15 | AF26 | AF26 | AF16 | AF16 | AF09 | AF16 |
| 11 | 18.5 | 18.5 | 18.5 | 22 | AF38 | AF30 | AF26 | AF26 | AF16 | AF26 |
| 15 | 22 | 30 | 30 | 30 | AF52 | AF52 | AF38 | AF30 | AF26 | AF30 |
| 18.5 | 30 | 37 | 37 | 37 | AF65 | AF52 | AF40 | AF30 | AF26 | AF38 |
| 22 | 37 | 45 | 45 | 45 | AF80 | AF65 | AF52 | AF40 | AF30 | AF40 |
| 25 | 45 | 55 | 55 | 55 | AF96 | AF80 | AF65 | AF52 | AF38 | AF52 |
| 30 | 55 | 55 | 75 | 55 | AF116 | AF116 | AF80 | AF65 | AF52 | AF65 |
| 37 | 75 | 75 | 90 | 75 | AF140 | AF140 | AF96 | AF80 | AF65 | AF65 |
| 45 | 75 | 75 | 90 | 90 | AF146 | AF140 | AF96 | AF80 | AF65 | AF65 |
| 55 | 90 | 90 | 110 | 132 | AF190 | AF146 | AF116 | AF96 | AF65 | AF80 |
| 55 | 110 | 110 | 132 | 160 | AF205 | AF190 | AF140 | AF116 | AF80 | AF96 |
| 75 | 132 | 132 | 160 | 200 | AF265 | AF265 | AF190 | AF140 | AF96 | AF116 |
| 90 | 160 | 160 | 160 | 250 | AF305 | AF265 | AF205 | AF190 | AF116 | AF140 |
| 110 | 200 | 200 | 200 | 315 | AF370 | AF370 | AF265 | AF190 | AF140 | AF190 |
| 132 | 250 | 250 | 250 | 355 | AF460 | AF400 | AF305 | AF265 | AF190 | AF205 |
| 160 | 315 | 355 | 355 | 500 | AF580 | AF580 | AF400 | AF305 | AF205 | AF305 |
| 220 | 400 | 425 | 450 | 600 | AF750 | AF750 | AF580 | AF400 | AF305 | AF400 |
| 257 | 475 | 500 | 560 | 900 | AF1350 | AF750 | AF580 | AF460 | AF400 | AF460 |
| 315 | 560 | 600 | 670 | 1000 | AF1650 | AF1350 | AF750 | AF580 | AF460 | AF580 |

# Three-phase transformer switching

## Contactor selection

## AC-6a Utilization category according to IEC 60947-4-1

### General

Switching the primary of 3-phase transformers, on energization of the transformer, is characterized by high current peaks due to the magnetization phenomena.

### Selection Table

The tables below show the operational ratings for:

- current peaks up to 20 to 30 times the transformer nominal current
- maximum switching frequency of 60 operating cycles per hour
- air ambient temperature ≤ 40 °C.

| AC / DC operated contactors | | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Operational power at Ue: 50/60 Hz - according to AC-6a | | | | | | | | | | | | |
| 220 / 240 V | kVA | 4 | 5 | 6 | 10 | 13 | 14 | 15 | 19 | 21 | 23 | 25 |
| 380 / 400 V | kVA | 7 | 8 | 10 | 17 | 22 | 25 | 26 | 33 | 36 | 39 | 44 |
| 415 / 440 V | kVA | 8 | 9 | 11 | 18 | 24 | 27 | 28.5 | 36 | 40 | 43 | 48 |
| 500 V | kVA | 9 | 11 | 13 | 22 | 28 | 32 | 34.5 | 43 | 48 | 52 | 57 |
| 660 / 690 V | kVA | 12.5 | 14 | 18 | 29 | 37 | 43 | 45.5 | 57 | 64 | 68 | 75 |
| Max. permissible Îpeak | A | 350 | 400 | 500 | 800 | 1000 | 1200 | 1250 | 1550 | 1750 | 1900 | 2100 |

| AC / DC operated contactors | | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | AF400 | AF460 | AF580 | AF750 | AF1350 | AF1650 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Operational power at Ue: 50/60 Hz - according to AC-6a | | | | | | | | | | | | | | |
| 220 / 240 V | kVA | 26 | 30 | 42 | 45 | 55 | 63 | 76 | 95 | 100 | 110 | 130 | 160 | 190 |
| 380 / 400 V | kVA | 46 | 52 | 73 | 75 | 94 | 108 | 132 | 165 | 170 | 190 | 240 | 275 | 350 |
| 415 / 440 V | kVA | 50 | 57 | 80 | 80 | 103 | 118 | 144 | 180 | 190 | 210 | 270 | 325 | 390 |
| 500 V | kVA | 60 | 68 | 96 | 100 | 124 | 143 | 173 | 220 | 230 | 250 | 320 | – | – |
| 660 / 690 V | kVA | 80 | 90 | 127 | 130 | 164 | 188 | 228 | 290 | 300 | 310 | 410 | – | – |
| Max. permissible Îpeak | A | 2100 | 2400 | 3300 | 3500 | 4300 | 4900 | 6000 | 7700 | 8400 | 9300 | 12000 | – | – |

# Notes

# Lighting circuit switching
## Contactor selection

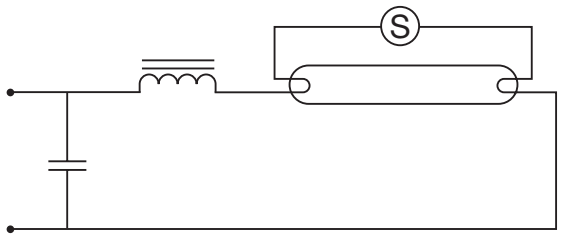
### General

Contactor selection criteria for control of lighting circuits are as follows:
- type, power rating and number of lamps
- connection mode
- current values on closing and in steady state
- power factor
- presence or not of correction capacitors.

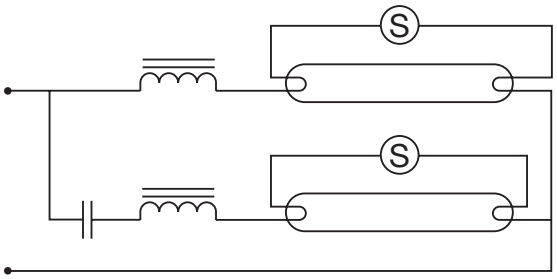
### Lighting circuits

In a given circuit, the number and power rating of lamps are defined and cannot result in overload. Only short-circuit protection has to be provided. gG fuses or modular circuit-breakers will be chosen for this purpose.
The lamps have very specific technical data, according to their construction type.
- Incandescent lamps have a very high current on closing: more than 15 times nominal current.
  They do not introduce a large phase displacement between current and voltage
- Fluorescent tubes are equipped with a ballast whose purpose is two-fold: contribute to ignition and limit current to nominal value once steady state is reached. This ballast is a reactor that considerably lowers the power factor. It may or may not be compensated.

Individual compensation
(parallel compensation)




Serial compensation in dual mounting




### Selection of contactors

The following tables indicate, for each contactor type, the maximum permissible number of lamps per phase. Air temperature, near the contactor, must be limited to 60 °C. Numbers are given for a 230 V voltage distributed between phase and neutral: single-phase (phase + neutral) or three-phase (3 phases + neutral) distribution, lamps are wired in star connection. In the case of a three-phase supply without neutral, 230 V phase-to-phase, the permissible number of lamps per phase will be that given in the tables multiplied by 0.58.

**Example:**
120 x 100 W / 230 V incandescent lamps - 400 V three-phase network with distributed neutral.
Calculate the number of lamps per phase: 120 : 3 = 40. On the 100 W line of the incandescent lamp table, contactor AF09 is limited to 38 lamps per phase, you must thus select contactor AF12 which accepts up to 43 lamps per phase.

# Lighting circuit switching

## Contactor selection AF09 ... AF146 3-pole contactors



### Selection table

| 3-pole AC / DC operated contactors | | | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 | AF116 | AF140 | AF146 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lamp characteristics | | | Maximum permissible number of lamps per phase | | | | | | | | | | | | | |
| W | A | µF | | | | | | | | | | | | | | |
| **Incandescent and halogen lamps** | | | | | | | | | | | | | | | | **according to AC-5b** |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 60 | 0.27 | - | 64 | 72 | 77 | 103 | 129 | 148 | 177 | 207 | 233 | 259 | 277 | 430 | 519 | 541 |
| 100 | 0.45 | - | 38 | 43 | 46 | 62 | 77 | 89 | 106 | 124 | 140 | 155 | 166 | 258 | 311 | 324 |
| 200 | 0.91 | - | 19 | 21 | 23 | 30 | 38 | 44 | 52 | 61 | 69 | 77 | 82 | 127 | 154 | 160 |
| 300 | 1.37 | - | 12 | 14 | 15 | 20 | 25 | 29 | 35 | 41 | 46 | 51 | 54 | 85 | 102 | 107 |
| 500 | 2.28 | - | 7 | 8 | 9 | 12 | 15 | 17 | 21 | 24 | 27 | 30 | 33 | 51 | 61 | 64 |
| 1000 | 4.55 | - | 3 | 4 | 4 | 6 | 7 | 8 | 10 | 12 | 13 | 15 | 16 | 25 | 31 | 32 |
| **Fluorescent lamps without compensation - Fluorescent lamps with electronic starter** | | | | | | | | | | | | | | | | **according to AC-5a** |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 20 | 0.38 | - | 46 | 51 | 55 | 73 | 84 | 92 | 126 | 147 | 157 | 184 | 210 | 305 | 368 | 384 |
| 40 | 0.45 | - | 38 | 43 | 46 | 62 | 71 | 77 | 106 | 124 | 133 | 155 | 177 | 258 | 311 | 324 |
| 65 | 0.70 | - | 25 | 27 | 30 | 40 | 45 | 50 | 68 | 80 | 85 | 100 | 114 | 166 | 200 | 209 |
| 80 | 0.80 | - | 21 | 24 | 26 | 35 | 40 | 43 | 60 | 70 | 75 | 87 | 100 | 145 | 175 | 183 |
| 100 | 1.15 | - | 15 | 16 | 18 | 24 | 27 | 30 | 41 | 48 | 52 | 60 | 69 | 101 | 122 | 127 |
| 110 | 1.20 | - | 14 | 16 | 17 | 23 | 26 | 29 | 40 | 46 | 50 | 58 | 66 | 97 | 117 | 122 |
| **Fluorescent lamps with parallel compensation** | | | | | | | | | | | | | | | | **according to AC-5a** |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 20 | 0.18 | 5 | 53 | 53 | 53 | 155 | 168 | 176 | 266 | 309 | 325 | 388 | 444 | 644 | 778 | 811 |
| 40 | 0.26 | 5 | 53 | 53 | 53 | 107 | 123 | 134 | 184 | 215 | 230 | 269 | 307 | 446 | 538 | 562 |
| 65 | 0.42 | 7 | 37 | 37 | 37 | 66 | 76 | 83 | 114 | 133 | 142 | 166 | 190 | 276 | 333 | 348 |
| 80 | 0.52 | 7 | 33 | 37 | 37 | 53 | 61 | 67 | 92 | 107 | 115 | 134 | 153 | 223 | 269 | 281 |
| 100 | 0.65 | 16 | 16 | 16 | 16 | 43 | 49 | 53 | 73 | 86 | 92 | 107 | 123 | 178 | 215 | 225 |
| 110 | 0.70 | 18 | 14 | 14 | 14 | 40 | 45 | 49 | 68 | 80 | 85 | 100 | 114 | 166 | 200 | 209 |
| **Fluorescent lamps in dual mounting** | | | | | | | | | | | | | | | | **according to AC-5a** |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 2 x 20 | 2 x 0.14 | - | 62 | 69 | 75 | 100 | 114 | 125 | 171 | 200 | 214 | 250 | 285 | 414 | 500 | 521 |
| 2 x 40 | 2 x 0.25 | - | 35 | 39 | 42 | 56 | 64 | 70 | 96 | 112 | 120 | 140 | 160 | 232 | 280 | 292 |
| 2 x 65 | 2 x 0.40 | - | 21 | 24 | 26 | 35 | 40 | 43 | 60 | 70 | 75 | 87 | 100 | 145 | 175 | 183 |
| 2 x 80 | 2 x 0.48 | - | 18 | 20 | 21 | 29 | 33 | 36 | 50 | 58 | 62 | 72 | 83 | 121 | 146 | 152 |
| 2 x 100 | 2 x 0.60 | - | 14 | 16 | 17 | 23 | 26 | 29 | 40 | 46 | 50 | 58 | 66 | 97 | 117 | 122 |
| 2 x 110 | 2 x 0.65 | - | 13 | 15 | 16 | 21 | 24 | 26 | 36 | 43 | 46 | 53 | 61 | 89 | 108 | 112 |
| **Compact fluorescent lamps** | | | | | | | | | | | | | | | | **according to AC-5a** |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 5 | 0.045 | - | 388 | 433 | 466 | 622 | 711 | 777 | 1066 | 1244 | 1333 | 1555 | 1777 | 2578 | 3111 | 3244 |
| 7 | 0.075 | - | 233 | 260 | 280 | 373 | 426 | 466 | 640 | 746 | 800 | 933 | 1066 | 1547 | 1867 | 1947 |
| 11 | 0.105 | - | 166 | 185 | 200 | 266 | 304 | 333 | 457 | 533 | 571 | 666 | 761 | 1105 | 1333 | 1390 |
| 15 | 0.135 | - | 129 | 144 | 155 | 207 | 237 | 259 | 355 | 414 | 444 | 518 | 592 | 859 | 1037 | 1081 |
| 20 | 0.160 | - | 109 | 121 | 131 | 175 | 200 | 218 | 300 | 350 | 375 | 437 | 500 | 725 | 875 | 913 |
| 23 | 0.180 | - | 97 | 108 | 116 | 155 | 177 | 194 | 266 | 311 | 333 | 388 | 444 | 644 | 778 | 811 |

# Lighting circuit switching

## Contactor selection AF190 ... AF2650 3-pole contactors

### Selection table

| 3-pole AC / DC operated contactors | | | AF190 | AF205 | AF265 | AF305 | AF370 | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lamp characteristics | | | Maximum permissible number of lamps per phase | | | | | | | | | | | | | |
| W | A | µF | | | | | | | | | | | | | | |
| **Incandescent and halogen lamps** | | | | | | | | | | | | | | | | **according to AC-5b** |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 60 | 0.27 | - | 704 | 759 | 981 | 1130 | 1370 | 1481 | 1704 | 2148 | 2778 | 3009 | 3250 | 3972 | 4935 | 6380 |
| 100 | 0.45 | - | 422 | 456 | 589 | 678 | 822 | 889 | 1022 | 1289 | 1667 | 1806 | 1950 | 2383 | 2961 | 3828 |
| 200 | 0.91 | - | 209 | 225 | 291 | 335 | 407 | 440 | 505 | 637 | 824 | 893 | 964 | 1179 | 1464 | 1893 |
| 300 | 1.37 | - | 139 | 150 | 193 | 223 | 270 | 292 | 336 | 423 | 547 | 593 | 641 | 783 | 973 | 1257 |
| 500 | 2.28 | - | 83 | 90 | 116 | 134 | 162 | 175 | 202 | 254 | 329 | 356 | 385 | 470 | 584 | 755 |
| 1000 | 4.55 | - | 42 | 45 | 58 | 67 | 81 | 88 | 101 | 127 | 165 | 179 | 193 | 236 | 293 | 379 |
| **Fluorescent lamps without compensation - Fluorescent lamps with electronic starter** | | | | | | | | | | | | | | | | **according to AC-5a** |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 20 | 0.38 | - | 500 | 539 | 697 | 803 | 974 | 1053 | 1211 | 1526 | 1974 | 2138 | 2309 | 2822 | 3507 | 4533 |
| 40 | 0.45 | - | 422 | 456 | 589 | 678 | 822 | 889 | 1022 | 1289 | 1667 | 1806 | 1950 | 2383 | 2961 | 3828 |
| 65 | 0.70 | - | 271 | 293 | 379 | 436 | 529 | 571 | 657 | 829 | 1071 | 1161 | 1254 | 1532 | 1904 | 2461 |
| 80 | 0.80 | - | 238 | 256 | 331 | 381 | 463 | 500 | 575 | 725 | 938 | 1016 | 1097 | 1341 | 1666 | 2153 |
| 100 | 1.15 | - | 165 | 178 | 230 | 265 | 322 | 348 | 400 | 504 | 652 | 707 | 763 | 933 | 1159 | 1498 |
| 110 | 1.20 | - | 158 | 171 | 221 | 254 | 308 | 333 | 383 | 483 | 625 | 677 | 731 | 894 | 1110 | 1435 |
| **Fluorescent lamps with parallel compensation** | | | | | | | | | | | | | | | | **according to AC-5a** |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 20 | 0.18 | 5 | 1056 | 1139 | 1472 | 1694 | 2056 | 2222 | 2556 | 3222 | 4167 | 4514 | 4875 | 5958 | 7403 | 9569 |
| 40 | 0.26 | 5 | 731 | 788 | 1019 | 1173 | 1423 | 1538 | 1769 | 2231 | 2885 | 3125 | 3375 | 4125 | 5125 | 6625 |
| 65 | 0.42 | 7 | 452 | 488 | 631 | 726 | 881 | 952 | 1095 | 1381 | 1786 | 1935 | 2089 | 2554 | 3173 | 4101 |
| 80 | 0.52 | 7 | 365 | 394 | 510 | 587 | 712 | 769 | 885 | 1115 | 1442 | 1563 | 1688 | 2063 | 2563 | 3313 |
| 100 | 0.65 | 16 | 292 | 315 | 408 | 469 | 569 | 615 | 708 | 892 | 1154 | 1250 | 1350 | 1650 | 2050 | 2650 |
| 110 | 0.70 | 18 | 271 | 293 | 379 | 436 | 529 | 571 | 657 | 829 | 1071 | 1161 | 1254 | 1532 | 1904 | 2461 |
| **Fluorescent lamps in dual mounting** | | | | | | | | | | | | | | | | **according to AC-5a** |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 2 x 20 | 2 x 0.14 | - | 679 | 732 | 946 | 1089 | 1321 | 1429 | 1643 | 2071 | 2679 | 2902 | 3134 | 3830 | 4759 | 6152 |
| 2 x 40 | 2 x 0.25 | - | 380 | 410 | 530 | 610 | 740 | 800 | 920 | 1160 | 1500 | 1625 | 1755 | 2145 | 2665 | 3445 |
| 2 x 65 | 2 x 0.40 | - | 238 | 256 | 331 | 381 | 463 | 500 | 575 | 725 | 938 | 1016 | 1097 | 1341 | 1666 | 2153 |
| 2 x 80 | 2 x 0.48 | - | 198 | 214 | 276 | 318 | 385 | 417 | 479 | 604 | 781 | 846 | 914 | 1117 | 1388 | 1794 |
| 2 x 100 | 2 x 0.60 | - | 158 | 171 | 221 | 254 | 308 | 333 | 383 | 483 | 625 | 677 | 731 | 894 | 1110 | 1435 |
| 2 x 110 | 2 x 0.65 | - | 146 | 158 | 204 | 235 | 285 | 308 | 354 | 446 | 577 | 625 | 675 | 825 | 1025 | 1325 |
| **Compact fluorescent lamps** | | | | | | | | | | | | | | | | **according to AC-5a** |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 5 | 0.045 | - | 4222 | 4556 | 5889 | 6778 | 8222 | 8889 | 10222 | 12889 | 16667 | 18056 | 19500 | 23833 | 29611 | 38278 |
| 7 | 0.075 | - | 2533 | 2733 | 3533 | 4067 | 4933 | 5333 | 6133 | 7733 | 10000 | 10833 | 11700 | 14300 | 17767 | 22967 |
| 11 | 0.105 | - | 1810 | 1952 | 2524 | 2905 | 3524 | 3810 | 4381 | 5524 | 7143 | 7738 | 8357 | 10214 | 12690 | 16405 |
| 15 | 0.135 | - | 1407 | 1519 | 1963 | 2259 | 2741 | 2963 | 3407 | 4296 | 5556 | 6019 | 6500 | 7944 | 9870 | 12759 |
| 20 | 0.160 | - | 1188 | 1281 | 1656 | 1906 | 2313 | 2500 | 2875 | 3625 | 4688 | 5078 | 5484 | 6703 | 8328 | 10766 |
| 23 | 0.180 | - | 1056 | 1139 | 1472 | 1694 | 2056 | 2222 | 2556 | 3222 | 4167 | 4514 | 4875 | 5958 | 7403 | 9569 |

# Lighting circuit switching

## Contactor selection AF09 ... AF146 3-pole contactors



### Selection table

| 3-pole AC / DC operated contactors | | | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 | AF116 | AF140 | AF146 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lamp characteristics | | | Maximum permissible number of lamps per phase | | | | | | | | | | | | | |
| W | A | µF | | | | | | | | | | | | | | |
| **Low pressure sodium vapour lamps without compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 35 | 1.4 | - | 9 | 10 | 12 | 15 | 15 | 16 | 23 | 31 | 35 | 39 | 42 | 70 | 85 | 89 |
| 55 | 1.4 | - | 9 | 10 | 12 | 15 | 15 | 16 | 23 | 31 | 35 | 39 | 42 | 70 | 85 | 89 |
| 90 | 2.1 | - | 6 | 7 | 8 | 10 | 10 | 10 | 15 | 20 | 23 | 26 | 28 | 47 | 57 | 59 |
| 135 | 3.1 | - | 4 | 4 | 5 | 6 | 7 | 7 | 10 | 14 | 15 | 17 | 19 | 32 | 38 | 40 |
| 180 | 3.1 | - | 4 | 4 | 5 | 6 | 7 | 7 | 10 | 14 | 15 | 17 | 19 | 32 | 38 | 40 |
| **Low pressure sodium vapour lamps with parallel compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 35 | 0.6 | 20 | 12 | 12 | 12 | 35 | 36 | 38 | 55 | 73 | 81 | 91 | 100 | 164 | 198 | 207 |
| 55 | 0.6 | 20 | 12 | 12 | 12 | 35 | 36 | 38 | 55 | 73 | 81 | 91 | 100 | 164 | 198 | 207 |
| 90 | 0.9 | 25 | 10 | 10 | 10 | 23 | 24 | 25 | 36 | 48 | 55 | 61 | 66 | 110 | 132 | 138 |
| 135 | 0.9 | 45 | 5 | 5 | 5 | 18 | 18 | 19 | 34 | 34 | 36 | 57 | 59 | 110 | 132 | 138 |
| 180 | 0.9 | 45 | 5 | 5 | 5 | 18 | 18 | 19 | 34 | 34 | 36 | 57 | 59 | 110 | 132 | 138 |
| **High pressure sodium vapour lamps without compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 150 | 1.8 | - | 7 | 8 | 9 | 11 | 12 | 12 | 18 | 24 | 27 | 30 | 33 | 45 | 54 | 57 |
| 250 | 3.0 | - | 4 | 5 | 5 | 7 | 7 | 7 | 11 | 14 | 16 | 18 | 20 | 27 | 33 | 34 |
| 400 | 4.4 | - | 3 | 3 | 3 | 4 | 5 | 5 | 7 | 10 | 11 | 12 | 13 | 18 | 22 | 23 |
| 600 | 6.2 | - | 2 | 2 | 2 | 3 | 3 | 3 | 5 | 7 | 7 | 8 | 9 | 13 | 16 | 16 |
| 1000 | 10.3 | - | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 4 | 4 | 5 | 5 | 8 | 10 | 10 |
| **High pressure sodium vapour lamps with parallel compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 150 | 1.0 | 20 | 12 | 12 | 12 | 21 | 22 | 23 | 33 | 43 | 49 | 55 | 60 | 93 | 112 | 117 |
| 250 | 1.5 | 36 | 7 | 7 | 7 | 14 | 14 | 15 | 22 | 29 | 33 | 36 | 40 | 62 | 75 | 78 |
| 400 | 2.5 | 48 | 5 | 5 | 5 | 8 | 8 | 9 | 13 | 17 | 19 | 22 | 24 | 37 | 45 | 47 |
| 600 | 3.3 | 65 | 3 | 3 | 3 | 6 | 6 | 6 | 10 | 13 | 15 | 16 | 18 | 28 | 34 | 35 |
| 1000 | 6.2 | 100 | 2 | 2 | 2 | 3 | 3 | 3 | 5 | 7 | 7 | 8 | 9 | 15 | 18 | 19 |
| **High pressure mercury vapour lamps without compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 50 | 0.60 | - | 22 | 25 | 28 | 35 | 36 | 38 | 55 | 73 | 82 | 91 | 100 | 152 | 190 | 214 |
| 80 | 0.80 | - | 16 | 18 | 21 | 26 | 27 | 28 | 41 | 55 | 61 | 68 | 75 | 114 | 143 | 160 |
| 125 | 1.15 | - | 11 | 13 | 14 | 18 | 19 | 20 | 28 | 38 | 43 | 47 | 52 | 79 | 99 | 112 |
| 250 | 2.15 | - | 6 | 6 | 7 | 9 | 10 | 10 | 15 | 20 | 23 | 25 | 27 | 42 | 53 | 60 |
| 400 | 3.25 | - | 4 | 4 | 5 | 6 | 6 | 7 | 10 | 13 | 15 | 16 | 18 | 28 | 35 | 39 |
| 700 | 5.40 | - | 2 | 2 | 3 | 3 | 4 | 4 | 6 | 8 | 9 | 10 | 11 | 17 | 21 | 24 |
| 1000 | 7.50 | - | 1 | 2 | 2 | 2 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 12 | 15 | 17 |
| **Voltage: 380/415 V AC** | | | | | | | | | | | | | | | | |
| 2000 | 8.00 | - | 1 | 1 | 2 | 2 | 2 | 2 | 4 | 5 | 6 | 6 | 7 | 11 | 14 | 16 |
| **High pressure mercury vapour lamps with compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 50 | 0.28 | 7 | 36 | 36 | 36 | 75 | 78 | 82 | 117 | 157 | 176 | 196 | 214 | 326 | 407 | 458 |
| 80 | 0.43 | 8 | 31 | 31 | 31 | 48 | 51 | 53 | 76 | 102 | 115 | 127 | 139 | 212 | 265 | 298 |
| 125 | 0.66 | 10 | 20 | 22 | 25 | 31 | 33 | 34 | 50 | 66 | 75 | 83 | 90 | 138 | 173 | 194 |
| 250 | 1.28 | 18 | 10 | 11 | 13 | 16 | 17 | 17 | 25 | 34 | 38 | 42 | 46 | 71 | 89 | 100 |
| 400 | 2.05 | 25 | 6 | 7 | 8 | 10 | 10 | 11 | 16 | 21 | 24 | 26 | 29 | 44 | 56 | 63 |
| 700 | 3.55 | 40 | 3 | 4 | 4 | 5 | 6 | 6 | 9 | 12 | 13 | 15 | 16 | 26 | 32 | 36 |
| 1000 | 4.83 | 60 | 2 | 3 | 3 | 4 | 4 | 4 | 6 | 9 | 10 | 11 | 12 | 19 | 24 | 27 |
| **Voltage: 380/415 V AC** | | | | | | | | | | | | | | | | |
| 2000 | 5.45 | 35 | 2 | 2 | 3 | 3 | 4 | 4 | 6 | 8 | 9 | 10 | 11 | 17 | 21 | 24 |

# Lighting circuit switching

## Contactor selection AF190 ... AF2650 3-pole contactors

### Selection table

| 3-pole AC / DC operated contactors | | | AF190 | AF205 | AF265 | AF305 | AF370 | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lamp characteristics | | | Maximum permissible number of lamps per phase | | | | | | | | | | | | | |
| W | A | µF | | | | | | | | | | | | | | |
| **Low pressure sodium vapour lamps without compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 35 | 1.4 | - | 115 | 124 | 161 | 185 | 225 | 243 | 279 | 352 | 455 | 493 | 533 | 651 | 809 | 1046 |
| 55 | 1.4 | - | 115 | 124 | 161 | 185 | 225 | 243 | 279 | 352 | 455 | 493 | 533 | 651 | 809 | 1046 |
| 90 | 2.1 | - | 77 | 83 | 107 | 123 | 150 | 162 | 186 | 235 | 304 | 329 | 355 | 434 | 539 | 697 |
| 135 | 3.1 | - | 52 | 56 | 73 | 84 | 101 | 110 | 126 | 159 | 206 | 223 | 241 | 294 | 365 | 472 |
| 180 | 3.1 | - | 52 | 56 | 73 | 84 | 101 | 110 | 126 | 159 | 206 | 223 | 241 | 294 | 365 | 472 |
| **Low pressure sodium vapour lamps with parallel compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 35 | 0.6 | 20 | 269 | 290 | 375 | 432 | 524 | 567 | 652 | 822 | 1063 | 1151 | 1243 | 1519 | 1888 | 2440 |
| 55 | 0.6 | 20 | 269 | 290 | 375 | 432 | 524 | 567 | 652 | 822 | 1063 | 1151 | 1243 | 1519 | 1888 | 2440 |
| 90 | 0.9 | 25 | 179 | 194 | 250 | 288 | 349 | 378 | 434 | 548 | 708 | 767 | 829 | 1013 | 1258 | 1627 |
| 135 | 0.9 | 45 | 179 | 194 | 250 | 288 | 349 | 378 | 434 | 548 | 708 | 767 | 829 | 1013 | 1258 | 1627 |
| 180 | 0.9 | 45 | 179 | 194 | 250 | 288 | 349 | 378 | 434 | 548 | 708 | 767 | 829 | 1013 | 1258 | 1627 |
| **High pressure sodium vapour lamps without compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 150 | 1.8 | - | 74 | 80 | 103 | 119 | 144 | 156 | 179 | 226 | 292 | 313 | 338 | 413 | 513 | 663 |
| 250 | 3.0 | - | 44 | 48 | 62 | 71 | 86 | 93 | 107 | 135 | 175 | 188 | 203 | 248 | 308 | 398 |
| 400 | 4.4 | - | 30 | 33 | 42 | 49 | 59 | 64 | 73 | 92 | 119 | 128 | 138 | 169 | 210 | 271 |
| 600 | 6.2 | - | 21 | 23 | 30 | 34 | 42 | 45 | 52 | 65 | 85 | 91 | 98 | 120 | 149 | 192 |
| 1000 | 10.3 | - | 13 | 14 | 18 | 21 | 25 | 27 | 31 | 39 | 51 | 55 | 59 | 72 | 90 | 116 |
| **High pressure sodium vapour lamps with parallel compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 150 | 1.0 | 20 | 152 | 164 | 212 | 244 | 296 | 320 | 368 | 464 | 600 | 625 | 675 | 825 | 1025 | 1325 |
| 250 | 1.5 | 36 | 101 | 109 | 141 | 163 | 197 | 213 | 245 | 309 | 400 | 417 | 450 | 550 | 683 | 883 |
| 400 | 2.5 | 48 | 61 | 66 | 85 | 98 | 118 | 128 | 147 | 186 | 240 | 250 | 270 | 330 | 410 | 530 |
| 600 | 3.3 | 65 | 46 | 50 | 64 | 74 | 90 | 97 | 112 | 141 | 182 | 189 | 205 | 250 | 311 | 402 |
| 1000 | 6.2 | 100 | 25 | 26 | 34 | 39 | 48 | 52 | 59 | 75 | 97 | 101 | 109 | 133 | 165 | 214 |
| **High pressure mercury vapour lamps without compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 50 | 0.60 | - | 261 | 333 | 380 | 475 | 570 | 570 | 665 | 760 | 998 | 1188 | 1283 | 1568 | 1948 | 2518 |
| 80 | 0.80 | - | 196 | 249 | 285 | 356 | 428 | 428 | 499 | 570 | 748 | 891 | 962 | 1176 | 1461 | 1888 |
| 125 | 1.15 | - | 136 | 173 | 198 | 248 | 297 | 297 | 347 | 397 | 520 | 620 | 669 | 818 | 1016 | 1313 |
| 250 | 2.15 | - | 73 | 93 | 106 | 133 | 159 | 159 | 186 | 212 | 278 | 331 | 358 | 437 | 543 | 703 |
| 400 | 3.25 | - | 48 | 61 | 70 | 88 | 105 | 105 | 123 | 140 | 184 | 219 | 237 | 289 | 360 | 465 |
| 700 | 5.40 | - | 29 | 37 | 42 | 53 | 63 | 63 | 74 | 84 | 111 | 132 | 143 | 174 | 216 | 280 |
| 1000 | 7.50 | - | 21 | 27 | 30 | 38 | 46 | 46 | 53 | 61 | 80 | 95 | 103 | 125 | 156 | 201 |
| **Voltage: 380/415 V AC** | | | | | | | | | | | | | | | | |
| 2000 | 8.00 | - | 20 | 25 | 29 | 36 | 43 | 43 | 50 | 57 | 75 | 89 | 96 | 118 | 146 | 189 |
| **High pressure mercury vapour lamps with compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 50 | 0.28 | 7 | 560 | 713 | 814 | 1018 | 1221 | 1221 | 1425 | 1629 | 2138 | 2545 | 2748 | 3359 | 4173 | 5395 |
| 80 | 0.43 | 8 | 365 | 464 | 530 | 663 | 795 | 795 | 928 | 1060 | 1392 | 1657 | 1790 | 2187 | 2717 | 3513 |
| 125 | 0.66 | 10 | 238 | 302 | 345 | 432 | 518 | 518 | 605 | 691 | 907 | 1080 | 1166 | 1425 | 1770 | 2289 |
| 250 | 1.28 | 18 | 122 | 156 | 178 | 223 | 267 | 267 | 312 | 356 | 468 | 557 | 601 | 735 | 913 | 1180 |
| 400 | 2.05 | 25 | 76 | 97 | 111 | 139 | 167 | 167 | 195 | 222 | 292 | 348 | 375 | 459 | 570 | 737 |
| 700 | 3.55 | 40 | 44 | 56 | 64 | 80 | 96 | 96 | 112 | 128 | 169 | 201 | 217 | 265 | 329 | 425 |
| 1000 | 4.83 | 60 | 32 | 41 | 47 | 59 | 71 | 71 | 83 | 94 | 124 | 148 | 159 | 195 | 242 | 313 |
| **Voltage: 380/415 V AC** | | | | | | | | | | | | | | | | |
| 2000 | 5.45 | 35 | 29 | 37 | 42 | 52 | 63 | 63 | 73 | 84 | 110 | 131 | 141 | 173 | 214 | 277 |

# Lighting circuit switching

## Contactor selection AF09 ... AF146 3-pole contactors



### Selection table

| 3-pole AC / DC operated contactors | | | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 | AF116 | AF140 | AF146 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lamp characteristics | | | Maximum permissible number of lamps per phase | | | | | | | | | | | | | |
| W | A | µF | | | | | | | | | | | | | | |
| **Metal halide vapour lamps without compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 250 | 3 | - | 4 | 5 | 5 | 7 | 7 | 7 | 11 | 14 | 16 | 18 | 20 | 27 | 33 | 38 |
| 400 | 4 | - | 3 | 3 | 4 | 5 | 5 | 5 | 8 | 11 | 12 | 13 | 15 | 20 | 25 | 28 |
| 1000 | 9.5 | - | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 4 | 5 | 5 | 6 | 8 | 11 | 12 |
| 2000 | 16.5 | - | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 5 | 6 | 7 |
| **Voltage: 380/415 V AC** | | | | | | | | | | | | | | | | |
| 2000 | 10.5 | - | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 4 | 4 | 5 | 5 | 8 | 10 | 11 |
| **Metal halide vapour lamps with compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 250 | 1.32 | 33 | 7 | 7 | 7 | 15 | 16 | 17 | 25 | 33 | 37 | 41 | 45 | 69 | 86 | 97 |
| 400 | 2.22 | 45 | 5 | 5 | 5 | 9 | 9 | 10 | 14 | 19 | 22 | 24 | 27 | 41 | 51 | 58 |
| 1000 | 5.14 | 85 | 2 | 2 | 3 | 4 | 4 | 4 | 6 | 8 | 9 | 10 | 11 | 18 | 22 | 25 |
| 2000 | 11.5 | 148 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 8 | 10 | 11 |
| **Voltage: 380/415 V AC** | | | | | | | | | | | | | | | | |
| 2000 | 6.10 | 60 | 2 | 2 | 2 | 3 | 3 | 3 | 5 | 7 | 8 | 9 | 9 | 15 | 19 | 21 |

# Lighting circuit switching

## Contactor selection AF190 ... AF2650 3-pole contactors

### Selection table

| 3-pole AC / DC operated contactors | | | AF190 | AF205 | AF265 | AF305 | AF370 | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lamp characteristics | | | Maximum permissible number of lamps per phase | | | | | | | | | | | | | |
| W | A | µF | | | | | | | | | | | | | | |
| **Metal halide vapour lamps without compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 250 | 3 | - | 46 | 58 | 67 | 83 | 100 | 100 | 117 | 133 | 175 | 208 | 225 | 275 | 342 | 442 |
| 400 | 4 | - | 34 | 44 | 50 | 63 | 75 | 75 | 88 | 100 | 131 | 156 | 169 | 206 | 256 | 331 |
| 1000 | 9.5 | - | 14 | 18 | 21 | 26 | 32 | 32 | 37 | 42 | 55 | 66 | 71 | 87 | 108 | 139 |
| 2000 | 16.5 | - | 8 | 11 | 12 | 15 | 18 | 18 | 21 | 24 | 32 | 38 | 41 | 50 | 62 | 80 |
| **Voltage: 380/415 V AC** | | | | | | | | | | | | | | | | |
| 2000 | 10.5 | - | 13 | 17 | 19 | 24 | 29 | 29 | 33 | 38 | 50 | 60 | 64 | 79 | 98 | 126 |
| **Metal halide vapour lamps with compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 250 | 1.32 | 33 | 119 | 151 | 173 | 216 | 259 | 259 | 302 | 345 | 453 | 540 | 583 | 713 | 885 | 1144 |
| 400 | 2.22 | 45 | 71 | 90 | 103 | 128 | 154 | 154 | 180 | 205 | 270 | 321 | 347 | 424 | 526 | 680 |
| 1000 | 5.14 | 85 | 30 | 39 | 44 | 55 | 67 | 67 | 78 | 89 | 116 | 139 | 150 | 183 | 227 | 294 |
| 2000 | 11.5 | 148 | 14 | 17 | 20 | 25 | 30 | 30 | 35 | 40 | 52 | 62 | 67 | 82 | 102 | 131 |
| **Voltage: 380/415 V AC** | | | | | | | | | | | | | | | | |
| 2000 | 6.10 | 60 | 26 | 33 | 37 | 47 | 56 | 56 | 65 | 75 | 98 | 117 | 126 | 154 | 192 | 248 |

# Lighting circuit switching

## Contactor selection AF09 ... AF370 4-pole contactors



### Selection table

| 4-pole AC / DC operated contactors | | | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lamp characteristics | | | Maximum permissible number of lamps per phase | | | | | | | | | | | | | |
| W | A | µF | | | | | | | | | | | | | | |
| **Incandescent and halogen lamps** | | | | | | | | | | | | | | | | **according to AC-5b** |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 60 | 0.27 | - | 64 | 77 | 103 | 114 | 177 | 207 | 259 | 430 | 519 | 704 | 759 | 981 | 1130 | 1370 |
| 100 | 0.45 | - | 38 | 46 | 62 | 68 | 106 | 124 | 155 | 258 | 311 | 422 | 456 | 589 | 678 | 822 |
| 200 | 0.91 | - | 19 | 23 | 30 | 34 | 52 | 61 | 77 | 127 | 154 | 209 | 225 | 291 | 335 | 407 |
| 300 | 1.37 | - | 12 | 15 | 20 | 22 | 35 | 41 | 51 | 85 | 102 | 139 | 150 | 193 | 223 | 270 |
| 500 | 2.28 | - | 7 | 9 | 12 | 13 | 21 | 24 | 30 | 51 | 61 | 83 | 90 | 116 | 134 | 162 |
| 1000 | 4.55 | - | 3 | 4 | 6 | 6 | 10 | 12 | 15 | 25 | 31 | 42 | 45 | 58 | 67 | 81 |
| **Fluorescent lamps without compensation - Fluorescent lamps with electronic starter** | | | | | | | | | | | | | | | | **according to AC-5a** |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 20 | 0.38 | - | 46 | 55 | 73 | 81 | 126 | 147 | 184 | 305 | 368 | 500 | 539 | 697 | 803 | 974 |
| 40 | 0.45 | - | 38 | 46 | 62 | 68 | 106 | 124 | 155 | 258 | 311 | 422 | 456 | 589 | 678 | 822 |
| 65 | 0.70 | - | 25 | 30 | 40 | 44 | 68 | 80 | 100 | 166 | 200 | 271 | 293 | 379 | 436 | 529 |
| 80 | 0.80 | - | 21 | 26 | 35 | 38 | 60 | 70 | 87 | 145 | 175 | 238 | 256 | 331 | 381 | 463 |
| 100 | 1.15 | - | 15 | 18 | 24 | 26 | 41 | 48 | 60 | 101 | 122 | 165 | 178 | 230 | 265 | 322 |
| 110 | 1.20 | - | 14 | 17 | 23 | 25 | 40 | 46 | 58 | 97 | 117 | 158 | 171 | 221 | 254 | 308 |
| **Fluorescent lamps with parallel compensation** | | | | | | | | | | | | | | | | **according to AC-5a** |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 20 | 0.18 | 5 | 53 | 53 | 110 | 110 | 266 | 309 | 309 | 644 | 778 | 1056 | 1139 | 1472 | 1694 | 2056 |
| 40 | 0.26 | 5 | 53 | 53 | 107 | 110 | 184 | 215 | 269 | 446 | 538 | 731 | 788 | 1019 | 1173 | 1423 |
| 65 | 0.42 | 7 | 37 | 37 | 66 | 73 | 114 | 133 | 166 | 276 | 333 | 452 | 488 | 631 | 726 | 881 |
| 80 | 0.52 | 7 | 33 | 37 | 53 | 59 | 92 | 107 | 134 | 223 | 269 | 365 | 394 | 510 | 587 | 712 |
| 100 | 0.65 | 16 | 16 | 16 | 34 | 34 | 73 | 86 | 96 | 178 | 215 | 292 | 315 | 408 | 469 | 569 |
| 110 | 0.70 | 18 | 14 | 14 | 30 | 30 | 68 | 80 | 86 | 166 | 200 | 271 | 293 | 379 | 436 | 529 |
| **Fluorescent lamps in dual mounting** | | | | | | | | | | | | | | | | **according to AC-5a** |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 2 x 20 | 2 x 0.14 | - | 62 | 75 | 100 | 110 | 171 | 200 | 250 | 414 | 500 | 679 | 732 | 946 | 1089 | 1321 |
| 2 x 40 | 2 x 0.25 | - | 35 | 42 | 56 | 62 | 96 | 112 | 140 | 232 | 280 | 380 | 410 | 530 | 610 | 740 |
| 2 x 65 | 2 x 0.40 | - | 21 | 26 | 35 | 38 | 60 | 70 | 87 | 145 | 175 | 238 | 256 | 331 | 381 | 463 |
| 2 x 80 | 2 x 0.48 | - | 18 | 21 | 29 | 32 | 50 | 58 | 72 | 121 | 146 | 198 | 214 | 276 | 318 | 385 |
| 2 x 100 | 2 x 0.60 | - | 14 | 17 | 23 | 25 | 40 | 46 | 58 | 97 | 117 | 158 | 171 | 221 | 254 | 308 |
| 2 x 110 | 2 x 0.65 | - | 13 | 16 | 21 | 23 | 36 | 43 | 53 | 89 | 108 | 146 | 158 | 204 | 235 | 285 |
| **Compact fluorescent lamps** | | | | | | | | | | | | | | | | **according to AC-5a** |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 5 | 0.045 | - | 388 | 466 | 622 | 688 | 1066 | 1244 | 1555 | 2578 | 3111 | 4222 | 4556 | 5889 | 6778 | 8222 |
| 7 | 0.075 | - | 233 | 280 | 373 | 413 | 640 | 746 | 933 | 1547 | 1867 | 2533 | 2733 | 3533 | 4067 | 4933 |
| 11 | 0.105 | - | 166 | 200 | 266 | 295 | 457 | 533 | 666 | 1105 | 1333 | 1810 | 1952 | 2524 | 2905 | 3524 |
| 15 | 0.135 | - | 129 | 155 | 207 | 229 | 355 | 414 | 518 | 859 | 1037 | 1407 | 1519 | 1963 | 2259 | 2741 |
| 20 | 0.160 | - | 109 | 131 | 175 | 193 | 300 | 350 | 437 | 725 | 875 | 1188 | 1281 | 1656 | 1906 | 2313 |
| 23 | 0.180 | - | 97 | 116 | 155 | 172 | 266 | 311 | 388 | 644 | 778 | 1056 | 1139 | 1472 | 1694 | 2056 |
| **Low pressure sodium vapour lamps without compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 35 | 1.4 | - | 9 | 12 | 15 | 16 | 23 | 31 | 39 | 70 | 85 | 115 | 124 | 161 | 185 | 225 |
| 55 | 1.4 | - | 9 | 12 | 15 | 16 | 23 | 31 | 39 | 70 | 85 | 115 | 124 | 161 | 185 | 225 |
| 90 | 2.1 | - | 6 | 8 | 10 | 10 | 15 | 20 | 26 | 47 | 57 | 77 | 83 | 107 | 123 | 150 |
| 135 | 3.1 | - | 4 | 5 | 6 | 7 | 10 | 14 | 17 | 32 | 38 | 52 | 56 | 73 | 84 | 101 |
| 180 | 3.1 | - | 4 | 5 | 6 | 7 | 10 | 14 | 17 | 32 | 38 | 52 | 56 | 73 | 84 | 101 |
| **Low pressure sodium vapour lamps with parallel compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 35 | 0.6 | 20 | 12 | 12 | 27 | 27 | 55 | 73 | 77 | 164 | 198 | 269 | 290 | 375 | 432 | 524 |
| 55 | 0.6 | 20 | 12 | 12 | 27 | 27 | 55 | 73 | 77 | 164 | 198 | 269 | 290 | 375 | 432 | 524 |
| 90 | 0.9 | 25 | 10 | 10 | 22 | 22 | 36 | 48 | 61 | 110 | 132 | 179 | 194 | 250 | 288 | 349 |
| 135 | 0.9 | 45 | 5 | 5 | 12 | 12 | 34 | 34 | 34 | 110 | 132 | 179 | 194 | 250 | 288 | 349 |
| 180 | 0.9 | 45 | 5 | 5 | 12 | 12 | 34 | 34 | 34 | 110 | 132 | 179 | 194 | 250 | 288 | 349 |

# Lighting circuit switching

## Contactor selection AF09 ... AF370 4-pole contactors

### Selection table

| 4-pole AC / DC operated contactors | | | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lamp characteristics | | | Maximum permissible number of lamps per phase | | | | | | | | | | | | | |
| W | A | µF | | | | | | | | | | | | | | |
| **High pressure sodium vapour lamps without compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 150 | 1.8 | - | 7 | 9 | 11 | 12 | 18 | 24 | 30 | 45 | 54 | 74 | 80 | 103 | 119 | 144 |
| 250 | 3,0 | - | 4 | 5 | 7 | 7 | 11 | 14 | 18 | 27 | 33 | 44 | 48 | 62 | 71 | 86 |
| 400 | 4.4 | - | 3 | 3 | 4 | 5 | 7 | 10 | 12 | 18 | 22 | 30 | 33 | 42 | 49 | 59 |
| 600 | 6.2 | - | 2 | 2 | 3 | 3 | 5 | 7 | 8 | 13 | 16 | 21 | 23 | 30 | 34 | 42 |
| 1000 | 10.3 | - | 1 | 1 | 2 | 2 | 3 | 4 | 5 | 8 | 10 | 13 | 14 | 18 | 21 | 25 |
| **High pressure sodium vapour lamps with parallel compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 150 | 1,0 | 20 | 12 | 12 | 21 | 23 | 33 | 43 | 55 | 93 | 112 | 152 | 164 | 212 | 244 | 296 |
| 250 | 1.5 | 36 | 7 | 7 | 14 | 15 | 22 | 29 | 36 | 62 | 75 | 101 | 109 | 141 | 163 | 197 |
| 400 | 2.5 | 48 | 5 | 5 | 8 | 9 | 13 | 17 | 22 | 37 | 45 | 61 | 66 | 85 | 98 | 118 |
| 600 | 3.3 | 65 | 3 | 3 | 6 | 6 | 10 | 13 | 16 | 28 | 34 | 46 | 50 | 64 | 74 | 90 |
| 1000 | 6.2 | 100 | 2 | 2 | 3 | 3 | 5 | 7 | 8 | 15 | 18 | 25 | 26 | 34 | 39 | 48 |
| **High pressure mercury vapour lamps without compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 50 | 0.60 | - | 22 | 28 | 35 | 38 | 55 | 73 | 91 | 152 | 190 | 261 | 333 | 380 | 475 | 570 |
| 80 | 0.80 | - | 16 | 21 | 26 | 28 | 41 | 55 | 68 | 114 | 143 | 196 | 249 | 285 | 356 | 428 |
| 125 | 1.15 | - | 11 | 14 | 18 | 20 | 28 | 38 | 47 | 79 | 99 | 136 | 173 | 198 | 248 | 297 |
| 250 | 2.15 | - | 6 | 7 | 9 | 10 | 15 | 20 | 25 | 42 | 53 | 73 | 93 | 106 | 133 | 159 |
| 400 | 3.25 | - | 4 | 5 | 6 | 7 | 10 | 13 | 16 | 28 | 35 | 48 | 61 | 70 | 88 | 105 |
| 700 | 5.40 | - | 2 | 3 | 3 | 4 | 6 | 8 | 10 | 17 | 21 | 29 | 37 | 42 | 53 | 63 |
| 1000 | 7.50 | - | 1 | 2 | 2 | 3 | 4 | 5 | 7 | 12 | 15 | 21 | 27 | 30 | 38 | 46 |
| **Voltage: 380/415 V AC** | | | | | | | | | | | | | | | | |
| 2000 | 8 | - | 1 | 2 | 2 | 2 | 4 | 5 | 6 | 11 | 14 | 20 | 25 | 29 | 36 | 43 |
| **High pressure mercury vapour lamps with compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 50 | 0.28 | 7 | 36 | 36 | 75 | 79 | 117 | 157 | 196 | 326 | 407 | 560 | 713 | 814 | 1018 | 1221 |
| 80 | 0.43 | 8 | 31 | 31 | 48 | 53 | 76 | 102 | 127 | 212 | 265 | 365 | 464 | 530 | 663 | 795 |
| 125 | 0.66 | 10 | 20 | 25 | 31 | 34 | 50 | 66 | 83 | 138 | 173 | 238 | 302 | 345 | 432 | 518 |
| 250 | 1.28 | 18 | 10 | 13 | 16 | 17 | 25 | 34 | 42 | 71 | 89 | 122 | 156 | 178 | 223 | 267 |
| 400 | 2.05 | 25 | 6 | 8 | 10 | 11 | 16 | 21 | 26 | 44 | 56 | 76 | 97 | 111 | 139 | 167 |
| 700 | 3.55 | 40 | 3 | 4 | 5 | 6 | 9 | 12 | 15 | 26 | 32 | 44 | 56 | 64 | 80 | 96 |
| 1000 | 4.83 | 60 | 2 | 3 | 4 | 4 | 6 | 9 | 11 | 19 | 24 | 32 | 41 | 47 | 59 | 71 |
| **Voltage: 380/415 V AC** | | | | | | | | | | | | | | | | |
| 2000 | 5,45 | 35 | 2 | 3 | 3 | 4 | 6 | 8 | 10 | 17 | 21 | 29 | 37 | 42 | 52 | 63 |
| **Metal halide vapour lamps without compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 250 | 3 | - | 4 | 5 | 7 | 7 | 11 | 14 | 18 | 27 | 33 | 46 | 58 | 67 | 83 | 100 |
| 400 | 4 | - | 3 | 4 | 5 | 5 | 8 | 11 | 13 | 20 | 25 | 34 | 44 | 50 | 63 | 75 |
| 1000 | 9.5 | - | 1 | 1 | 2 | 2 | 3 | 4 | 5 | 8 | 11 | 14 | 18 | 21 | 26 | 32 |
| 2000 | 16.5 | - | 0 | 1 | 1 | 1 | 2 | 2 | 3 | 5 | 6 | 8 | 11 | 12 | 15 | 18 |
| **Voltage: 380/415 V AC** | | | | | | | | | | | | | | | | |
| 2000 | 10.5 | - | 1 | 1 | 2 | 2 | 3 | 4 | 5 | 8 | 10 | 13 | 17 | 19 | 24 | 29 |
| **Metal halide vapour lamps with compensation** | | | | | | | | | | | | | | | | |
| **Voltage: 220/240 V AC** | | | | | | | | | | | | | | | | |
| 250 | 1.32 | 33 | 7 | 7 | 15 | 16 | 25 | 33 | 41 | 69 | 86 | 119 | 151 | 173 | 216 | 259 |
| 400 | 2.22 | 45 | 5 | 5 | 9 | 10 | 14 | 19 | 24 | 41 | 51 | 71 | 90 | 103 | 128 | 154 |
| 1000 | 5.14 | 85 | 2 | 3 | 4 | 4 | 6 | 8 | 10 | 18 | 22 | 30 | 39 | 44 | 55 | 67 |
| 2000 | 11.5 | 148 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 8 | 10 | 14 | 17 | 20 | 25 | 30 |
| **Voltage: 380/415 V AC** | | | | | | | | | | | | | | | | |
| 2000 | 6.10 | 60 | 2 | 2 | 3 | 3 | 5 | 7 | 9 | 15 | 19 | 26 | 33 | 37 | 47 | 56 |

# Parallel connection of main poles

## General

Purpose: Increasing the AC resistive load by wiring connection of main poles in parallel.

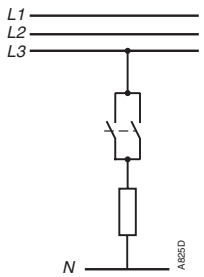
Remarks:

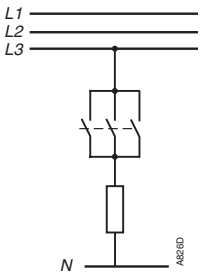
- Parallel connection of main poles to increase the DC resistive load is not acceptable
- Parallel connection of main poles does not increase the breaking capacity.

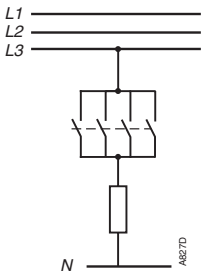
The table below shows the uprating factor for Ie / AC-1 max. in relation to the number of poles wired connected in parallel and for a maximum switching frequency.

Note: The poles can be connected in parallel via following connecting strips. See details and permissible current in "Accessory" part.

- LP, LH, LY and LF for parallel connection of 2 or 3 poles
- LG for parallel connection of 4 poles.




| | | | 2 poles in parallel | 3 poles in parallel | 4 poles in parallel |
|---|---|---|---|---|---|
| **Contactors** | | | **Factor to be applied to the rated operational current Ie / AC-1 to obtain the permissible current Ie / AC-1 with "n" poles in parallel** | | |
| AC operated | DC operated | Cycles / h | | | |
| **3-pole contactors** | | | | | |
| AF09 ... AF96 | AF09 ... AF96 | 600 | 1.6 | 2.2 | – |
| AF116 ... AF1250 | AF116 ... AF1250 | 300 | 1.6 | 2.2 | – |
| AF1350 ... AF2650 | AF1350 ... AF2650 | 30 | 1.6 | 2.2 | – |
| **4-pole contactors** | | | | | |
| AF09 ... AF38<br>A45 ... A75 | AF09 ... AF38 | 600 | 1.6 | 2.2 | 2.6 |
| AF45 ... AF75 | AE45 ... AE75<br>TAE45 ... TAE75<br>AF45 ... AF75 | 300 | 1.6 | 2.2 | 2.6 |
| EK | EK | 300 | 1.6 | 2.2 | 2.8 |

# Temporary or intermittent duty

### Utilization of contactors for temporary / intermittent duty

The table below shows the factor (known as "On-load factor") to be applied to the rated operational current Ie / AC-1 to obtain the permissible operational current Ie / AC-1 in relation to the switching frequency and the current flow time per cycle.

| Operating cycles per hour | | 1 | 2 | 3 | 6 | 12 | 20 | 30 | 60 | 120 |
|---|---|---|---|---|---|---|---|---|---|---|
| Prefered classes acc. to IEC 60947-4-1 | | 1 | – | 3 | – | 12 | – | 30 | – | 120 |
| Current flow time per cycle | | Factors applicable to Ie / AC-1 | | | | | | | | |
| | 5 s | 5.2 | 5 | 4.9 | 4.7 | 4.3 | 4.0 | 3.7 | 3.4 | 2.8 |
| | 10 s | 3.8 | 3.7 | 3.6 | 3.4 | 3.1 | 3.0 | 2.8 | 2.6 | 2.2 |
| | 20 s | 2.8 | 2.7 | 2.7 | 2.6 | 2.5 | 2.4 | 2.2 | 2.0 | 1.5 |
| | 30 s | 2.4 | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 1.9 | 1.7 | – |
| | 40 s | 2.2 | 2.1 | 2.1 | 2.0 | 1.9 | 1.9 | 1.7 | 1.5 | – |
| | 60 s | 1.9 | 1.8 | 1.8 | 1.8 | 1.7 | 1.7 | 1.5 | – | – |

**Example:**

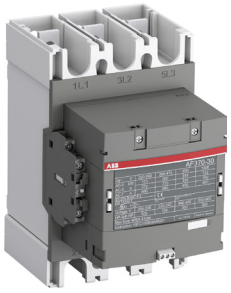
**AF09 contactor (intermittent duty, resistive load)**

| | |
|---|---|
| Rated operational current Ie / AC-1 at 60 °C | |
| (see "Technical data: main pole utilization characteristics") | 25 A |
| Switching frequency | 2 operating cycles/h |
| Current flow time per cycle | 20 s |
| Factor to be applied to the current Ie / AC-1 | 2.7 |
| Permissible current: 2.7 x 25 = | 67 A |

# Influence of the length of conductors used in contactor control circuit




AF40-30-00




AF370-30-11

Under certain conditions the excessive length of the control circuit conductors may prevent the contactor from carrying out closing and opening orders.

- **no closing:** due to excessive voltage drop (in AC or DC)
- **no opening:** due to excessive capacitance (in AC).

### Contactor Closing (contactor with AC or DC operated coil).

The voltage drop is due to the pull-in current (pull-in power) and to the resistance of the control circuit conductors.

The table and graph below can be used to determine the single length of line feeders (distance between the control device and the contactor coil) in relation to:

- the coil pull-in consumption.
- the supply voltage.
- the connecting wire cross-sectional area.

### The graph has been drawn for a max. line voltage drop of 5 %.

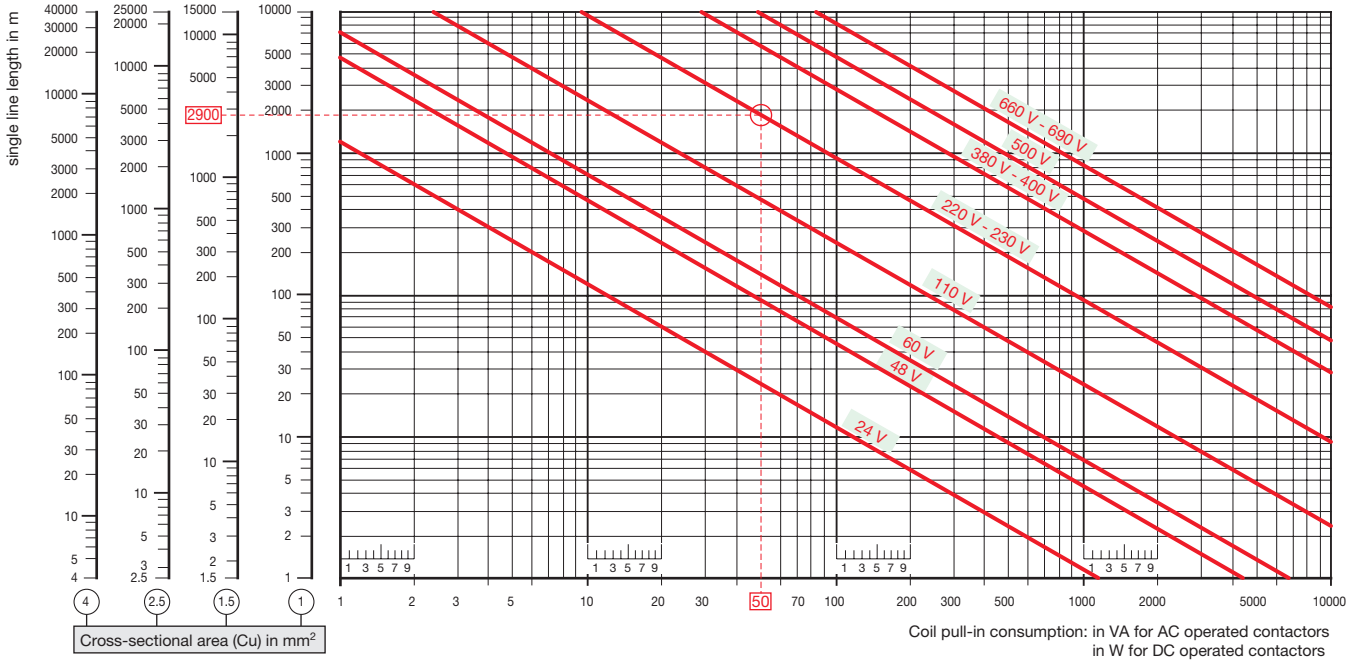
Coil pull-in consumption (average value)

| 3-pole contactors | AC control supply 50/60 Hz | DC control supply |
|---|---|---|
| AF09, AF12, AF16, AF26, AF30, AF38 | 50 VA | 50 W |
| AF09Z, AF12Z, AF16Z, AF26Z, AF30Z, AF38Z | 20 VA | 20 W |
| AF40, AF52, AF65 | 25 VA | 25 W |
| AF80, AF96 | 40 VA | 40 W |
| AF116, AF140, AF146 | 180 VA | 170 W |
| AF190, AF205 | 195 VA | 185 W |
| AF265, AF305, AF370 | 405 VA | 465 W |
| AF400, AF460 | 1005 VA | 960 W |
| AF580, AF750, AF1250 | 940 VA | 900 W |
| AF1350, AF1650, AF2050, AF2650 | 2450 VA | 2290 W |

| 4-pole contactors | AC control supply 50/60 Hz | DC control supply |
|---|---|---|
| AF09, AF16, AF26, AF38 | 50 VA | 50 W |
| AF09Z, AF16Z, AF26Z, AF38Z | 20 W | 20 W |
| AF40, AF52, AF80 | 40 VA | 40 W |
| AF116, AF140 | 185 VA | 170 W |
| AF190, AF205 | 190 VA | 180 W |
| AF265, AF305, AF370 | 405 VA | 445 W |

### Permissible single length for the control circuit conductors on contactor closing:

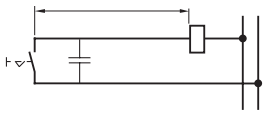
Depending on the coil pull-in power consumption on the supply voltage and on the control circuit conductor cross-sectional area.



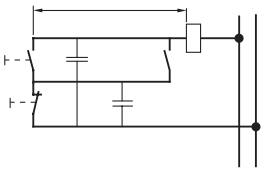

Example AF09 contactor: Coil voltage: 230 V 50 Hz, contactor coil pull-in power consumption: 50 VA, control circuit conductor cross-sectional area: Cu 1.5 mm². Max. permissible length: 2900 m.

# Influence of the length of conductors used in contactor control circuit

## Single control line length



**Wiring diagram A**
Via maintained pushbutton and 2-core cable (with a capacity of 0.2 µF/km, for example).



**Wiring diagram B**
Via momentary pushbutton plus hold-in contact and 3-core cable (with a capacity of 2 x 0.2 = 0.4 µF/km, for example).

## Contactor Opening (contactor with AC operated coil)

Under certain conditions, an AC operated contactor does not open when the control circuit is de-energized.

This is due to a critical capacity of the excessively long control circuit line and the type of contactor coil control layout (see diagrams A and B opposite). This may be caused by the following factors:

- high control voltage
- low coil holding consumption
- low contactor drop-out voltage (according to IEC 60947-4-1: 0.2 to 0.75 x Uc).

If lines longer than those indicated are required, the following measures must be taken:

- select a contactor with a higher rating
- select a lower control voltage
- connect “Rp” resistance in parallel with the contactor coil:

$$RP = \frac{10^3}{C}\ \Omega \text{(with C in µF)}$$

The table and graph below can be used to determine the single length of line feeders (distance between the control device and the contactor coil) in relation to:

- the coil holding consumption VA
- the supply voltage
- the capacity in µF/km (depending on the control layout).

Wiring diagrams A and B opposite show two supply and coil control wiring examples.

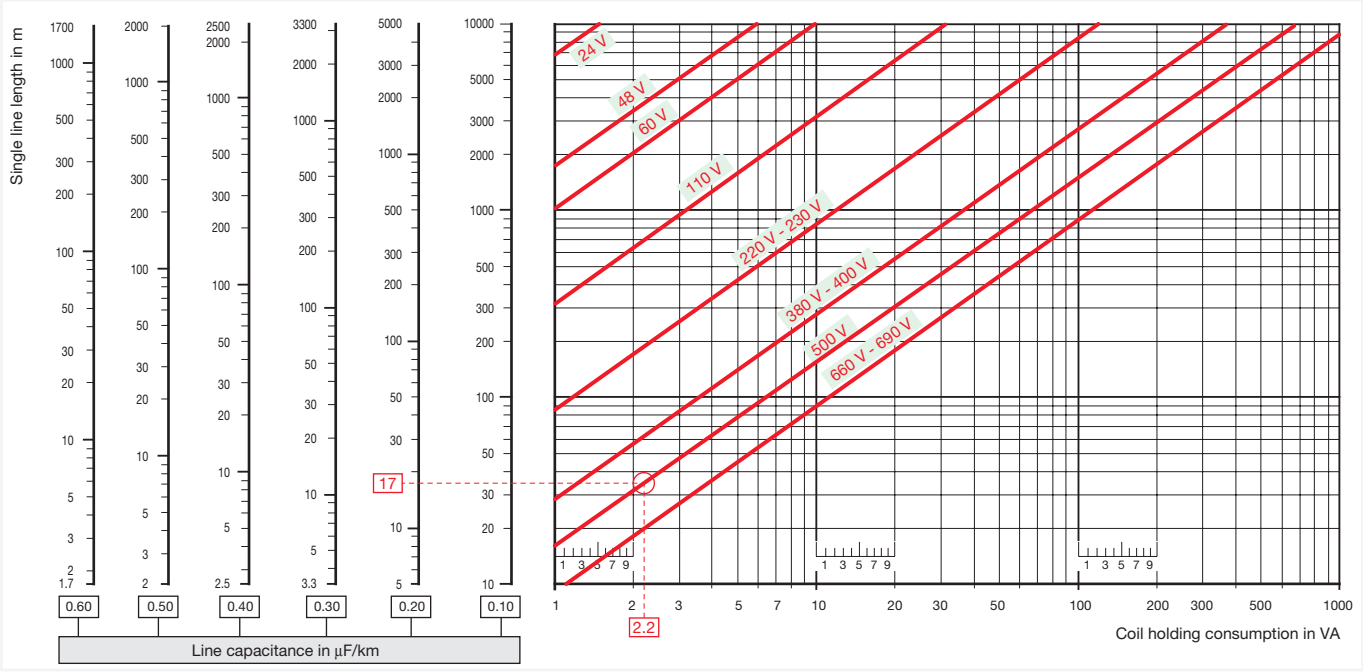
Coil holding consumption (average value)

| 3-pole contactors | AC control supply 50/60 Hz |
|---|---|
| AF09, AF12, AF16, AF26, AF30, AF38 | 2.2 VA |
| AF09Z, AF12Z, AF16Z, AF26Z, AF30Z, AF38Z | 1.7 VA |
| AF40, AF52, AF65, AF80, AF96 | 4 VA |
| AF116, AF140, AF146 | 8.9 VA |
| AF190, AF205 | 9.3 VA |
| AF265, AF305, AF370 | 16.6 VA |
| AF400, AF460, AF580, AF750, AF1250 | 12 VA |
| AF1350, AF1650, AF2050, AF2650 | 48 VA |

| 4-pole contactors | AC control supply 50/60 Hz |
|---|---|
| AF09, AF16, AF26, AF38 | 2.2 VA |
| AF09Z, AF16Z, AF26Z, AF38Z | 1.7 VA |
| AF40, AF52, AF80 | 4 VA |
| AF116, AF140, AF190, AF205 | 8 VA |
| AF265, AF305, AF370 | 16 VA |

## Permissible single length for the control circuit conductors on contactor opening:

Depending on the coil holding power consumption, on the supply voltage and on the control circuit conductor capacity.




Example AF16 contactor: Coil voltage Uc = 500 V, 50 Hz, 2.2 VA contactor coil holding consumption, control type: diagram A, via maintained pushbutton, and 2-core cable with a capacity of 0.2 µF/km. Max. permissible length: 17 m.

# Voltage code table

The below tables indicate the available coil voltages and corresponding digits for order codes. When placing an order, please give the order code. Select a standard contactor from ordering detail pages. Change the coil voltage code in the order code according to the table below. Example: for contactor AF400-30-11 and coil 100...250 V 50/60 Hz, the order code is: 1SFL577001R7011.

## AF09 ... AF370 3-pole contactors
## AF09 ... AF370 4-pole contactors



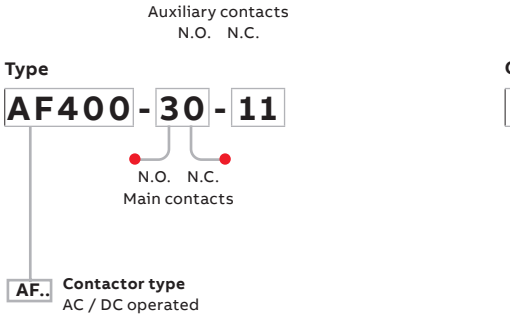

| | AC coil code 50/60 Hz | DC coil code |
|---|---|---|
| 41 | 24...60 V | - |
| 11 | 24...60 V | 20...60 V |
| 12 | 48...130 V | 48...130 V |
| **13** | **100...250 V** | **100...250 V** |
| 14 | 250...500 V | 250...500 V |

Coil 41: not available for AF116 ... AF370

### AF116 ... AF370 3-pole contactors with built-in PLC interface

| | AC coil code 50/60 Hz | DC coil code |
|---|---|---|
| 33 | 100...250 V | 100...250 V |
| 34 | 250...500 V | 250...500 V |

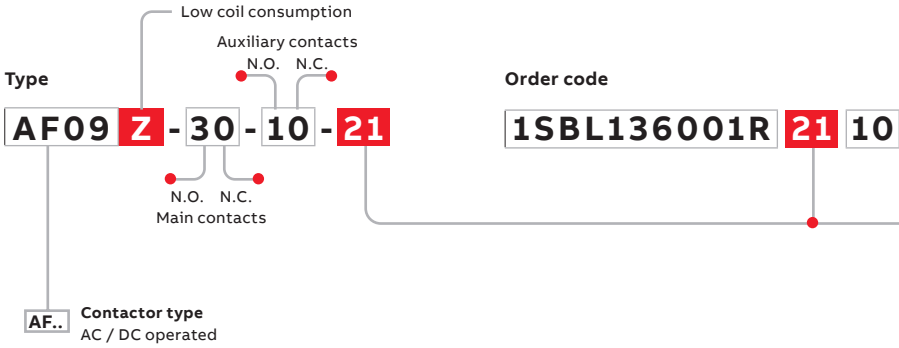
## AF400 ... AF2650 3-pole contactors




| | AC coil code 50/60 Hz | DC coil code |
|---|---|---|
| 68 | - | 24...60 V |
| **69** | **48...130 V** | **48...130 V** |
| 70 | 100...250 V | 100...250 V |
| 71 | 250...500 V | 250...500 V |

Coil 68, 69, 71: not available for AF1350 ... AF2650

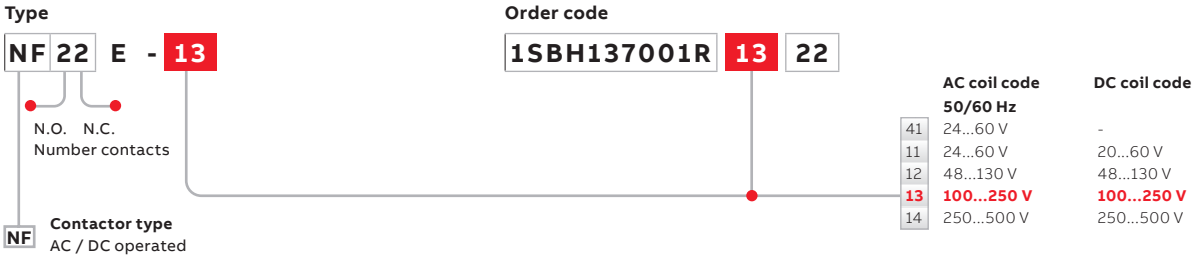
## AF09 ... AF38 3- and 4-pole contactors - low consumption



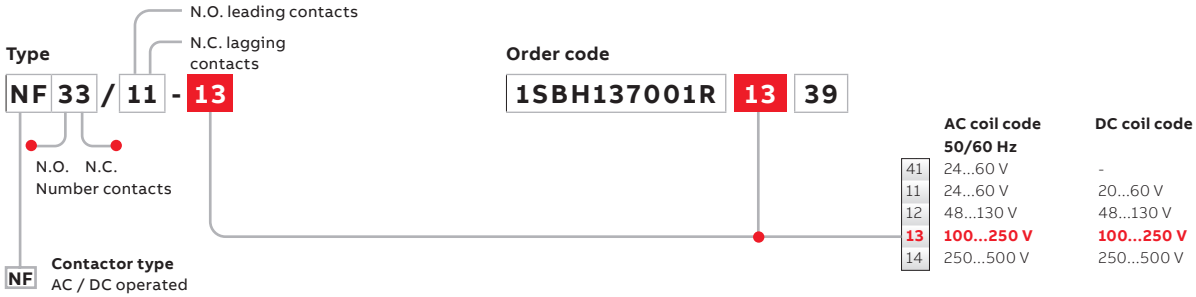

| | AC coil code 50/60 Hz | DC coil code |
|---|---|---|
| 20 | - | 12...20 V |
| **21** | **24...60 V** | **20...60 V** |
| 22 | 48...130 V | 48...130 V |
| 23 | 100...250 V | 100...250 V |

# Voltage code table

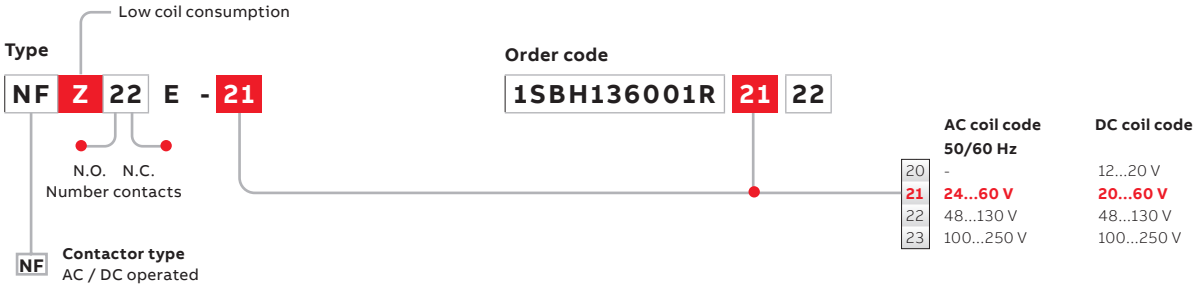
## NF contactor relays



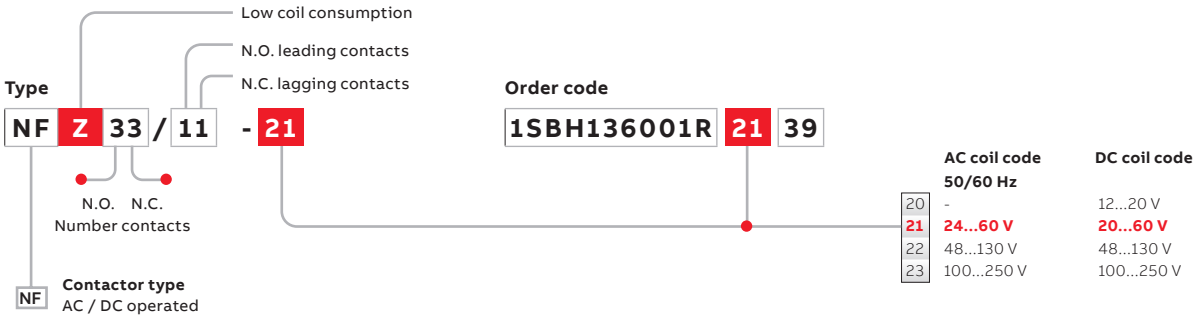

## NF contactor relays with overlapping of lagging / leading contacts




## NF contactor relays - low consumption

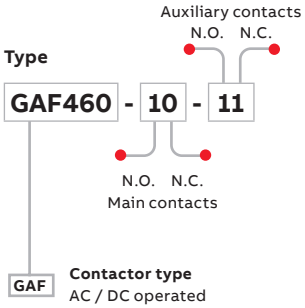



## NF contactor relays with overlapping of lagging / leading contacts - low consumption



# Voltage code table

## GAF460 ... GAF1250 contactors

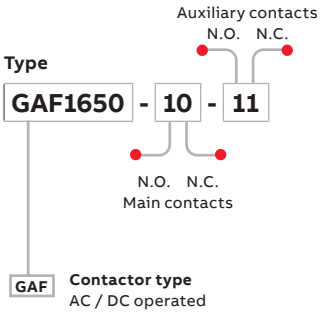



**Order code**

**1SFL597025R** **69** **11**

| | AC coil code 50/60 Hz | DC coil code |
|---|---|---|
| 68 | - 24...60 V | |
| **69** | **48...130 V** | **48...130 V** |
| 70 | 100...250 V | 100...250 V |
| 71 | 250...500 V | 250...500 V |

## GAF1650, GAF2050 contactors



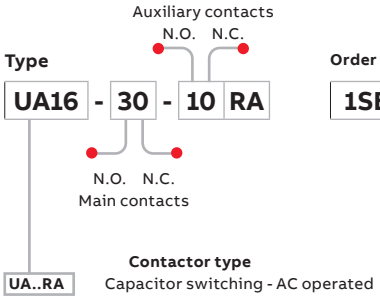

**Order code**

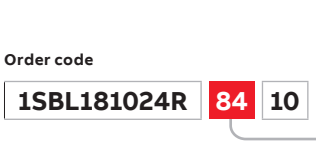
**1SFL677025R** **70** **11**

| | AC coil code 50/60 Hz | DC coil code |
|---|---|---|
| **70** | **100...250 V** | **100...250 V** |

# Voltage code table

## UA..RA contactors

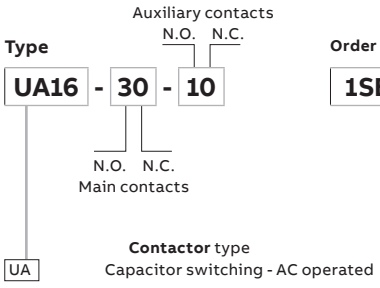



| Contactors: UA..RA AC coil code | 50 Hz | 60 Hz |
|---|---|---|
| **81** | **24 V** | **24 V** |
| **84** | **110 V** | **110**...120 V |
| **89** | 110...**115 V** | **115**...127 V |
| 36 | 190 V | 220 V |
| **80** | 220...**230 V** | **230**...240 V |
| **88** | 230...**240 V** | **240**...260 V |
| **85** | 380...**400 V** | **400**...415 V |
| **86** | 400...**415 V** | **415**...440 V |
| 75 | **200 V** | **200**...220 V |

Codes in bold for dual frequency coils.

## UA contactors





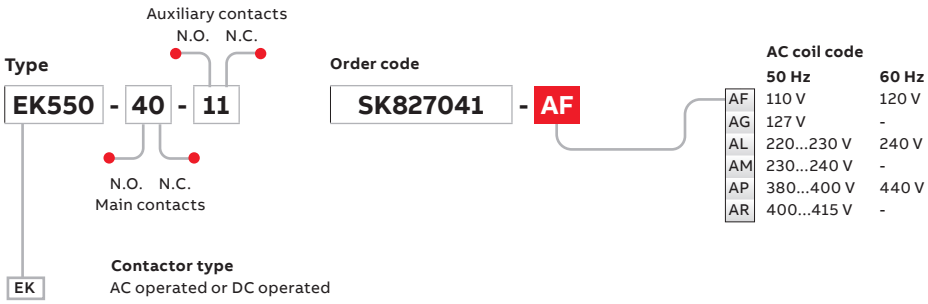


| Contactors: UA AC coil code | 50 Hz | 60 Hz |
|---|---|---|
| **81** | **24 V** | **24 V** |
| **83** | **48 V** | **48 V** |
| **84** | **110 V** | **110**...120 V |
| **89** | 110...**115 V** | **115**...127 V |
| 36 | 190 V | 220 V |
| **80** | 220...**230 V** | **230**...240 V |
| **88** | 230...**240 V** | **240**...260 V |
| 42 | 230...240 V | 277 V |
| **85** | 380...**400 V** | **400**...415 V |
| **86** | 400...**415 V** | **415**...440 V |
| **75** | **200 V** | **200**...220 V |

Codes in bold for dual frequency coils.

# Voltage code table

## EK550, EK1000 contactors




**AC coil code**

| | 50 Hz | 60 Hz |
|---|---|---|
| AF | 110 V | 120 V |
| AG | 127 V | - |
| AL | 220...230 V | 240 V |
| AM | 230...240 V | - |
| AP | 380...400 V | 440 V |
| AR | 400...415 V | - |

**Dual frequency coil code**

| | 50 Hz | 60 Hz |
|---|---|---|
| EL | 220 V | 220...240 V |
| EM | 220...230 V | 230...255 V |

2 auxiliary contact blocks maximum per contactor, ambient temperature ≤ 55 °C and mounting positions 2 and 6 excluded.

**DC coil code**

| | |
|---|---|
| DD | 48 V |
| DE | 110 V |
| DU | 125 V |
| DF | 220 V |

# Notes

# Questionnaire for product specifications: Block contactors

Tel.: e-mail:
Segments:

Tel.: e-mail:
Date:

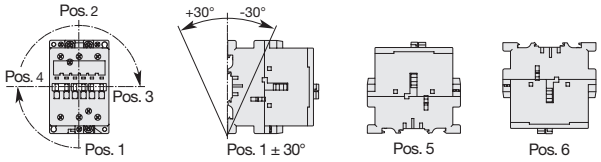
## Application

Type: No of phases:
Utilisation category (AC/DC): % AC4 if any:
Rated operational voltage Ue: V Cos j:

Frequency: Hz L/R: ms
Nominal current In: A
Making current: A Breaking current: A
Duty: ☐ continuous ☐ temporary ☐ intermittent
Load factor (% of ON time): %
Number of cycles per hour: or per year:
Expected durability: operating cycles
Number of main poles N.O.: N.C.:
Other information:

## Installation

Ambient temperature:
Ambient environment:
Humidity: %
Chemical pollution:
Other:
Mounting position, see drawing below (Position 6: please consult factory):




Wiring: ☐ Clamping screws or cage connectors
☐ Cable lugs (ring tongue)
Other: Cross section:
Additional comments:

## Control circuit

Rated control Uc voltage: V ☐ DC ☐ AC f: Hz
Minimum / maximum: V to V
Surge suppressor: type:
Interface with PLC: mA V DC
Accessories:
Number of auxiliary contacts: N.O.: N.C.:
Low level contacts: mA V ☐ DC ☐ AC

## Protection

Short circuit protection:
Type: ☐ Fuse ☐ Circuit breaker ☐ Manual motor starter
Max short circuit current: A
Motor protection: ☐ Overload relay ☐ Manual Motor Starter ☐ Electronic overload relay

## Logistic and packaging

Quantity by batch:
Delivery order:
Expected quantity: per year
Expected first delivery date: and Qty:
Quantity on first 6 month: on first year:

## Approvals and other requirements

Reference standards:
Required approvals:
Customer specifications:
Shock and vibrations:
Specific quality assurance clauses:
Other comments:

# Questionnaire for product specifications: Block contactors



Other comments:

## User Guide for the questionnaire

**This document is used to define the contactor specifications according to the complete information on the application. Do not hesitate to join some complementary documents if necessary (schemes, tables, customer specification...).**

Please see below some definitions to help you :

**Operating cycle**

Includes one making operation and one breaking operation.

**Electrical Durability**

Number of on-load operating cycles that the contactor is able to carry out. It depends on the utilization category.

**Mechanical Durability**

Number of no-current operating cycles that the contactor is able to carry out

**Load Factor**

Ratio of the on-load operating time to the total cycle time x 100 (%).

**Intermittent Duty**

Duty during which the contactor is successively closed or open for periods which are too short to enable the contactor to achieve thermal balance.

**Temporary Duty**

Duty in which the main contacts of the contactor remain closed for periods insufficient to allow the equipment to reach stabilized temperature, the unload periods being separated by off-load periods of sufficient duration to restore the ambient temperature

**Continuous Duty**

Duty in which the main contacts of the contactor remain closed, with a continuous current during enough time to reach thermal stabilization, but no more than eight hours without interruption.

**Ambient Temperature**

Air temperature close to the contactor.

**Mounting Position**

Comply with the manufacturer's instructions. Restrictions could be taken into account for certain mounting positions.

A contactor's duty is characterized by the utilization category together with the rated operational voltage and current indicated:

**Utilization categories for contactors according to IEC 60947-4-1**
**Utilization categories for contactor relays according to IEC 60947-5-1**

See our catalog for further information in Standards and utilization categories part.

**Making and breaking current**

Current at contactor closing or at contactor opening

**Time constant L/R (for DC circuit)**

Ratio of the inductance to the resistance (L/R = mH/Ω = ms)



**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**GJL1213001R0107**

# B, M mini contactors
# K, M mini contactor relays


**4/**3 **B mini contactors**
**K mini contactor relays**

**4/**57 **M mini contactors**
**M mini contactor relays**



**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**GJL1213001R0107**

# B mini contactors
# K mini contactor relays


**4/**4 **Presentation**

**4/**8 **Overview**

**With screw terminals**

**4/**10 3-pole contactors AC and DC operated
**4/**12 3-pole reversing contactors AC and DC operated
**4/**16 3-pole low consumption contactors DC operated
**4/**17 4-pole contactors AC and DC operated
**4/**19 Contactor relays AC and DC operated
**4/**21 Low consumption contactor relays DC operated

**With soldering pins**

**4/**22 3-pole contactors AC and DC operated
**4/**24 3-pole reversing contactors AC and DC operated
**4/**28 3-pole low consumption contactors DC operated
**4/**29 Contactor relays AC and DC operated
**4/**31 Low consumption contactor relays DC operated

**With flat pin connection**

**4/**32 3-pole contactors AC and DC operated
**4/**34 3-pole reversing contactors AC and DC operated
**4/**38 3-pole low consumption contactors DC operated
**4/**39 Contactor relays AC and DC operated
**4/**40 Low consumption contactor relays DC operated

**4/**41 **Technical data**

**4/**48 **Accessories**

**4/**51 **Terminal marking and positioning**

**4/**52 **Dimension drawings**

# B mini contactors
## Flexibility in small spaces






B mini contactors are ideally suited for applications where reliability is a must and space is at a premium. The dimensions, technical features and the variety of the assortment provide customers a high flexibility in a wide-range of applications.

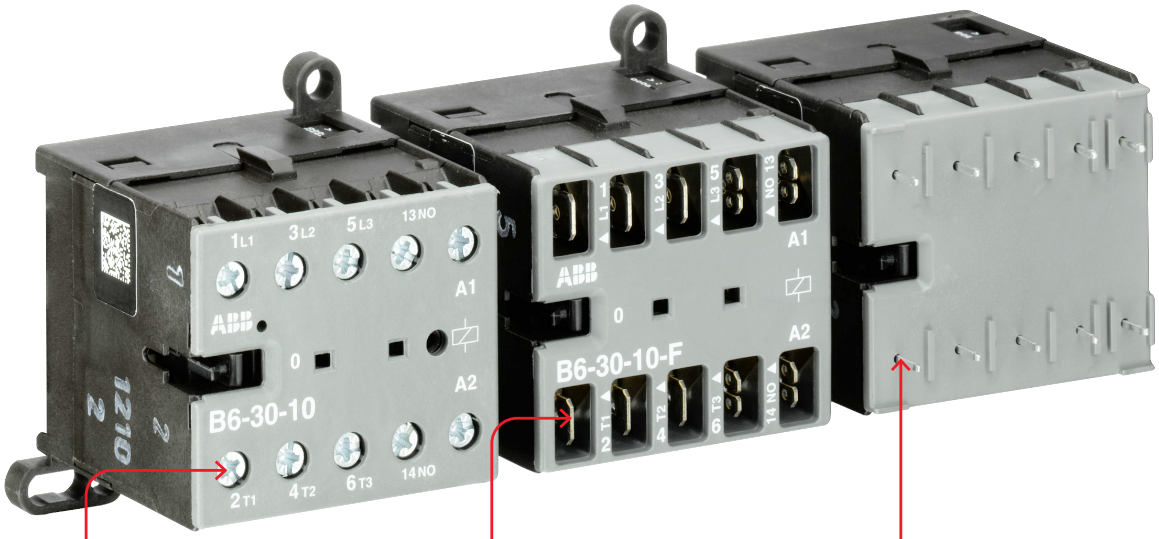
### Space-saving
**Designed to be mini**
This type of contactor is a specialist for applications in small spaces. It comes with three different terminal types. Side or front auxiliary contact blocks can be mounted to match the requirements of width or depth limitations.

### Optimum interface
**Great flexibility**
B mini contactors offer many possibilities to adapt to any project. It offers screw terminals, soldering pins or flat pin connectors and different coil versions. This makes this contactor a perfect fit and simplifies the installation greatly.

### Speed up your projects
**Simpler by design**
You can easily combine a manual motor starter or overload relay with a mini contactor in order to create the solution of your choice. Reversing starters come pre-assembled from the factory, which saves time. With the right accessories, this range is simple to use.

# B mini contactors

## Smart - flexibility and diversity in a small size




### Screw

**Screw terminals**

This conventional terminal type enables a quick connection to an installation using just a one size screwdriver. All terminal screws, from power to control, are aligned and accessible from the front for easy tightening.

### Flat pins

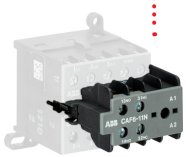
**Flat pin terminals**

Thanks to really quick plug-in assembling, good reliability of the connection and low costs, the flat pin terminals are already the favorite choice in many industry sectors. The best option when high connection speed is required.

### Soldering pins

**Soldering pin terminals**

This connection type allows an easy installation on PCB boards, where all components have to be soldered in place.
The soldering pins sustain currents up to AC-1/AC-3 12 A.



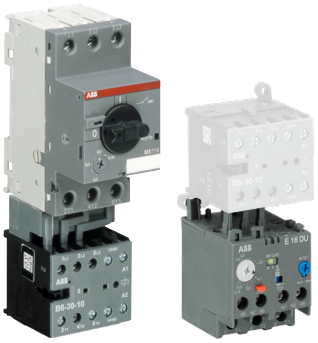
**Mountable in just about any place**

According to the available space, auxiliary contacts can be mounted on the front or at the side of the B mini. Also, additional surge protection can be fitted on any side of the contactor.



**Save assembly time**

This range offers reversing starters delivered as one piece from the factory. It avoids mounting mistakes and secures operation. It is also available with mechanical interlock for special demands.



**Perfect fit**

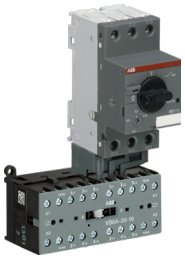
B mini contactors match manual motor starters or overload relays. This creates a space-saving and easy to install motor starting solution for a complete protection and control of your devices.

# Individual motor starting solutions



## Direct-On-Line Starter

A direct-on-line starter is a simple and economic solution for controlling three-phase asynchronous motors.
You can easily assemble a direct-on-line starter by connecting an B mini contactor with a M5116 and MS132 manual motor starter. The BEA7/132 is the dedicated connecting link for the B mini and MS116/ M5132.



## Reversing starters

Reversing starters use two contactors to interchange the connection of two terminals. This allows to change the direction of the motor.
Thanks to our complete range of accessories, you can easily assemble reversing starter combinations.



All starting solutions can also be realized with ABB mini contactors in combination with suitable overload relays and M0132 manual motor starter.
This allows to create individuai starting solutions in applications where space is at a premium.

# B mini contactors
## Compact - a tiny specialist for specific needs



**Choose your specialist.**
No matter what kind of application - The B mini contactors range includes contactors with low power consumption coils and integrated surge suppression for direct control by PLC. Dedicated relay versions for control functions or for small loads are also available.

### Motors control
With a maximum rated operational power AC-3 of 5.5 kW at 400 V the B mini contactors are the best solution for controlling the small motor inside your products. If the both direction control is needed, the preassembled reversing contactors are always ready to help.



### Resisitive loads
Not only motors! The B mini contactors can be used for the activation of your AC-1 loads up to 20 A as well. Heaters, coffee machines and ovens are just examples of products in which it is possible to utilize these reliable and silent devices as components.






### Marine applications
B mini contactors are covered by the most important marine approvals in order to ensure their suitability also for applications close to the see.

# B mini contactors





| | | | | Screw terminals | | | |
|---|---|---|---|---|---|---|---|
| **AC Control supply** | | | | | | | |
| 3-pole contactors | | Coil consumption 3.5 VA | Type | **B6** | **B7** | **-** | **-** |
| 3-pole reversing contactors | | Coil consumption 3.5 VA | Type | **-** | **-** | **VB6**<br>**VB6A (2)** | **VB7**<br>**VB7A (2)** |
| 4-pole contactors | | Coil consumption 3.5 VA | Type | **B6** | **B7** | **(3)** | **(3)** |
| **DC Control supply** | | | | | | | |
| 3-pole contactors | | Coil consumption 3.5 W | Type | **BC6** | **BC7**<br>**B7D (1)** | **-** | **-** |
| 3-pole reversing contactors | | Coil consumption 3.5 W | Type | **-** | **-** | **VBC6**<br>**VBC6A (2)** | **VBC7**<br>**VBC7A (2)** |
| 3-pole low consumption contactors | | Coil consumption 1.4 ... 2.8 W | Type | **BC6**<br>**B6S (1)** | **BC7**<br>**B7S (1)** | **(3)** | **(3)** |
| 4-pole contactors | | Coil consumption 3.5 W | Type | **BC6** | **B7D** | **(3)** | **(3)** |
| IEC | Rated operational power AC-3 | 220-230-240 V | kW | 2.2 | 3 | 2.2 | 3 |
| | | 380-400 V | kW | 4 | 5.5 | 4 | 5.5 |
| | Rated operational current AC-1 | 400 V, θ ≤ 40 °C | A | 20 | 20 | 20 | 20 |
| UL/CSA | 3-phase motor rating | 220-240 V AC | hp | 2 | 3 | 2 | 3 |
| | | 440-480 V AC | hp | 3 | 5 | 3 | 5 |
| | General use rating | | A | 12 (300 V) | 16 (600 V) | 12 (300 V) | 16 (600 V) |
| **Main accessories** | | | | | | | |
| Auxiliary contact blocks | | Front mounting | | CAF6 | | | |
| | | Side mounting | | CA6 | | **-** | |
| Connection sets | | For reversing contactors | | BSM6-30 | | | |
| Surge suppressors | | Varistor (AC/DC) | | RV-BC6 | | | |
| **Overload relays** | | | | | | | |
| Thermal overload relays<br>Thermal and phase failure protection, with single setup possible | | | Class 10 | T16 | | | |
| Electronic overload relays<br>With single setup possible | | | Class 10E, 20E, 30E | E16DU | | | |
| **Manual motor starters** | | | | | | | |
| Thermal / magnetic protection | | | Class 10 | MS116, MS132 | | | |
| Magnetic only types | | | | MO132 | | | |
| Connecting link to manual motor starters | | | | BEA7/132 | | | |

# K mini contactor relays



| | | | | Screw terminals |
|---|---|---|---|---|
| **AC Control supply** | | | | |
| 4-pole contactor relays | | Coil consumption 3.5 VA | Type | **K6** |
| **DC Control supply** | | | | |
| 4-pole contactor relays | | Coil consumption 3.5 W | Type | **KC6** |
| 4-pole low consumption contactor relays | | Coil consumption 1.4 ... 2.8 W | Type | **KC6, K6S (1)** |
| IEC | Rated operational current AC-15 | 220-230-240 V | A | 4 |
| | | 380-400 V | A | 3 |
| | Rated operational current DC-13 | 24 V | A | 2.5 |
| **Main accessories** | | | | |
| Auxiliary contact blocks | | Front mounting | | CAF6 |
| | | Side mounting | | CA6-11K |

(1) With integrated surge suppressor
(2) With safety blocking function
(3) Please visit: https://new.abb.com/low-voltage/products/motor-protection/3-pole-contactors-and-overload-relays-for-motor-starting/mini-contactors






| | Soldering pins | | | | Flat pins | | | |
|---|---|---|---|---|---|---|---|---|
| | **B6...P** | **B7...P** | **-** | **-** | **B6...F** | **B7...F** | **-** | **-** |
| | **-** | **-** | **VB6...P**<br>**VB6A...P (2)** | **VB7...P**<br>**VB7A...P (2)** | **-** | **-** | **VB6...F**<br>**VB6A...F (2)** | **VB7...F**<br>**VB7A...F (2)** |
| | **(3)** | **(3)** | **(3)** | **(3)** | **(3)** | **(3)** | | |
| | **BC6...P** | **BC7...P**<br>**B7D...P (1)** | **-** | **-** | **BC6...F** | **BC7...F**<br>**B7D...F (1)** | **-** | **-** |
| | **-** | **-** | **VBC6...P**<br>**VBC6A...P (2)** | **VBC7...P**<br>**VBC7A...P (2)** | **-** | **-** | **VBC6...F**<br>**VBC6A...F (2)** | **VBC7...F**<br>**VBC7A...F (2)** |
| | **BC6...P** | **BC7...P** | **(3)** | **(3)** | **BC6...F** | **BC7...F** | **-** | **-** |
| | **(3)** | **(3)** | **(3)** | **(3)** | **(3)** | **(3)** | | |
| | 2.2 | 3 | 2.2 | 3 | 2.2 | 3 | 2.2 | 3 |
| | 4 | 5.5 | 4 | 5.5 | 4 | 5.5 | 4 | 5.5 |
| | 12 | 12 | 12 | 12 | 20 | 20 | 20 | 20 |
| | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 |
| | 3 | 5 | 3 | 5 | 3 | 5 | 3 | 5 |
| | 12 (300 V) | 16 (600 V) | 12 (300 V) | 16 (600 V) | 12 (300 V) | 16 (600 V) | 12 (300 V) | 16 (600 V) |
| | - | | | | - | | | |
| | CA6-11K-P | | - | | CA6-11K-F | | - | |
| | - | | | | - | | | |
| | - | | | | - | | | |
| | - | | | | - | | | |
| | - | | | | - | | | |
| | MS116, MS132 | | | | MS116, MS132 | | | |
| | MO132 | | | | MO132 | | | |
| | - | | | | - | | | |




| | Soldering pins | Flat pins |
|---|---|---|
| | **K6...P** | **K6...F** |
| | **KC6...P** | **KC6...F** |
| | **KC6...P** | **KC6...F** |
| | 4 | 4 |
| | 3 | 3 |
| | 2.5 | 2.5 |
| | - | - |
| | CA6-11K-P | CA6-11K-F |

# B6, B7 3-pole mini contactors – with screw terminals

4 to 5.5 kW

AC operated




2CDC211001F0010

B6-30-10




2CDC211014F0011

B7-30-10

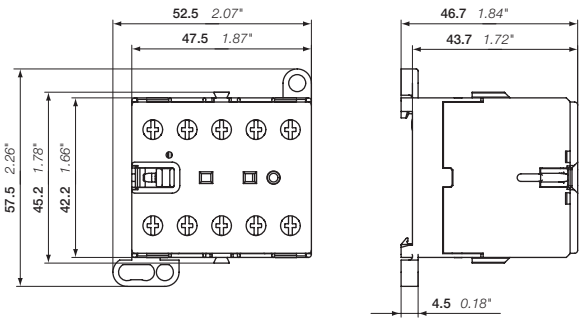
B6, B7 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating | 50 Hz | 60 Hz | | | | | |
| kW | A | hp | | V AC | V AC | | | | | kg |
| **B6 mini contactors** | | | | | | | | | | |
| 4 | 20 | 3 | 300 V / 12 A | 24 | 24 | 1 0 | B6-30-10-01 | GJL1211001R0101 | 10 | 0.175 |
| | | | | | | 0 1 | B6-30-01-01 | GJL1211001R0011 | 10 | 0.175 |
| | | | | 48 | 48 | 1 0 | B6-30-10-03 | GJL1211001R0103 | 10 | 0.175 |
| | | | | | | 0 1 | B6-30-01-03 | GJL1211001R0013 | 10 | 0.175 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | B6-30-10-84 | GJL1211001R8104 | 10 | 0.175 |
| | | | | | | 0 1 | B6-30-01-84 | GJL1211001R8014 | 10 | 0.175 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | B6-30-10-80 | GJL1211001R8100 | 10 | 0.175 |
| | | | | | | 0 1 | B6-30-01-80 | GJL1211001R8010 | 10 | 0.175 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | B6-30-10-85 | GJL1211001R8105 | 10 | 0.175 |
| | | | | | | 0 1 | B6-30-01-85 | GJL1211001R8015 | 10 | 0.175 |
| **B7 mini contactors** | | | | | | | | | | |
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 24 | 1 0 | B7-30-10-01 | GJL1311001R0101 | 10 | 0.175 |
| | | | | | | 0 1 | B7-30-01-01 | GJL1311001R0011 | 10 | 0.175 |
| | | | | 48 | 48 | 1 0 | B7-30-10-03 | GJL1311001R0103 | 10 | 0.175 |
| | | | | | | 0 1 | B7-30-01-03 | GJL1311001R0013 | 10 | 0.175 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | B7-30-10-84 | GJL1311001R8104 | 10 | 0.175 |
| | | | | | | 0 1 | B7-30-01-84 | GJL1311001R8014 | 10 | 0.175 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | B7-30-10-80 | GJL1311001R8100 | 10 | 0.175 |
| | | | | | | 0 1 | B7-30-01-80 | GJL1311001R8010 | 10 | 0.175 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | B7-30-10-85 | GJL1311001R8105 | 10 | 0.175 |
| | | | | | | 0 1 | B7-30-01-85 | GJL1311001R8015 | 10 | 0.175 |

Other types on request




B6, B7

Main dimensions mm, inches

# BC6, BC7, B7D 3-pole mini contactors – with screw terminals

4 to 5.5 kW

DC operated




2CDC211040F0011

BC6-30-10




2CDC211013F0011

BC7-30-10

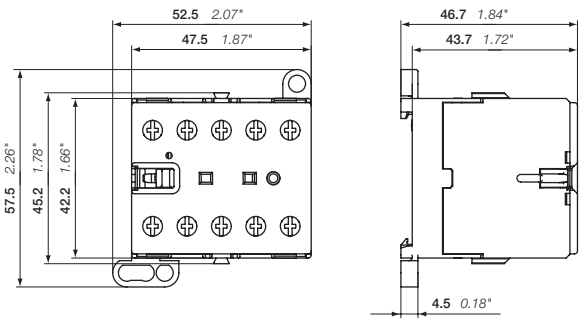
BC6, BC7, B7D 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating | | | | | | |
| kW | A | hp | | V DC | | | | | kg |
| **BC6 mini contactors** | | | | | | | | | |
| 4 | 20 | 3 | 300 V / 12 A | 12 | 1 0 | BC6-30-10-07 | GJL1213001R0107 | 10 | 0.175 |
| | | | | | 0 1 | BC6-30-01-07 | GJL1213001R0017 | 10 | 0.175 |
| | | | | 24 | 1 0 | BC6-30-10-01 | GJL1213001R0101 | 10 | 0.175 |
| | | | | | 0 1 | BC6-30-01-01 | GJL1213001R0011 | 10 | 0.175 |
| | | | | 48 | 1 0 | BC6-30-10-16 | GJL1213001R1106 | 10 | 0.175 |
| | | | | | 0 1 | BC6-30-01-16 | GJL1213001R1016 | 10 | 0.175 |
| | | | | 110 ... 125 | 1 0 | BC6-30-10-04 | GJL1213001R0104 | 10 | 0.175 |
| | | | | | 0 1 | BC6-30-01-04 | GJL1213001R0014 | 10 | 0.175 |
| | | | | 220 ... 240 | 1 0 | BC6-30-10-05 | GJL1213001R0105 | 10 | 0.175 |
| | | | | | 0 1 | BC6-30-01-05 | GJL1213001R0015 | 10 | 0.175 |
| **BC7 mini contactors** | | | | | | | | | |
| 5.5 | 20 | 5 | 600 V / 16 A | 12 | 1 0 | BC7-30-10-07 | GJL1313001R0107 | 10 | 0.175 |
| | | | | | 0 1 | BC7-30-01-07 | GJL1313001R0017 | 10 | 0.175 |
| | | | | 24 | 1 0 | BC7-30-10-01 | GJL1313001R0101 | 10 | 0.175 |
| | | | | | 0 1 | BC7-30-01-01 | GJL1313001R0011 | 10 | 0.175 |
| | | | | 48 | 1 0 | BC7-30-10-16 | GJL1313001R1106 | 10 | 0.175 |
| | | | | | 0 1 | BC7-30-01-16 | GJL1313001R1016 | 10 | 0.175 |
| | | | | 110 ... 125 | 1 0 | BC7-30-10-04 | GJL1313001R0104 | 10 | 0.175 |
| | | | | | 0 1 | BC7-30-01-04 | GJL1313001R0014 | 10 | 0.175 |
| | | | | 220 ... 240 | 1 0 | BC7-30-10-05 | GJL1313001R0105 | 10 | 0.175 |
| | | | | | 0 1 | BC7-30-01-05 | GJL1313001R0015 | 10 | 0.175 |
| **B7D mini contactors with integrated suppressor diode** | | | | | | | | | |
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 1 0 | B7D-30-10-01 | GJL1317001R0101 | 10 | 0.175 |
| | | | | | 0 1 | B7D-30-01-01 | GJL1317001R0011 | 10 | 0.175 |
| | | | | 220 | 1 0 | B7D-30-10-05 | GJL1317001R0105 | 10 | 0.175 |
| | | | | | 0 1 | B7D-30-01-05 | GJL1317001R0015 | 10 | 0.175 |

Other types on request




BC6, BC7, B7D

Main dimensions mm, inches

# VB6, VB7 3-pole mini reversing contactors – with screw terminals

4 to 5.5 kW

AC operated




2CDC211006F0011

VB7-30-10

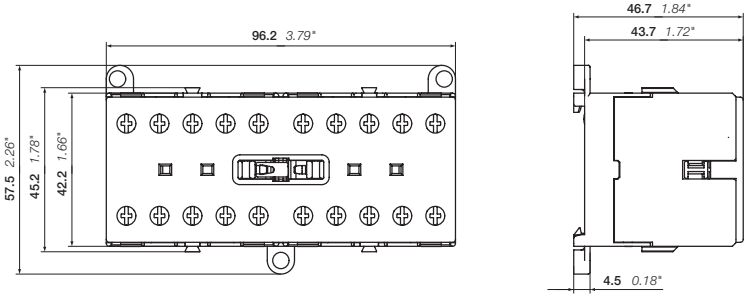
VB6, VB7 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for front mounting
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating | 50 Hz | 60 Hz | | | | | |
| kW | A | hp | | V AC | V AC | | | | | kg |
| **VB6 mini reversing contactors** | | | | | | | | | | |
| 4 | 20 | 3 | 300 V / 12 A | 24 | 24 | 1 0 | VB6-30-10-01 | GJL1211901R0101 | 5 | 0.355 |
| | | | | | | 0 1 | VB6-30-01-01 | GJL1211901R0011 | 5 | 0.355 |
| | | | | 48 | 48 | 1 0 | VB6-30-10-03 | GJL1211901R0103 | 5 | 0.355 |
| | | | | | | 0 1 | VB6-30-01-03 | GJL1211901R0013 | 5 | 0.355 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | VB6-30-10-84 | GJL1211901R8104 | 5 | 0.355 |
| | | | | | | 0 1 | VB6-30-01-84 | GJL1211901R8014 | 5 | 0.355 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | VB6-30-10-80 | GJL1211901R8100 | 5 | 0.355 |
| | | | | | | 0 1 | VB6-30-01-80 | GJL1211901R8010 | 5 | 0.355 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | VB6-30-10-85 | GJL1211901R8105 | 5 | 0.355 |
| | | | | | | 0 1 | VB6-30-01-85 | GJL1211901R8015 | 5 | 0.355 |
| **VB7 mini reversing contactors** | | | | | | | | | | |
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 24 | 1 0 | VB7-30-10-01 | GJL1311901R0101 | 5 | 0.355 |
| | | | | | | 0 1 | VB7-30-01-01 | GJL1311901R0011 | 5 | 0.355 |
| | | | | 48 | 48 | 1 0 | VB7-30-10-03 | GJL1311901R0103 | 5 | 0.355 |
| | | | | | | 0 1 | VB7-30-01-03 | GJL1311901R0013 | 5 | 0.355 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | VB7-30-10-84 | GJL1311901R8104 | 5 | 0.355 |
| | | | | | | 0 1 | VB7-30-01-84 | GJL1311901R8014 | 5 | 0.355 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | VB7-30-10-80 | GJL1311901R8100 | 5 | 0.355 |
| | | | | | | 0 1 | VB7-30-01-80 | GJL1311901R8010 | 5 | 0.355 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | VB7-30-10-85 | GJL1311901R8105 | 5 | 0.355 |
| | | | | | | 0 1 | VB7-30-01-85 | GJL1311901R8015 | 5 | 0.355 |

Other types on request




VB6, VB7

Main dimensions mm, inches

# VBC6, VBC7 3-pole mini reversing contactors – with screw terminals

4 to 5.5 kW

DC operated



2CDC211042F0011

VBC6-30-10



2CDC211001F0011

VBC7-30-10

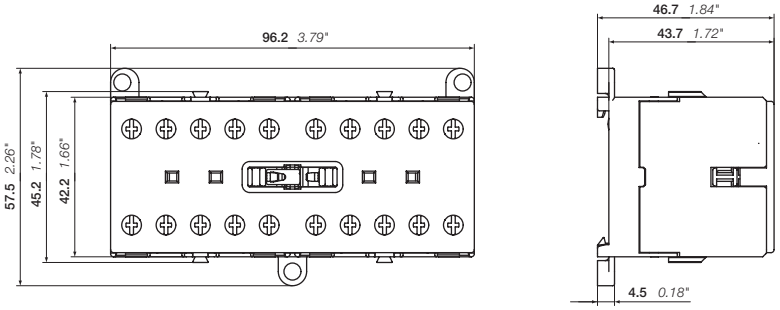
VBC6, VBC7 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for front mounting
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating | | | | | | |
| kW | A | hp | | V DC | | | | | kg |
| **VBC6 mini reversing contactors** | | | | | | | | | |
| 4 | 20 | 3 | 300 V / 12 A | 12 | 1 0 | VBC6-30-10-07 | GJL1213901R0107 | 5 | 0.355 |
| | | | | | 0 1 | VBC6-30-01-07 | GJL1213901R0017 | 5 | 0.355 |
| | | | | 24 | 1 0 | VBC6-30-10-01 | GJL1213901R0101 | 5 | 0.355 |
| | | | | | 0 1 | VBC6-30-01-01 | GJL1213901R0011 | 5 | 0.355 |
| | | | | 48 | 1 0 | VBC6-30-10-16 | GJL1213901R1106 | 5 | 0.355 |
| | | | | | 0 1 | VBC6-30-01-16 | GJL1213901R1016 | 5 | 0.355 |
| | | | | 110 ... 125 | 1 0 | VBC6-30-10-04 | GJL1213901R0104 | 5 | 0.355 |
| | | | | | 0 1 | VBC6-30-01-04 | GJL1213901R0014 | 5 | 0.355 |
| | | | | 220 ... 240 | 1 0 | VBC6-30-10-05 | GJL1213901R0105 | 5 | 0.355 |
| | | | | | 0 1 | VBC6-30-01-05 | GJL1213901R0015 | 5 | 0.355 |
| **VBC7 mini reversing contactors** | | | | | | | | | |
| 5.5 | 20 | 5 | 600 V / 16 A | 12 | 1 0 | VBC7-30-10-07 | GJL1313901R0107 | 5 | 0.355 |
| | | | | | 0 1 | VBC7-30-01-07 | GJL1313901R0017 | 5 | 0.355 |
| | | | | 24 | 1 0 | VBC7-30-10-01 | GJL1313901R0101 | 5 | 0.355 |
| | | | | | 0 1 | VBC7-30-01-01 | GJL1313901R0011 | 5 | 0.355 |
| | | | | 48 | 1 0 | VBC7-30-10-16 | GJL1313901R1106 | 5 | 0.355 |
| | | | | | 0 1 | VBC7-30-01-16 | GJL1313901R1016 | 5 | 0.355 |
| | | | | 110 ... 125 | 1 0 | VBC7-30-10-04 | GJL1313901R0104 | 5 | 0.355 |
| | | | | | 0 1 | VBC7-30-01-04 | GJL1313901R0014 | 5 | 0.355 |
| | | | | 220 ... 240 | 1 0 | VBC7-30-10-05 | GJL1313901R0105 | 5 | 0.355 |
| | | | | | 0 1 | VBC7-30-01-05 | GJL1313901R0015 | 5 | 0.355 |

Other types on request




VBC6, VBC7

Main dimensions mm, inches

# VB6A, VB7A 3-pole mini reversing contactors – with screw terminals

## 4 to 5.5 kW

## AC operated – with safety blocking function




VB6A-30-10




VB7A-30-10

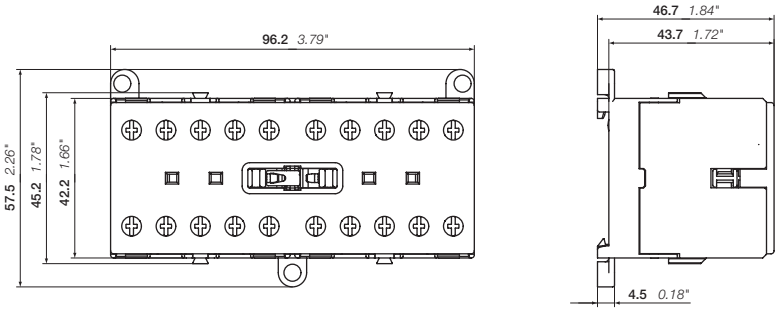
VB6A, VB7A 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for front mounting
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating | 50 Hz | 60 Hz | | | | | |
| kW | A | hp | | V AC | V AC | | | | | kg |
| **VB6A mini reversing contactors with safety blocking function** | | | | | | | | | | |
| 4 | 20 | 3 | 300 V / 12 A | 24 | 24 | 1 0 | VB6A-30-10-01 | GJL1211911R0101 | 5 | 0.355 |
| | | | | | | 0 1 | VB6A-30-01-01 | GJL1211911R0011 | 5 | 0.355 |
| | | | | 48 | 48 | 1 0 | VB6A-30-10-03 | GJL1211911R0103 | 5 | 0.355 |
| | | | | | | 0 1 | VB6A-30-01-03 | GJL1211911R0013 | 5 | 0.355 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | VB6A-30-10-84 | GJL1211911R8104 | 5 | 0.355 |
| | | | | | | 0 1 | VB6A-30-01-84 | GJL1211911R8014 | 5 | 0.355 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | VB6A-30-10-80 | GJL1211911R8100 | 5 | 0.355 |
| | | | | | | 0 1 | VB6A-30-01-80 | GJL1211911R8010 | 5 | 0.355 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | VB6A-30-10-85 | GJL1211911R8105 | 5 | 0.355 |
| | | | | | | 0 1 | VB6A-30-01-85 | GJL1211911R8015 | 5 | 0.355 |
| **VB7A mini reversing contactors with safety blocking function** | | | | | | | | | | |
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 24 | 1 0 | VB7A-30-10-01 | GJL1311911R0101 | 5 | 0.355 |
| | | | | | | 0 1 | VB7A-30-01-01 | GJL1311911R0011 | 5 | 0.355 |
| | | | | 48 | 48 | 1 0 | VB7A-30-10-03 | GJL1311911R0103 | 5 | 0.355 |
| | | | | | | 0 1 | VB7A-30-01-03 | GJL1311911R0013 | 5 | 0.355 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | VB7A-30-10-84 | GJL1311911R8104 | 5 | 0.355 |
| | | | | | | 0 1 | VB7A-30-01-84 | GJL1311911R8014 | 5 | 0.355 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | VB7A-30-10-80 | GJL1311911R8100 | 5 | 0.355 |
| | | | | | | 0 1 | VB7A-30-01-80 | GJL1311911R8010 | 5 | 0.355 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | VB7A-30-10-85 | GJL1311911R8105 | 5 | 0.355 |
| | | | | | | 0 1 | VB7A-30-01-85 | GJL1311911R8015 | 5 | 0.355 |

Other types on request




VB6A, VB7A

Main dimensions mm, inches

# VBC6A, VBC7A 3-pole mini reversing contactors – with screw terminals

4 to 5.5 kW

DC operated – with safety blocking function




2CDC211044F0011

VBC6A-30-10




2CDC211007F0011

VBC7A-30-10

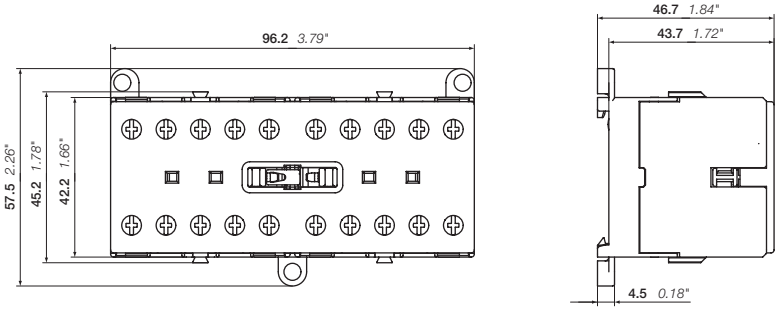
VBC6A, VBC7A 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for front mounting
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating | | | | | | |
| kW | A | hp | | V DC | | | | | kg |
| **VBC6A mini reversing contactors with safety blocking function** | | | | | | | | | |
| 4 | 20 | 3 | 300 V / 12 A | 12 | 1 0 | VBC6A-30-10-07 | GJL1213911R0107 | 5 | 0.355 |
| | | | | | 0 1 | VBC6A-30-01-07 | GJL1213911R0017 | 5 | 0.355 |
| | | | | 24 | 1 0 | VBC6A-30-10-01 | GJL1213911R0101 | 5 | 0.355 |
| | | | | | 0 1 | VBC6A-30-01-01 | GJL1213911R0011 | 5 | 0.355 |
| | | | | 48 | 1 0 | VBC6A-30-10-16 | GJL1213911R1106 | 5 | 0.355 |
| | | | | | 0 1 | VBC6A-30-01-16 | GJL1213911R1016 | 5 | 0.355 |
| | | | | 110 ... 125 | 1 0 | VBC6A-30-10-04 | GJL1213911R0104 | 5 | 0.355 |
| | | | | | 0 1 | VBC6A-30-01-04 | GJL1213911R0014 | 5 | 0.355 |
| | | | | 220 ... 240 | 1 0 | VBC6A-30-10-05 | GJL1213911R0105 | 5 | 0.355 |
| | | | | | 0 1 | VBC6A-30-01-05 | GJL1213911R0015 | 5 | 0.355 |
| **VBC7A mini reversing contactors with safety blocking function** | | | | | | | | | |
| 5.5 | 20 | 5 | 600 V / 16 A | 12 | 1 0 | VBC7A-30-10-07 | GJL1313911R0107 | 5 | 0.355 |
| | | | | | 0 1 | VBC7A-30-01-07 | GJL1313911R0017 | 5 | 0.355 |
| | | | | 24 | 1 0 | VBC7A-30-10-01 | GJL1313911R0101 | 5 | 0.355 |
| | | | | | 0 1 | VBC7A-30-01-01 | GJL1313911R0011 | 5 | 0.355 |
| | | | | 48 | 1 0 | VBC7A-30-10-16 | GJL1313911R1106 | 5 | 0.355 |
| | | | | | 0 1 | VBC7A-30-01-16 | GJL1313911R0016 | 5 | 0.355 |
| | | | | 110 ... 125 | 1 0 | VBC7A-30-10-04 | GJL1313911R0104 | 5 | 0.355 |
| | | | | | 0 1 | VBC7A-30-01-04 | GJL1313911R0014 | 5 | 0.355 |
| | | | | 220 ... 240 | 1 0 | VBC7A-30-10-05 | GJL1313911R0105 | 5 | 0.355 |
| | | | | | 0 1 | VBC7A-30-01-05 | GJL1313911R0015 | 5 | 0.355 |

Other types on request




VBC6A, VBC7A

Main dimensions mm, inches

# BC6, BC7 3-pole mini contactors – with screw terminals

## 4 to 5.5 kW

## DC operated - low consumption




BC6-30-10




BC7-30-10

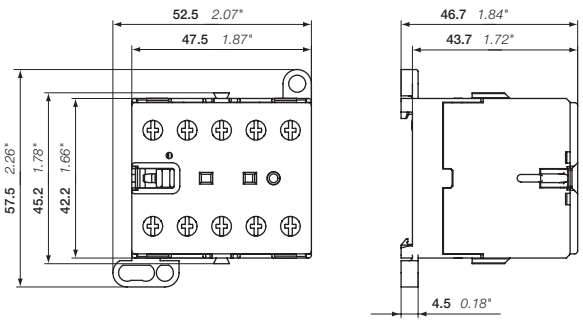
BC6, BC7 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating | | | | | | |
| kW | A | hp | | V DC | | | | | kg |
| **DC operation 24 V / 1.4 W** | | | | | | | | | |
| 4 | 20 | 3 | 300 V / 12 A | 24 | 1 0 | BC6-30-10-1.4-81 | GJL1213001R8101 | 10 | 0.175 |
| | | | | | 0 1 | BC6-30-01-1.4-81 | GJL1213001R8011 | 10 | 0.175 |
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 1 0 | BC7-30-10-1.4-81 | GJL1313001R8101 | 10 | 0.175 |
| | | | | | 0 1 | BC7-30-01-1.4-81 | GJL1313001R8011 | 10 | 0.175 |
| **DC operation 17 ... 32 V / 2.4 W** | | | | | | | | | |
| 4 | 20 | 3 | 300 V / 12 A | 17 ... 32 | 1 0 | BC6-30-10-2.4-51 | GJL1213001R5101 | 10 | 0.175 |
| | | | | | 0 1 | BC6-30-01-2.4-51 | GJL1213001R5011 | 10 | 0.175 |
| 5.5 | 20 | 5 | 600 V / 16 A | 17 ... 32 | 1 0 | BC7-30-10-2.4-51 | GJL1313001R5101 | 10 | 0.175 |
| | | | | | 0 1 | BC7-30-01-2.4-51 | GJL1313001R5011 | 10 | 0.175 |
| **Connection to PLCs with integrated protective circuit** | | | | | | | | | |
| **DC operation 24 V / 1.7 W** | | | | | | | | | |
| 4 | 20 | 3 | 300 V / 12 A | 24 | 1 0 | B6S-30-10-1.7-71 | GJL1213001R7101 | 10 | 0.175 |
| | | | | | 0 1 | B6S-30-01-1.7-71 | GJL1213001R7011 | 10 | 0.175 |
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 1 0 | B7S-30-10-1.7-71 | GJL1313001R7101 | 10 | 0.175 |
| | | | | | 0 1 | B7S-30-01-1.7-71 | GJL1313001R7011 | 10 | 0.175 |
| **DC operation 17 ... 32 V / 2.8 W** | | | | | | | | | |
| 4 | 20 | 3 | 300 V / 12 A | 17 ... 32 | 1 0 | B6S-30-10-2.8-72 | GJL1213001R7102 | 10 | 0.175 |
| | | | | | 0 1 | B6S-30-01-2.8-72 | GJL1213001R7012 | 10 | 0.175 |
| 5.5 | 20 | 5 | 600 V / 16 A | 17 ... 32 | 1 0 | B7S-30-10-2.8-72 | GJL1313001R7102 | 10 | 0.175 |
| | | | | | 0 1 | B7S-30-01-2.8-72 | GJL1313001R7012 | 10 | 0.175 |

Other types on request




BC6, BC7

Main dimensions mm, inches

# B6, B7 4-pole mini contactors – with screw terminals

4 to 5.5 kW

AC operated




2CDC211028F0011

B6-22-00

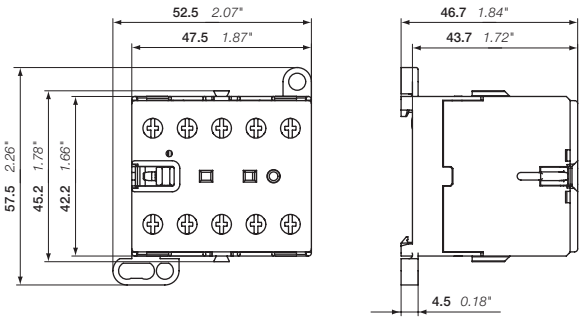
B6, B7 4-pole mini contactors are compact control products mainly used for switching resistive loads up to 690 V AC.

These contactors are designed with 4 main poles:

- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- suitable for rail or wall mounting

| IEC | UL/CSA | Rated control circuit voltage Uc 50/60 Hz | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 40 °C AC-1 A | General use rating | V AC | | | | | kg |
| **4 N.O. main poles** | | | | | | | |
| 20 | 300 V / 12 A | 24 | 0 0 | B6-40-00-01 | GJL1211201R0001 | 10 | 0.175 |
| | | 48 | 0 0 | B6-40-00-03 | GJL1211201R0003 | 10 | 0.175 |
| | | 110 ... 127 | 0 0 | B6-40-00-84 | GJL1211201R8004 | 10 | 0.175 |
| | | 220 ... 240 | 0 0 | B6-40-00-80 | GJL1211201R8000 | 10 | 0.175 |
| 20 | 600 V / 16 A | 24 | 0 0 | B7-40-00-01 | GJL1311201R0001 | 10 | 0.175 |
| | | 48 | 0 0 | B7-40-00-03 | GJL1311201R0003 | 10 | 0.175 |
| | | 110 ... 127 | 0 0 | B7-40-00-84 | GJL1311201R8004 | 10 | 0.175 |
| | | 220 ... 240 | 0 0 | B7-40-00-80 | GJL1311201R8000 | 10 | 0.175 |
| **2 N.O. + 2 N.C. main poles** | | | | | | | |
| 20 | 300 V / 12 A | 24 | 0 0 | B6-22-00-01 | GJL1211501R0001 | 10 | 0.175 |
| | | 48 | 0 0 | B6-22-00-03 | GJL1211501R0003 | 10 | 0.175 |
| | | 110 ... 127 | 0 0 | B6-22-00-84 | GJL1211501R8004 | 10 | 0.175 |
| | | 220 ... 240 | 0 0 | B6-22-00-80 | GJL1211501R8000 | 10 | 0.175 |
| 20 | 600 V / 16 A | 24 | 0 0 | B7-22-00-01 | GJL1311501R0001 | 10 | 0.175 |
| | | 48 | 0 0 | B7-22-00-03 | GJL1311501R0003 | 10 | 0.175 |
| | | 110 ... 127 | 0 0 | B7-22-00-84 | GJL1311501R8004 | 10 | 0.175 |
| | | 220 ... 240 | 0 0 | B7-22-00-80 | GJL1311501R8000 | 10 | 0.175 |

Other types on request



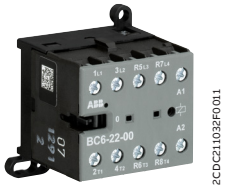

B6, B7

Main dimensions mm, inches

# BC6, BC7, B7D 4-pole mini contactors – with screw terminals

4 to 5.5 kW

DC operated




BC6-22-00

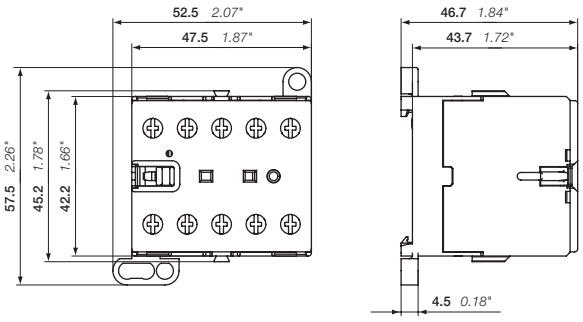


B6, B7, B7D 4-pole mini contactors are compact control products mainly used for switching resistive loads up to 690 V AC.

These contactors are designed with 4 main poles:

- control circuit: DC operated, low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- suitable for rail or wall mounting

| IEC | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 55 °C AC-1 | 3-phase motor rating 480 V | General use rating | | | | | | |
| A | hp | | V DC | | | | | kg |
| **4 N.O. main poles** | | | | | | | | |
| 20 | 3 | 300 V / 12 A | 12 | 0 0 | BC6-40-00-07 | GJL1213201R0007 | 10 | 0.175 |
| | | | 24 | 0 0 | BC6-40-00-01 | GJL1213201R0001 | 10 | 0.175 |
| | | | 48 | 0 0 | BC6-40-00-16 | GJL1213201R1006 | 10 | 0.175 |
| | | | 110 ... 125 | 0 0 | BC6-40-00-04 | GJL1213201R0004 | 10 | 0.175 |
| | | | 220 ... 240 | 0 0 | BC6-40-00-05 | GJL1213201R0005 | 10 | 0.175 |
| 20 | 5 | 600 V / 16 A | 12 | 0 0 | BC7-40-00-07 | GJL1313201R0007 | 10 | 0.175 |
| | | | 24 | 0 0 | BC7-40-00-01 | GJL1313201R0001 | 10 | 0.175 |
| | | | 48 | 0 0 | BC7-40-00-16 | GJL1313201R1006 | 10 | 0.175 |
| | | | 110 ... 125 | 0 0 | BC7-40-00-04 | GJL1313201R0004 | 10 | 0.175 |
| | | | 220 ... 240 | 0 0 | BC7-40-00-05 | GJL1313201R0005 | 10 | 0.175 |
| **2 N.O. + 2 N.C. main poles** | | | | | | | | |
| 20 | 3 | 300 V / 12 A | 12 | 0 0 | BC6-22-00-07 | GJL1213501R0007 | 10 | 0.175 |
| | | | 24 | 0 0 | BC6-22-00-01 | GJL1213501R0001 | 10 | 0.175 |
| | | | 48 | 0 0 | BC6-22-00-16 | GJL1213501R1006 | 10 | 0.175 |
| | | | 110 ... 125 | 0 0 | BC6-22-00-04 | GJL1213501R0004 | 10 | 0.175 |
| | | | 220 ... 240 | 0 0 | BC6-22-00-05 | GJL1213501R0005 | 10 | 0.175 |
| **4 N.O. main poles with integrated suppressor diode** | | | | | | | | |
| 20 | 5 | 600 V | 24 | 0 0 | B7D-40-00-05 | GJL1317201R0005 | 10 | 0.175 |
| | | | 220 ... 240 | 0 0 | B7D-40-00-01 | GJL1317201R0001 | 10 | 0.175 |




BC6, B7D

Main dimensions mm, inches

# K6 4-pole mini contactor relays – with screw terminals

## AC operated




2CDC211012F0011

K6-22Z




2CDC211004F0010

K6-31Z

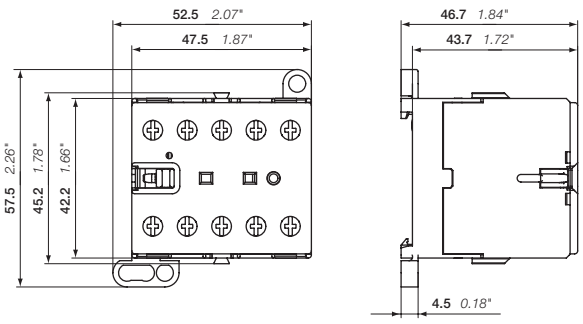
K6 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to AC-15 4 A / 240 V.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configurations 22 and 31 fulfill the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- suitable for rail or wall mounting

| Rated control circuit voltage Uc | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|
| 50 Hz V AC | 60 Hz V AC | | | | kg |
| **2 N.O. + 2 N.C. contacts** | | | | | |
| 24 | 24 | K6-22Z-01 | GJH1211001R0221 | 10 | 0.175 |
| 48 | 48 | K6-22Z-03 | GJH1211001R0223 | 10 | 0.175 |
| 110 ...127 | 110 ...127 | K6-22Z-84 | GJH1211001R8224 | 10 | 0.175 |
| 220 ... 240 | 220 ... 240 | K6-22Z-80 | GJH1211001R8220 | 10 | 0.175 |
| 380 ... 415 | 380 ... 415 | K6-22Z-85 | GJH1211001R8225 | 10 | 0.175 |
| **3 N.O. + 1 N.C. contacts** | | | | | |
| 24 | 24 | K6-31Z-01 | GJH1211001R0311 | 10 | 0.175 |
| 48 | 48 | K6-31Z-03 | GJH1211001R0313 | 10 | 0.175 |
| 110 ...127 | 110 ...127 | K6-31Z-84 | GJH1211001R8314 | 10 | 0.175 |
| 220 ... 240 | 220 ... 240 | K6-31Z-80 | GJH1211001R8310 | 10 | 0.175 |
| 380 ... 415 | 380 ... 415 | K6-31Z-85 | GJH1211001R8315 | 10 | 0.175 |
| **4 N.O. contacts** | | | | | |
| 24 | 24 | K6-40E-01 | GJH1211001R0401 | 10 | 0.175 |
| 48 | 48 | K6-40E-03 | GJH1211001R0403 | 10 | 0.175 |
| 110 ...127 | 110 ...127 | K6-40E-84 | GJH1211001R8404 | 10 | 0.175 |
| 220 ... 240 | 220 ... 240 | K6-40E-80 | GJH1211001R8400 | 10 | 0.175 |
| 380 ... 415 | 380 ... 415 | K6-40E-85 | GJH1211001R8405 | 10 | 0.175 |

Other types on request.




K6

Main dimensions mm, inches

# KC6 4-pole mini contactor relays – with screw terminals

## DC operated




2CDC211016F0011

KC6-22Z

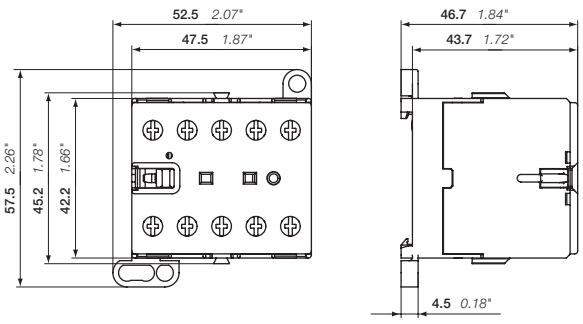
KC6 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to AC-15 4 A / 240 V.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configurations 22 and 31 fulfill the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- suitable for rail or wall mounting

| Rated control circuit voltage Uc<br>V DC | Type | Order code | Pkg qty | Weight (1 pce)<br>kg |
|---|---|---|---|---|
| **2 N.O. + 2 N.C. contacts** | | | | |
| 12 | KC6-22Z-07 | GJH1213001R0227 | 10 | 0.175 |
| 24 | KC6-22Z-01 | GJH1213001R0221 | 10 | 0.175 |
| 48 | KC6-22Z-16 | GJH1213001R1226 | 10 | 0.175 |
| 110 ... 125 | KC6-22Z-04 | GJH1213001R0224 | 10 | 0.175 |
| 220 ... 240 | KC6-22Z-05 | GJH1213001R0225 | 10 | 0.175 |
| **3 N.O. + 1 N.C. contacts** | | | | |
| 12 | KC6-31Z-07 | GJH1213001R0317 | 10 | 0.175 |
| 24 | KC6-31Z-01 | GJH1213001R0311 | 10 | 0.175 |
| 48 | KC6-31Z-16 | GJH1213001R1316 | 10 | 0.175 |
| 110 ... 125 | KC6-31Z-04 | GJH1213001R0314 | 10 | 0.175 |
| 220 ... 240 | KC6-31Z-05 | GJH1213001R0315 | 10 | 0.175 |
| **4 N.O. contacts** | | | | |
| 12 | KC6-40E-07 | GJH1213001R0407 | 10 | 0.175 |
| 24 | KC6-40E-01 | GJH1213001R0401 | 10 | 0.175 |
| 48 | KC6-40E-16 | GJH1213001R1406 | 10 | 0.175 |
| 110 ... 125 | KC6-40E-04 | GJH1213001R0404 | 10 | 0.175 |
| 220 ... 240 | KC6-40E-05 | GJH1213001R0405 | 10 | 0.175 |

Other types on request




KC6

Main dimensions mm, inches

# KC6 4-pole mini contactor relays – with screw terminals

## DC operated - low consumption




KC6-31Z

KC6 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to AC-15 4 A / 240 V.

These contactors are designed with 4 poles with various contact combinations:

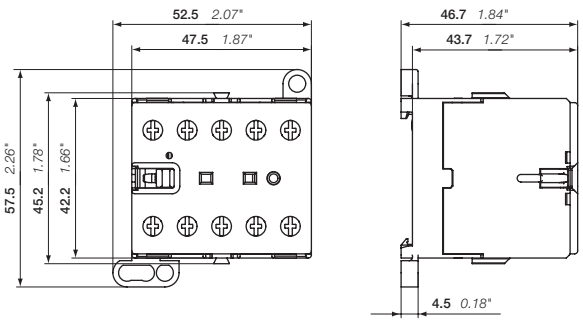
- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- hum-free coil
- contacts configurations 22 and 31 fulfill the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

| Rated control circuit voltage Uc V DC | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| **DC operation 24 V / 1.4 W** | | | | |
| 24 | KC6-31Z-1.4-81 | GJH1213001R8311 | 10 | 0.175 |
| 24 | KC6-40E-1.4-81 | GJH1213001R8401 | 10 | 0.175 |
| **DC operation 17 ... 32 V / 2.4 W** | | | | |
| 17 ... 32 | KC6-31Z-2.4-51 | GJH1213001R5311 | 10 | 0.175 |
| 17 ... 32 | KC6-40E-2.4-51 | GJH1213001R5401 | 10 | 0.175 |

**Connection to PLCs with integrated protective circuit**

| | | | | |
|---|---|---|---|---|
| **DC operation 24 V / 1.7 W** | | | | |
| 24 | K6S-22Z-1.7-71 | GJH1213001R7221 | 10 | 0.175 |
| 24 | K6S-31Z-1.7-71 | GJH1213001R7311 | 10 | 0.175 |
| 24 | K6S-40E-1.7-71 | GJH1213001R7401 | 10 | 0.175 |
| **DC operation 17 ... 32 V / 2.8 W** | | | | |
| 17 ... 32 | K6S-22Z-2.8-72 | GJH1213001R7222 | 10 | 0.175 |
| 17 ... 32 | K6S-31Z-2.8-72 | GJH1213001R7312 | 10 | 0.175 |
| 17 ... 32 | K6S-40E-2.8-72 | GJH1213001R7402 | 10 | 0.175 |

Other types on request




KC6

Main dimensions mm, inches

# B6, B7 3-pole mini contactors – with soldering pins

4 to 5.5 kW

AC operated




B6-30-10-P




B7-30-10-P

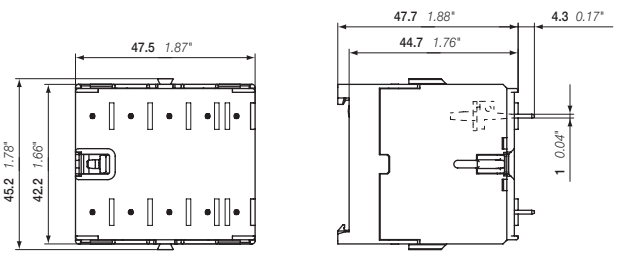
B6..P and B7..P 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for side mounting
- suitable for soldering on PCB boards

| IEC | | UL/CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating | 50 Hz | 60 Hz | | | | | |
| kW | A | hp | | V AC | V AC | | | | | kg |
| **B6 mini contactors** | | | | | | | | | | |
| 4 | 12 | 3 | 300 V / 8 A | 24 | 24 | 1 0 | B6-30-10-P-01 | GJL1211009R0101 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-P-01 | GJL1211009R0011 | 10 | 0.170 |
| | | | | 48 | 48 | 1 0 | B6-30-10-P-03 | GJL1211009R0103 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-P-03 | GJL1211009R0013 | 10 | 0.170 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | B6-30-10-P-84 | GJL1211009R8104 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-P-84 | GJL1211009R8014 | 10 | 0.170 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | B6-30-10-P-80 | GJL1211009R8100 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-P-80 | GJL1211009R8010 | 10 | 0.170 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | B6-30-10-P-85 | GJL1211009R8105 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-P-85 | GJL1211009R8015 | 10 | 0.170 |
| **B7 mini contactors** | | | | | | | | | | |
| 5.5 | 12 | 5 | 600 V / 12 A | 24 | 24 | 1 0 | B7-30-10-P-01 | GJL1311009R0101 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-P-01 | GJL1311009R0011 | 10 | 0.170 |
| | | | | 48 | 48 | 1 0 | B7-30-10-P-03 | GJL1311009R0103 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-P-03 | GJL1311009R0013 | 10 | 0.170 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | B7-30-10-P-84 | GJL1311009R8104 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-P-84 | GJL1311009R8014 | 10 | 0.170 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | B7-30-10-P-80 | GJL1311009R8100 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-P-80 | GJL1311009R8010 | 10 | 0.170 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | B7-30-10-P-85 | GJL1311009R8105 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-P-85 | GJL1311009R8015 | 10 | 0.170 |

Other types on request




B6, B7

Main dimensions mm, inches

# BC6, BC7 3-pole mini contactors – with soldering pins

4 to 5.5 kW

DC operated



2CDC211030F0011

BC7-30-10-P

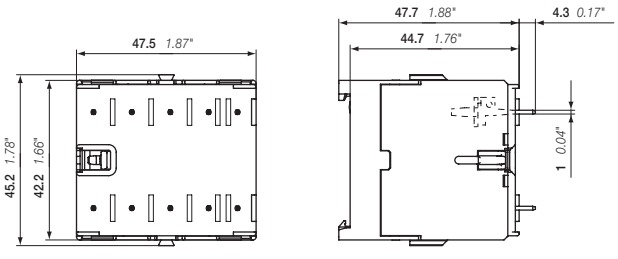
B6..P and B7..P 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for side mounting
- suitable for soldering on PCB boards

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating | | | | | | |
| kW | A | hp | | V DC | | | | | kg |
| **BC6 mini contactors with 3 N.O. main poles** | | | | | | | | | |
| 4 | 12 | 3 | 300 V / 8 A | 12 | 1 0 | BC6-30-10-P-07 | GJL1213009R0107 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-P-07 | GJL1213009R0017 | 10 | 0.170 |
| | | | | 24 | 1 0 | BC6-30-10-P-01 | GJL1213009R0101 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-P-01 | GJL1213009R0011 | 10 | 0.170 |
| | | | | 48 | 1 0 | BC6-30-10-P-16 | GJL1213009R1106 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-P-16 | GJL1213009R1016 | 10 | 0.170 |
| | | | | 110 ... 125 | 1 0 | BC6-30-10-P-04 | GJL1213009R0104 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-P-04 | GJL1213009R0014 | 10 | 0.170 |
| | | | | 220 ... 240 | 1 0 | BC6-30-10-P-05 | GJL1213009R0105 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-P-05 | GJL1213009R0015 | 10 | 0.170 |
| **BC7 mini contactors with 3 N.O. main poles** | | | | | | | | | |
| 5.5 | 12 | 5 | 600 V / 12 A | 12 | 1 0 | BC7-30-10-P-07 | GJL1313009R0107 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-P-07 | GJL1313009R0017 | 10 | 0.170 |
| | | | | 24 | 1 0 | BC7-30-10-P-01 | GJL1313009R0101 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-P-01 | GJL1313009R0011 | 10 | 0.170 |
| | | | | 48 | 1 0 | BC7-30-10-P-16 | GJL1313009R1106 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-P-16 | GJL1313009R1016 | 10 | 0.170 |
| | | | | 110 ... 125 | 1 0 | BC7-30-10-P-04 | GJL1313009R0104 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-P-04 | GJL1313009R0014 | 10 | 0.170 |
| | | | | 220 ... 240 | 1 0 | BC7-30-10-P-05 | GJL1313009R0105 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-P-05 | GJL1313009R0015 | 10 | 0.170 |
| **BC6 mini contactors 2 N.O. + 1 N.C. main poles** | | | | | | | | | |
| 4 | 12 | 3 | 300 V / 8 A | 24 | 1 0 | BC6-21-10-P-01 | GJL1213109R0101 | 10 | 0.170 |
| | | | | 48 | 1 0 | BC6-21-10-P-16 | GJL1213109R1106 | 10 | 0.170 |
| | | | | 110 ... 125 | 1 0 | BC6-21-10-P-04 | GJL1213109R0104 | 10 | 0.170 |
| | | | | 220 ... 240 | 1 0 | BC6-21-10-P-05 | GJL1213109R0105 | 10 | 0.170 |

Other types on request




B6, B7

Main dimensions mm, inches

# VB6, VB7 3-pole mini reversing contactors – with soldering pins

4 to 5.5 kW

AC operated




VB7-30-10-P

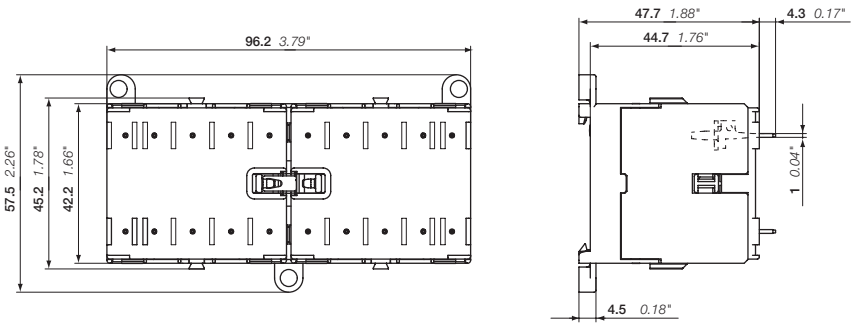
VB6..P, VB7..P 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for soldering on PCB boards

| IEC | | UL/CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating | 50 Hz | 60 Hz | | | | | |
| kW | A | hp | | V AC | V AC | | | | | kg |
| **VB6 mini reversing contactors** | | | | | | | | | | |
| 4 | 12 | 3 | 300 V / 8 A | 24 | 24 | 1 0 | VB6-30-10-P-01 | GJL1211909R0101 | 5 | 0.345 |
| | | | | | | 0 1 | VB6-30-01-P-01 | GJL1211909R0011 | 5 | 0.345 |
| | | | | 48 | 48 | 0 1 | VB6-30-01-P-03 | GJL1211909R0013 | 5 | 0.345 |
| | | | | 110 ... 127 | 110 ... 127 | 0 1 | VB6-30-01-P-84 | GJL1211909R8014 | 5 | 0.345 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | VB6-30-10-P-80 | GJL1211909R8100 | 5 | 0.345 |
| | | | | | | 0 1 | VB6-30-01-P-80 | GJL1211909R8010 | 5 | 0.345 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | VB6-30-10-P-85 | GJL1211909R8105 | 5 | 0.345 |
| | | | | | | 0 1 | VB6-30-01-P-85 | | 5 | 0.345 |
| **VB7 mini reversing contactors** | | | | | | | | | | |
| 5.5 | 12 | 5 | 600 V / 12 A | 24 | 24 | 1 0 | VB7-30-10-P-01 | GJL1311909R0101 | 5 | 0.345 |
| | | | | | | 0 1 | VB7-30-01-P-01 | GJL1311909R0011 | 5 | 0.345 |
| | | | | 48 | 48 | 1 0 | VB7-30-10-P-03 | GJL1311909R0103 | 5 | 0.345 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | VB7-30-10-P-84 | GJL1311909R8104 | 5 | 0.345 |
| | | | | | | 0 1 | VB7-30-01-P-84 | GJL1311909R8014 | 5 | 0.345 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | VB7-30-10-P-80 | GJL1311909R8100 | 5 | 0.345 |
| | | | | | | 0 1 | VB7-30-01-P-80 | GJL1311909R8010 | 5 | 0.345 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | VB7-30-10-P-85 | GJL1311909R8105 | 5 | 0.345 |
| | | | | | | 0 1 | VB7-30-01-P-85 | GJL1311909R8015 | 5 | 0.345 |

Other types on request




VB6, VB7

Main dimensions mm, inches

# VBC6, VBC7 3-pole mini reversing contactors – with soldering pins

4 to 5.5 kW

DC operated



2CDC211009F0011

VBC7-30-10-P

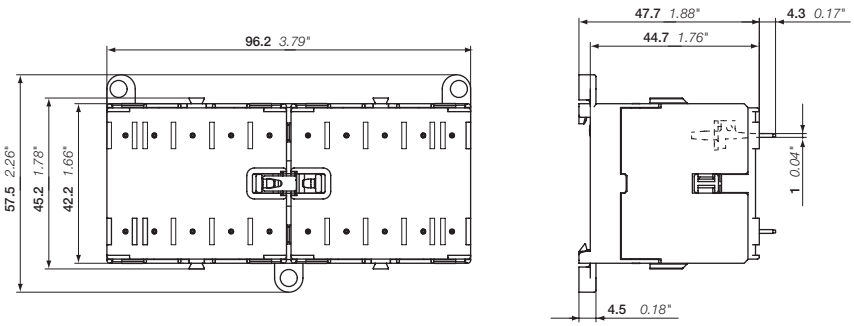
VBC6..P, VBC7..P 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for soldering on PCB boards

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating | | | | | | |
| kW | A | hp | | V DC | | | | | kg |
| **VBC6 mini reversing contactors** | | | | | | | | | |
| 4 | 12 | 3 | 300 V / 8 A | 12 | 0 1 | VBC6-30-01-P-07 | GJL1213909R0017 | 5 | 0.345 |
| | | | | 24 | 1 0 | VBC6-30-10-P-01 | GJL1213909R0101 | 5 | 0.345 |
| | | | | | 0 1 | VBC6-30-01-P-01 | GJL1213909R0011 | 5 | 0.345 |
| | | | | 48 | 1 0 | VBC6-30-10-P-06 | GJL1213909R0106 | 5 | 0.345 |
| | | | | | 0 1 | VBC6-30-06-P-06 | GJL1213909R0016 | 5 | 0.345 |
| **VBC7 mini reversing contactors** | | | | | | | | | |
| | | | | 24 | 1 0 | VBC7-30-10-P-01 | GJL1313909R0101 | 5 | 0.345 |
| | | | | | 0 1 | VBC7-30-01-P-01 | GJL1313909R0011 | 5 | 0.345 |
| | | | | 48 | 0 1 | VBC7-30-01-P-16 | GJL1313909R1016 | 5 | 0.345 |

Other types on request



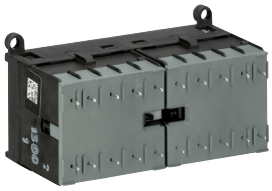

VBC6, VBC7

Main dimensions mm, inches

# VB6A, VB7A 3-pole mini reversing contactors – with soldering pins

## 4 to 5.5 kW

## AC operated – with safety blocking function




VB7-30-01-P

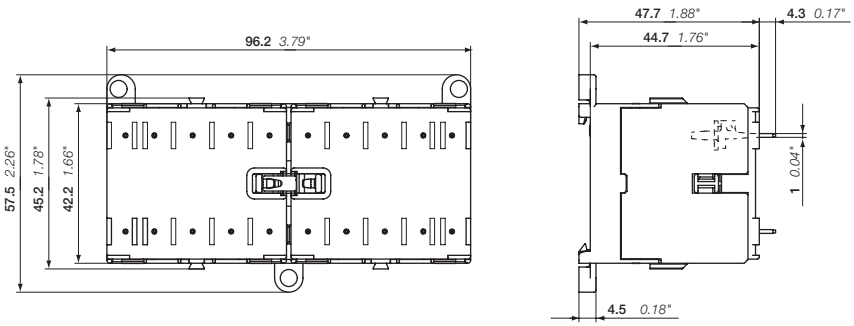
VB6A..P, VB7A..P 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for soldering on PCB boards

| IEC | | UL/CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating | 50 Hz | 60 Hz | | | | | |
| kW | A | hp | | V AC | V AC | | | | | kg |
| **VB6A mini reversing contactors with safety blocking function** | | | | | | | | | | |
| 4 | 12 | 3 | 300 V / 8 A | 24 | 24 | 1 0 | VB6A-30-10-P-01 | GJL1211919R0101 | 5 | 0.345 |
| | | | | | | 0 1 | VB6A-30-01-P-01 | GJL1211919R0011 | 5 | 0.345 |
| | | | | 48 | 48 | 0 1 | VB6A-30-01-P-03 | GJL1211919R0013 | 5 | 0.345 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | VB6A-30-10-P-84 | GJL1211919R8104 | 5 | 0.345 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | VB6A-30-10-P-80 | GJL1211919R8100 | 5 | 0.345 |
| | | | | | | 0 1 | VB6A-30-01-P-80 | GJL1211919R8010 | 5 | 0.345 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | VB6A-30-10-P-85 | GJL1211919R8105 | 5 | 0.345 |
| | | | | | | 0 1 | VB6A-30-01-P-85 | GJL1211919R8015 | 5 | 0.345 |
| **VB7A mini reversing contactors with safety blocking function** | | | | | | | | | | |
| 5.5 | 12 | 5 | 600 V / 12 A | 24 | 24 | 1 0 | VB7A-30-10-P-01 | GJL1311919R0101 | 5 | 0.345 |
| | | | | | | 0 1 | VB7A-30-01-P-01 | GJL1311919R0011 | 5 | 0.345 |
| | | | | 48 | 48 | 1 0 | VB7A-30-10-P-03 | GJL1311919R0103 | 5 | 0.345 |
| | | | | | | 0 1 | VB7A-30-01-P-03 | GJL1311919R0013 | 5 | 0.345 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | VB7A-30-10-P-84 | GJL1311919R8104 | 5 | 0.345 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | VB7A-30-10-P-80 | GJL1311919R8100 | 5 | 0.345 |
| | | | | | | 0 1 | VB7A-30-01-P-80 | GJL1311919R8010 | 5 | 0.345 |

Other types on request



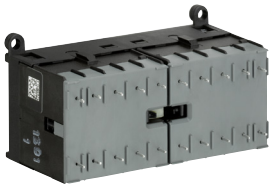

VB6A, VB7A

Main dimensions mm, inches

# VBC7A 3-pole mini reversing contactors – with soldering pins

## 4 to 5.5 kW

## DC operated – with safety blocking function




VBC7A-30-10-P

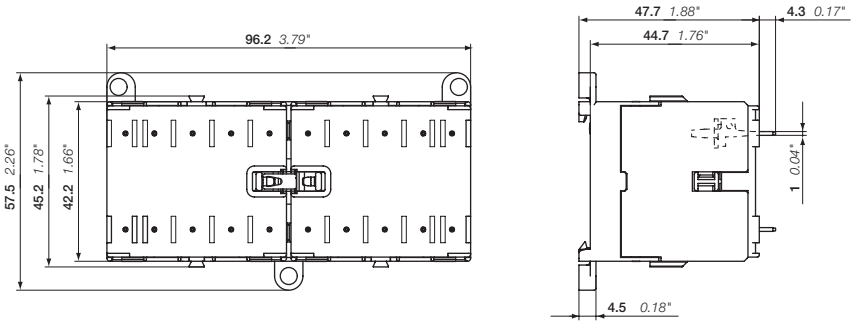
VBC7A..P 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for soldering on PCB boards

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating | | | | | | |
| kW | A | hp | | V DC | | | | | kg |
| **VBC7A mini reversing contactors with safety blocking function** | | | | | | | | | |
| 5.5 | 12 | 5 | 600 V / 12 A | 24 | 1 0 | VBC7A-30-10-P-01 | GJL1313919R0101 | 5 | 0.345 |
| | | | | | 0 1 | VBC7A-30-01-P-01 | GJL1313919R0011 | 5 | 0.345 |

Other types on request




VBC7A

Main dimensions mm, inches

# BC6, BC7 3-pole mini contactors – with soldering pins

## 4 to 5.5 kW

## DC operated - low consumption



2CDC211030F0011

BC7-30-10-P



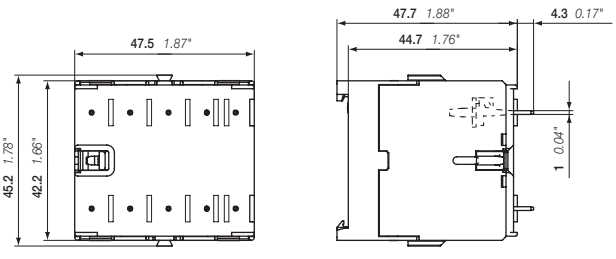
BC6..P, BC7..P 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for soldering on PCB boards

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating | | | | | | |
| kW | A | hp | | V DC | | | | | kg |
| **DC operation 24 V / 1.4 W** | | | | | | | | | |
| 4 | 12 | 3 | 300 V / 8 A | 24 | 1 0 | BC6-30-10-P-1.4-81 | GJL1213009R8101 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-P-1.4-81 | GJL1213009R8011 | 10 | 0.170 |
| 5.5 | 12 | 5 | 600 V / 12 A | 24 | 1 0 | BC7-30-10-P-1.4-81 | GJL1313009R8101 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-P-1.4-81 | GJL1313009R8011 | 10 | 0.170 |
| **DC operation 17 ... 32 V / 2.4 W, Ith < 8 A** | | | | | | | | | |
| 4 | 12 | 3 | 300 V / 8 A | 17 ... 32 | 1 0 | BC6-30-10-P-2.4-51 | GJL1213009R5101 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-P-2.4-51 | GJL1213009R5011 | 10 | 0.170 |
| 5.5 | 12 | 5 | 600 V / 12 A | 17 ... 32 | 1 0 | BC7-30-10-P-2.4-51 | GJL1313009R5101 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-P-2.4-51 | GJL1313009R5011 | 10 | 0.170 |

Other types on request




BC6, BC7

Main dimensions mm, inches

# K6 4-pole mini contactor relays – with soldering pins

## AC operated




K6-22Z-P

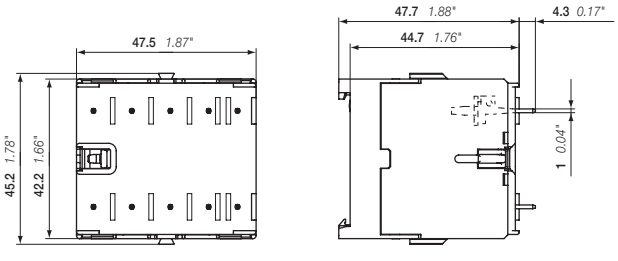
K6..P 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configurations 22 and 31 fulfill the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- add-on auxiliary contact blocks for side mounting
- suitable for soldering on PCB boards

| Rated control circuit voltage Uc | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|
| 50 Hz | 60 Hz | | | | |
| V AC | V AC | | | | kg |
| **2 N.O. + 2 N.C. contacts** | | | | | |
| 24 | 24 | K6-22Z-P-01 | GJH1211009R0221 | 10 | 0.170 |
| 48 | 48 | K6-22Z-P-03 | GJH1211009R0223 | 10 | 0.170 |
| 110 ...127 | 110 ...127 | K6-22Z-P-84 | GJH1211009R8224 | 10 | 0.170 |
| 220 ... 240 | 220 ... 240 | K6-22Z-P-80 | GJH1211009R8220 | 10 | 0.170 |
| 380 ... 415 | 380 ... 415 | K6-22Z-P-85 | GJH1211009R8225 | 10 | 0.170 |
| **3 N.O. + 1 N.C. contacts** | | | | | |
| 24 | 24 | K6-31Z-P-01 | GJH1211009R0311 | 10 | 0.170 |
| 48 | 48 | K6-31Z-P-03 | GJH1211009R0313 | 10 | 0.170 |
| 110 ...127 | 110 ...127 | K6-31Z-P-84 | GJH1211009R8314 | 10 | 0.170 |
| 220 ... 240 | 220 ... 240 | K6-31Z-P-80 | GJH1211009R8310 | 10 | 0.170 |
| 380 ... 415 | 380 ... 415 | K6-31Z-P-85 | GJH1211009R8315 | 10 | 0.170 |
| **4 N.O. contacts** | | | | | |
| 24 | 24 | K6-40E-P-01 | GJH1211009R0401 | 10 | 0.170 |
| 48 | 48 | K6-40E-P-03 | GJH1211009R0403 | 10 | 0.170 |
| 110 ...127 | 110 ...127 | K6-40E-P-84 | GJH1211009R8404 | 10 | 0.170 |
| 220 ... 240 | 220 ... 240 | K6-40E-P-80 | GJH1211009R8400 | 10 | 0.170 |
| 380 ... 415 | 380 ... 415 | K6-40E-P-85 | GJH1211009R8405 | 10 | 0.170 |

Other types on request.




K6

Main dimensions mm, inches

# KC6 4-pole mini contactor relays – with soldering pins

## DC operated



2CDC211025F0011

KC6-22Z-P



2CDC211023F0011

KC6-31Z-P

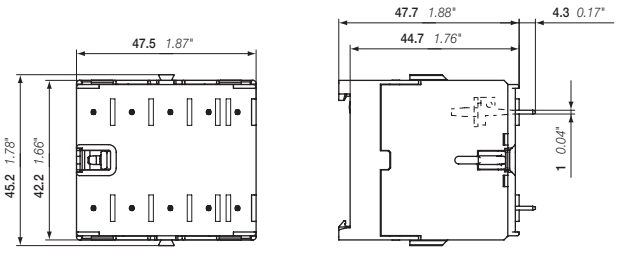
KC6..P 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configurations 22 and 31 fulfill the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- add-on auxiliary contact blocks for side mounting
- suitable for soldering on PCB boards

| Rated control circuit voltage Uc<br>V DC | Type | Order code | Pkg qty | Weight (1 pce)<br>kg |
|---|---|---|---|---|
| **2 N.O. + 2 N.C. contacts** | | | | |
| 24 | KC6-22Z-P-01 | GJH1213009R0221 | 10 | 0.170 |
| **3 N.O. + 1 N.C. contacts** | | | | |
| 24 | KC6-31Z-P-01 | GJH1213009R0311 | 10 | 0.170 |
| **4 N.O. contacts** | | | | |
| 24 | KC6-40E-P-01 | GJH1213009R0401 | 10 | 0.170 |

Other types on request.




KC6

Main dimensions mm, inches

# KC6 4-pole mini contactor relays – with solderings pins

## DC operated - low consumption




KC6-31Z-P-1.4

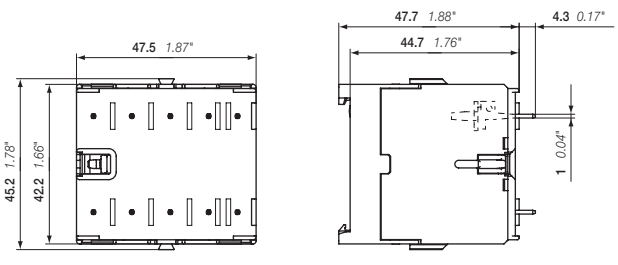
KC6..P 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- hum-free coil
- contacts configuration 31 fulfills the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- no auxiliary contact block permitted for mounting
- suitable for soldering on PCB boards

| Rated control circuit voltage Uc V DC | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| **DC operation 24 V / 1.4 W** | | | | |
| 24 | KC6-31Z-P-1.4-81 | GJH1213009R8311 | 10 | 0.170 |
| 24 | KC6-40E-P-1.4-81 | GJH1213009R8401 | 10 | 0.170 |
| **DC operation 17 ... 32 V / 2.4 W** | | | | |
| 17 ... 32 | KC6-31Z-P-2.4-51 | GJH1213009R5311 | 10 | 0.170 |
| 17 ... 32 | KC6-40E-P-2.4-51 | GJH1213009R5401 | 10 | 0.170 |

Other types on request




KC6

Main dimensions mm, inches

04

# B6, B7 3-pole mini contactors – with flat pin connection

## 4 to 5.5 kW

## AC operated




B6-30-10-F




B7-30-10-F

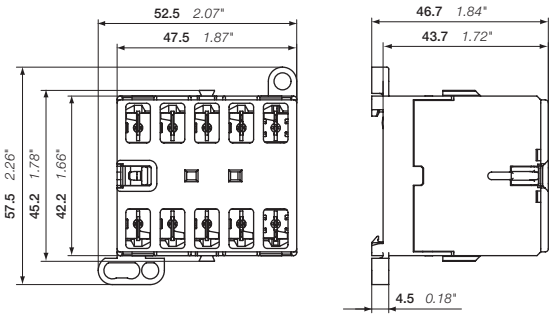
B6..F, B7..F 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- flat pin connection for plug-in wiring and shake proven connection
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for side mounting
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating | 50 Hz | 60 Hz | | | | | |
| kW | A | hp | | V AC | V AC | | | | | kg |
| **B6 mini contactors** | | | | | | | | | | |
| 4 | 20 | 3 | 300 V / 12 A | 24 | 24 | 1 0 | B6-30-10-F-01 | GJL1211003R0101 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-F-01 | GJL1211003R0011 | 10 | 0.170 |
| | | | | 48 | 48 | 1 0 | B6-30-10-F-03 | GJL1211003R0103 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-F-03 | GJL1211003R0013 | 10 | 0.170 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | B6-30-10-F-84 | GJL1211003R8104 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-F-84 | GJL1211003R8014 | 10 | 0.170 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | B6-30-10-F-80 | GJL1211003R8100 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-F-80 | GJL1211003R8010 | 10 | 0.170 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | B6-30-10-F-85 | GJL1211003R8105 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-F-85 | GJL1211003R8015 | 10 | 0.170 |
| **B7 mini contactors** | | | | | | | | | | |
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 24 | 1 0 | B7-30-10-F-01 | GJL1311003R0101 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-F-01 | GJL1311003R0011 | 10 | 0.170 |
| | | | | 48 | 48 | 1 0 | B7-30-10-F-03 | GJL1311003R0103 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-F-03 | GJL1311003R0013 | 10 | 0.170 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | B7-30-10-F-84 | GJL1311003R8104 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-F-84 | GJL1311003R8014 | 10 | 0.170 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | B7-30-10-F-80 | GJL1311003R8100 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-F-80 | GJL1311003R8010 | 10 | 0.170 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | B7-30-10-F-85 | GJL1311003R8105 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-F-85 | GJL1311003R8015 | 10 | 0.170 |

Other types on request




B6, B7

Main dimensions mm, inches

# BC6, BC7 3-pole mini contactors – with flat pin connection

4 to 5.5 kW

DC operated




BC6-30-10-F




BC7-30-10-F

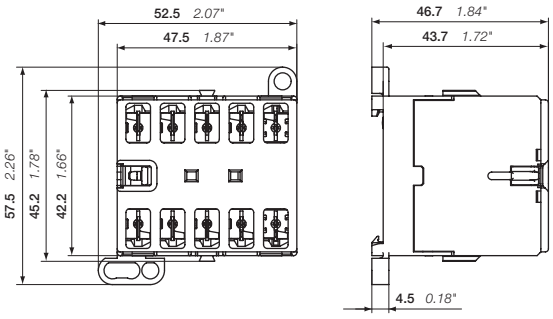
BC6..F, BC7..F 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for side mounting
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating | | | | | | |
| kW | A | hp | | V DC | | | | | kg |
| **BC6 mini contactors** | | | | | | | | | |
| 4 | 20 | 3 | 300 V / 12 A | 12 | 1 0 | BC6-30-10-F-07 | GJL1213003R0107 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-F-07 | GJL1213003R0017 | 10 | 0.170 |
| | | | | 24 | 1 0 | BC6-30-10-F-01 | GJL1213003R0101 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-F-01 | GJL1213003R0011 | 10 | 0.170 |
| **BC7 mini contactors** | | | | | | | | | |
| 5.5 | 20 | 5 | 600 V / 16 A | 12 | 1 0 | BC7-30-10-F-07 | GJL1313003R0107 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-F-07 | GJL1313003R0017 | 10 | 0.170 |
| | | | | 24 | 1 0 | BC7-30-10-F-01 | GJL1313003R0101 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-F-01 | GJL1313003R0011 | 10 | 0.170 |
| | | | | 48 | 1 0 | BC7-30-10-F-16 | GJL1313003R1106 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-F-16 | GJL1313003R1016 | 10 | 0.170 |
| | | | | 110 ... 125 | 1 0 | BC7-30-10-F-04 | GJL1313003R0104 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-F-04 | GJL1313003R0014 | 10 | 0.170 |
| | | | | 220 ... 240 | 1 0 | BC7-30-10-F-05 | GJL1313003R0105 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-F-05 | GJL1313003R0015 | 10 | 0.170 |

Other types on request




BC6, BC7

Main dimensions mm, inches

# VB7 3-pole mini reversing contactors – with flat pin connection

## 4 to 5.5 kW

## AC operated




VB7-30-10-F

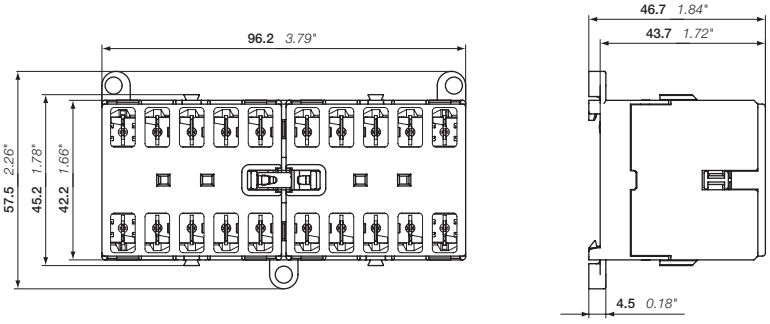
VB7..F 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 kW | current θ ≤ 40 °C AC-1 A | 3-phase motor rating 480 V hp | General use rating | 50 Hz V AC | 60 Hz V AC | | | | | kg |
| **VB7 mini reversing contactors** | | | | | | | | | | |
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 24 | 1 0 | VB7-30-10-F-01 | GJL1311903R0101 | 5 | 0.345 |
| | | | | | | 0 1 | VB7-30-01-F-01 | GJL1311903R0011 | 5 | 0.345 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | VB7-30-10-F-80 | GJL1311903R8100 | 5 | 0.345 |
| | | | | | | 0 1 | VB7-30-01-F-80 | GJL1311903R8010 | 5 | 0.345 |

Other types on request




VB7

Main dimensions mm, inches

# VBC7 3-pole mini reversing contactors – with flat pin connection

4 to 5.5 kW

DC operated




VBC7-30-10-F

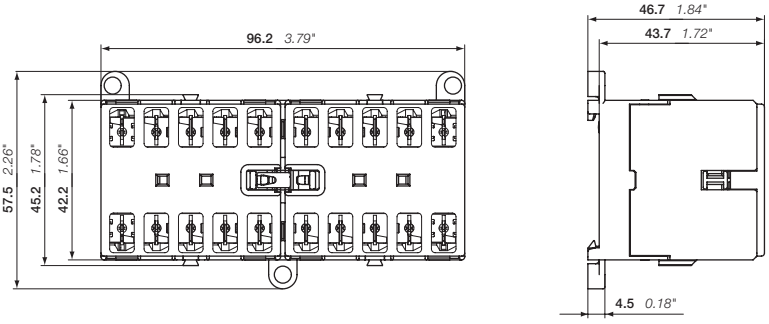
VBC7..F 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating | | | | | | |
| kW | A | hp | | V DC | | | | | kg |
| **VBC7 mini reversing contactors** | | | | | | | | | |
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 1 0 | VBC7-30-10-F-01 | GJL1313903R0101 | 5 | 0.345 |
| | | | | | 0 1 | VBC7-30-01-F-01 | GJL1313903R0011 | 5 | 0.345 |

Other types on request



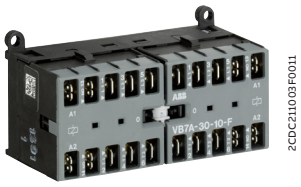

VBC7

Main dimensions mm, inches

# VB7A 3-pole mini reversing contactors – with flat pin connection

## 4 to 5.5 kW

## AC operated – with safety blocking function




VB7A-30-10-F

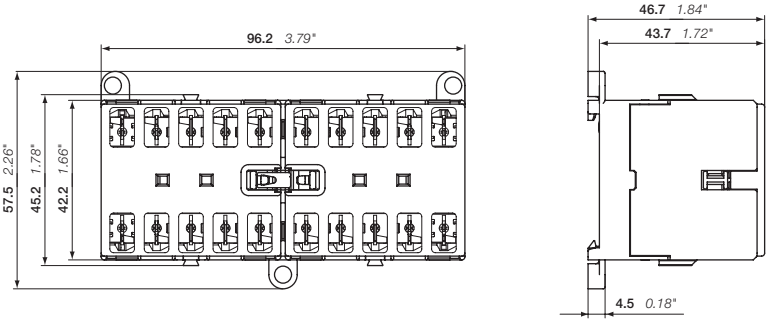
VB7A..F 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|---|
| Rated operational power | current θ ≤ 40 °C | 3-phase motor rating | General use rating | | | | | | | |
| 400 V | | 480 V | | 50 Hz | 60 Hz | | | | | |
| AC-3 | AC-1 | | | | | | | | | |
| kW | A | hp | | V AC | V AC | | | | pce | kg |
| **VB7A mini reversing contactors with safety blocking function** | | | | | | | | | | |
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 24 | 1 0 | VB7A-30-10-F-01 | GJL1311913R0101 | 5 | 0.345 |
| | | | | | | 0 1 | VB7A-30-01-F-01 | GJL1311913R0011 | 5 | 0.345 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | VB7A-30-10-F-80 | GJL1311913R8100 | 5 | 0.345 |
| | | | | | | 0 1 | VB7A-30-01-F-80 | GJL1311913R8010 | 5 | 0.345 |

Other types on request




VB7A

Main dimensions mm, inches

# VBC7A 3-pole mini reversing contactors – with flat pin connection

## 4 to 5.5 kW

## DC operated – with safety blocking function




VBC7A-30-10-F

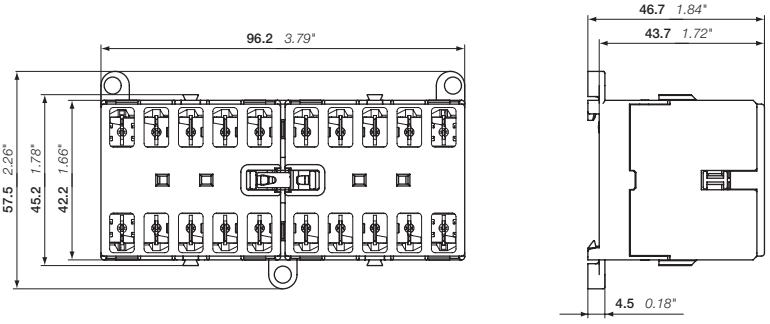
VBC7A..F 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating | | | | | | |
| kW | A | hp | | V DC | | | | | kg |
| **VBC7A mini reversing contactors with safety blocking function** | | | | | | | | | |
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 1 0 | VBC7A-30-10-F-01 | GJL1313913R0101 | 5 | 0.345 |
| | | | | | 0 1 | VBC7A-30-01-F-01 | GJL1313913R0011 | 5 | 0.345 |

Other types on request




VBC7A

Main dimensions mm, inches

# BC6, BC7 3-pole mini contactors – with flat pin connection

## 4 to 5.5 kW

## DC operated - low consumption




BC6-30-10-F




BC7-30-10-F

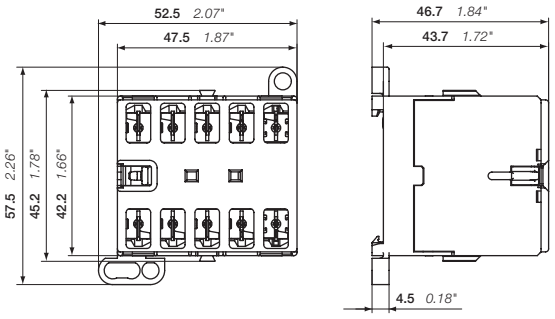
BC6..F, BC7..F 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating | | | | | | |
| kW | A | hp | | V DC | | | | | kg |
| **DC operation 24 V / 1.4 W** | | | | | | | | | |
| 4 | 20 | 3 | 300 V / 12 A | 24 | 1 0 | BC6-30-10-F-1.4-81 | GJL1213003R8101 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-F-1.4-81 | GJL1213003R8011 | 10 | 0.170 |
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 1 0 | BC7-30-10-F-1.4-81 | GJL1313003R8101 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-F-1.4-81 | GJL1313003R8011 | 10 | 0.170 |
| **DC operation 17 ... 32 V / 2.4 W** | | | | | | | | | |
| 4 | 20 | 3 | 300 V / 12 A | 17 ... 32 | 1 0 | BC6-30-10-F-2.4-51 | GJL1213003R5101 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-F-2.4-51 | GJL1213003R5011 | 10 | 0.170 |
| 5.5 | 20 | 5 | 600 V / 16 A | 17 ... 32 | 1 0 | BC7-30-10-F-2.4-51 | GJL1313003R5101 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-F-2.4-51 | GJL1313003R5011 | 10 | 0.170 |

Other types on request




BC6, BC7

Main dimensions mm, inches

# KC6 4-pole mini contactor relays – with flat pin connection

## DC operated




KC6-22Z-F-01

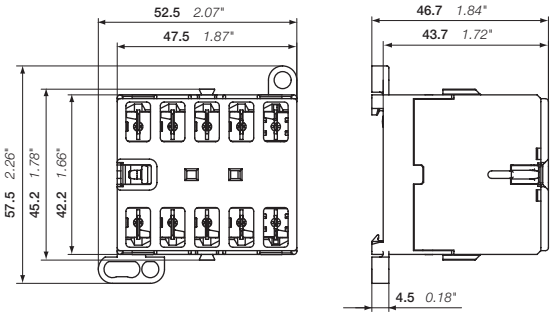
K6..F 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with 4 poles with various contact combinations:

- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configurations 22 and 31 fulfill the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- add-on auxiliary contact blocks for side mounting
- suitable for rail or wall mounting

| Rated control circuit voltage Uc<br>V DC | Type | Order code | Pkg qty | Weight (1 pce)<br>kg |
|---|---|---|---|---|
| **2 N.O. + 2 N.C. contacts** | | | | |
| 24 | KC6-22Z-F-01 | GJH1213003R0221 | 10 | 0.170 |
| **3 N.O. + 1 N.C. contacts** | | | | |
| 24 | KC6-31Z-F-01 | GJH1213003R0311 | 10 | 0.170 |
| **4 N.O. contacts** | | | | |
| 24 | KC6-40E-F-01 | GJH1213003R0401 | 10 | 0.170 |

Other types on request.




KC6

Main dimensions mm, inches

# KC6 4-pole mini contactor relays – with flat pin connection

## DC operated - low consumption




2CDC211033F0011

KC6-31Z-F-05

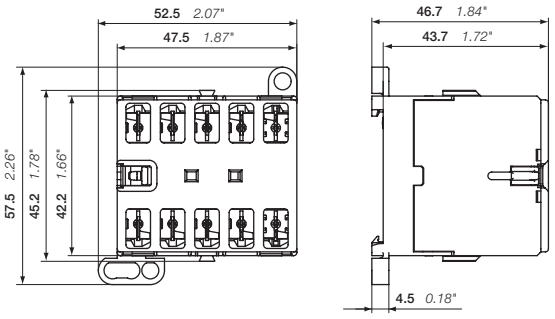
KC6..F 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with 4 poles with various contact combinations:

- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- hum-free coil
- contacts configuration 31 fulfills the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

| Rated control circuit voltage Uc<br>V DC | Type | Order code | Pkg qty | Weight (1 pce)<br>kg |
|---|---|---|---|---|
| **DC operation 24 V / 1.4 W** | | | | |
| 24 | KC6-31Z-F-1.4-81 | GJH1213003R8311 | 10 | 0.170 |
| 24 | KC6-40E-F-1.4-81 | GJH1213003R8401 | 10 | 0.170 |
| **DC operation 17 ... 32 V / 2.4 W** | | | | |
| 17 ... 32 | KC6-31Z-F-51 | GJH1213003R5311 | 10 | 0.170 |
| 17 ... 32 | KC6-40E-F-51 | GJH1213003R5401 | 10 | 0.170 |

Other types on request




KC6

Main dimensions mm, inches

# B6, B7, BC6, BC7 3- and 4-pole mini contactors
# VB6, VB7, VBC6, VBC7 3- and 4-pole mini reversing contactors
## Technical data

### Main pole – Utilization characteristics according to IEC

| | | | |
|---|---|---|---|
| Contactor types | AC operated | **B6, VB6, VB6A** | **B7, VB7, VB7A** |
| | DC operated | **BC6, VBC6, VBC6A** | **BC7, VBC7, VBC7A** |
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1 | |
| Rated operational voltage Ue max | | 690 V AC, 220 V DC | |
| Rated frequency (without derating) | | DC or 50 / 60 Hz | |
| Conventional free-air thermal current Ith acc. to IEC/EN 60947-4-1, open contactors, θ ≤ 40 °C, with conductor cross-sectional area | | Screw terminal types: 20 A<br>Flat pin types: 20 A<br>Soldering pin types: 12 A | |
| AC-1 Utilization category for air temperature close to contactor θ ≤ 40 °C | | | |
| Ie / Rated operational current AC-1<br>Ue max ≤ 690 V, 50/60 Hz | 240 V | Screw terminal types: 20 A<br>Flat pin types: 20 A<br>Soldering pin types: 12 A | |
| | 400 V | Screw terminal types: 20 A<br>Flat pin types: 20 A<br>Soldering pin types: 12 A | |
| | 440 V | Screw terminal types: 20 A<br>Flat pin types: 20 A<br>Soldering pin types: 12 A | |
| | 500 V | 12 A | |
| | 690 V | 6 A | |
| AC-1 Utilization category for air temperature close to contactor θ ≤ 55 °C | | | |
| Ie / Rated operational current AC-1<br>Ue max ≤ 690 V, 50/60 Hz | 240 V | Screw terminal types: 16 A<br>Flat pin types: 16 A<br>Soldering pin types: 12 A | |
| | 400 V | Screw terminal types: 16 A<br>Flat pin types: 16 A<br>Soldering pin types: 12 A | |
| | 440 V | Screw terminal types: 16 A<br>Flat pin types: 16 A<br>Soldering pin types: 12 A | |
| | 500 V | 12 A | |
| | 690 V | 6 A | |
| AC-3 / AC-3e Utilization category for air temperature close to contactor θ ≤ 55 °C | | | |
| Ie / Rated operational current AC-3 / AC-3e<br>3-phase motors | 240 V | 9 A | 12 A |
| | 400 V | 9 A | 12 A |
| | 440 V | 8 A | 11 A |
| | 500 V | 6.5 A | 9 A |
| | 690 V | 3.5 A | 3.5 A |
| Rated operational power AC-3 / AC-3e<br>1500 r.p.m. 50 Hz<br>1800 r.p.m. 60 Hz<br>3-phase motors | 240 V | 2.2 kW | 3 kW |
| | 400 V | 4 kW | 5.5 kW |
| | 440 V | 4 kW | 5.5 kW |
| | 500 V | 4 kW | 5.5 kW |
| | 690 V | 3 kW | 3 kW |
| Rated making capacity | | 10 x Ie AC-3 acc. to IEC/EN 60947-4-1; 13 x Ie AC-3e acc. to IEC/EN 60947-4-1 | |
| Rated breaking capacity | | 8 x Ie AC-3 acc. to IEC/EN 60947-4-1; 8.5 x Ie AC-3e acc. to IEC/EN 60947-4-1 | |
| Short-circuit protection device for contactors without thermal O/L relay - motor protection excluded fuse type gG | | Type 1: 25 A / Type 2: 20 A | Type 1: 25 A / Type 2: 25 A |
| Rated short-time withstand current Icw at 40 °C ambient temperature, in free air from a cold state | 10 s | 64 A | 96 A |
| Maximum breaking capacity cos ϕ = 0.45 | at 400 V | 64 A | 96 A |
| Maximum electrical switching frequency | AC-1 | 300 cycles/h | |
| | AC-3 | 600 cycles/h | |
| | DC-1, DC-3, DC-5 | 600 cycles/h | |

### DC-1 / DC-3 / DC-5 Utilization category for air temperature close to the contactor θ ≤ 55 °C - valid for B7 only

| Ie / Rated operational current | Per pole | | | | | Two poles in series | | | | | Three poles in series | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 24 V | 48 V | 60 V | 110 V | 220 V | 24 V | 48 V | 60 V | 110 V | 220 V | 24 V | 48 V | 60 V | 110 V | 220 V |
| DC-1 (L/R ≤ 1 ms) | 16 A | 16 A | 16 A | 5 A | 0.6 A | 16 A | 16 A | 16 A | 16 A | 5 A | 16 A | 16 A | 16 A | 16 A | 14 A |
| DC-3 (L/R ≤ 2 ms) | 16 A | 8 A | 8 A | 1.5 A | 0.25 A | 16 A | 16 A | 16 A | 7 A | 1.5 A | 16 A | 16 A | 16 A | 15 A | 4 A |
| DC-5 (L/R ≤ 7.5 ms) | 16 A | 2 A | 2 A | 0.4 A | 0.2 A | 16 A | 16 A | 16 A | 2 A | 1 A | 16 A | 16 A | 16 A | 8 A | 2 A |

# B6, B7, BC6, BC7 3- and 4-pole mini contactors
# VB6, VB7, VBC6, VBC7 3- and 4-pole mini reversing contactors
Technical data

### Main pole – Utilization characteristics according to UL/NEMA/CSA

| Contactor types | AC operated | **B6, VB6, VB6A** | **B7, VB7, VB7A** |
|---|---|---|---|
| | DC operated | **BC6, VBC6, VBC6A** | **BC7, VBC7, VBC7A** |
| Standards | | UL/CSA 60947-1, UL/CSA 60947-4-1 | |
| Maximum operational voltage | | 600 V | |
| UL/CSA general use rating | | 12 A / 300 V (2) | 16 A / 600 V (2) |
| UL/CSA maximum 1-phase motor rating | | | |
| Full load current | 120 V AC | 5.8 A | 13.8 A |
| | 240 V AC | 4.9 A | 10.0 A |
| Horse power rating | 120 V AC | 0.25 hp | 0.75 hp |
| | 240 V AC | 0.5 hp | 1.5 hp |
| UL/CSA maximum 3-phase motor rating | | | |
| Full load current (1) | 200 / 208 V AC | 4.8 / 4.6 A | 7.8 / 10.6 A |
| | 220-240 V AC | 6.8 A | 9.6 A |
| | 440-480 V AC | 4.8 A | 7.6 A |
| | 550-600 V AC | 1.7 A | 6.1 A |
| Horse power rating (1) | 200 / 208 V AC | 1 hp | 2 / 3 hp |
| | 220-240 V AC | 2 hp | 3 hp |
| | 440-480 V AC | 3 hp | 5 hp |
| | 550-600 V AC | 1 hp | 5 hp |
| Resistive Heating | 300 V per pole | 8 A | 8 A |
| Incandescent Lamps | 300 V per pole | 6 A | 6 A |
| Fluorescent Lamps | 300 V per pole | 8.4 A | 8.4 A |
| Short-circuit protection device for contactors without thermal overload relay - motor protection excluded | | | |
| High fault current | 600 V | 100 kA (3) | |
| Fuse rating | 600 V | 40 A | |
| Fuse type | 600 V | Class J | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) Versions equipped with soldering pin terminals: 8 A / 300 V for B6 series and 12 A / 600 V for B7 series
(3) Versions equipped with flat and soldering pin terminals: 5 kA

### General technical data

| Contactor types | AC operated | **B6, VB6, VB6A** | **B7, VB7, VB7A** |
|---|---|---|---|
| | DC operated | **BC6, VBC6, VBC6A** | **BC7, VBC7, VBC7A** |
| Rated insulation voltage Ui | | | |
| acc. to IEC/EN 60947-4-1 | | 690 V | |
| acc. to UL/CSA 60947-4-1 | | 600 V | |
| Rated impulse withstand voltage Uimp | | 6 kV | |
| Ambient air temperature, close to contactor | | | |
| Operation | Fitted with thermal overload relay | -25 ... +50 °C | |
| | Without thermal overload relay | -25 ... +55 °C | |
| Storage | | -40 ... +80 °C | |
| Climatic withstand | | Acc. to IEC 60947-1 Annex Q | |
| Maximum operating altitude (without derating) | | 2000 m | |
| Mechanical durability | | $10^7$ operating cycles | |
| Resistance to shock | | Half-sine | |
| acc. to IEC/EN 60068-2-27 | | 15 g / 11 ms | |
| acc. to IEC/EN 60947-1 Annex. Q | | Category E | |
| Resistance to vibrations | | Sinusoidal | |
| acc. to IEC/EN 60068-2-6 | | 5 g / 3 ... 150 Hz | |
| acc. to IEC/EN 60947-1 Annex. Q | | Category E | |

# B6, B7, BC6, BC7 3- and 4-pole mini contactors
# VB6, VB7, VBC6, VBC7 3- and 4-pole mini reversing contactors
Technical data



### Magnet system characteristics for B6, B7 contactors

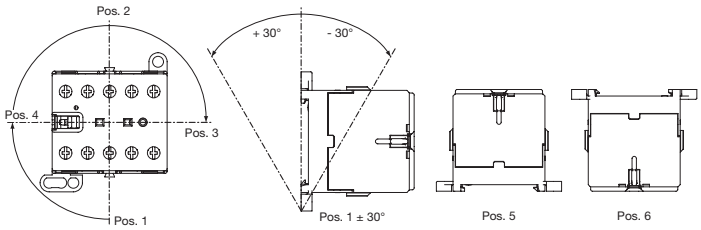
| Contactor types | AC operated | B6, VB6 | B7, VB7 |
|---|---|---|---|
| Coil operating limits acc. to IEC/EN 60947-4-1 | AC supply | 0.85 ... 1.1 x Uc | |
| AC control voltage | | | |
| Rated control circuit voltage Uc | | See ordering tables | |
| Coil consumption | Average pull-in value | 3.5 VA | |
| | Average holding value | 3.5 VA | |
| Drop-out voltage in % of Uc min | | 20 ... 75 % | |

### Magnet system characteristics for BC6, BC7 contactors

| Contactor types | DC operated | BC6, VBC6 | BC7, VBC7 |
|---|---|---|---|
| Coil operating limits acc. to IEC/EN 60947-4-1 | DC supply | 0.85 ... 1.1 x Uc | |
| AC control voltage | | | |
| Rated control circuit voltage Uc | | See ordering tables | |
| Coil consumption (1) | Average pull-in value | 3.5 W | |
| | Average holding value | 3.5 W | |
| Drop-out voltage in % of Uc min | | 10 ... 75 % | |

(1) Low consumption mini contactors: see coil consumption on ordering details pages.

### Mounting characteristics and conditions for use

| Contactor types | AC operated | B6, VB6, VB6A | B7, VB7, VB7A |
|---|---|---|---|
| | DC operated | BC6, VBC6, VBC6A | BC7, VBC7, VBC7A |
| Mounting positions | |  | |
| Mounting distances | | The contactors can be assembled side by side | |
| Fixing | | | |
| On rail acc. to IEC/EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | |
| By screws (not supplied) | | 2 x M4 screws placed diagonally | |

# B6, B7, BC6, BC7 3- and 4-pole mini contactors
# VB6, VB7, VBC6, VBC7 3- and 4-pole mini reversing contactors
## Technical data

### Built-in auxiliary contact according to IEC

| Types | | **Built-in auxiliary contacts** |
|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-5-1 |
| Rated operational voltage Ue max | | 690 V AC, 250 V DC |
| Rated frequency (without derating) | | DC or 50 / 60 Hz |
| Conventional free-air thermal current Ith θ ≤ 40 °C | | 6 A |
| Ie / Rated operational current AC-15 | 24 V | 4 A |
| | 110-120 V | 4 A |
| | 220-230-240 V | 4 A |
| | 380-400 V | 3 A |
| | 440 V | 3 A |
| Ie / Rated operational current DC-13 | 24 V | 2.5 A |
| | 110 V | 0.7 A |
| | 220 - 240 V | 0.4 A |
| Short-circuit protection device - fuse type gG | | 6 A |
| Minimum switching capacity | | 17 V / 5 mA |
| Maximum electrical switching frequency | AC-15 | 600 cycles/h |
| | DC-13 | 600 cycles/h |

### Built-in auxiliary contact according to UL/CSA

| Types | **Built-in auxiliary contacts** |
|---|---|
| Standard | UL/CSA 60947-1, UL/CSA 60947-5-1 |
| Max. operational voltage | 600 V AC |
| Pilot duty | A600 |

### Connection characteristics

| Contactor types | AC operated | **B6, VB6, VB6A** | **B7, VB7, VB7A** |
|---|---|---|---|
| | DC operated | **BC6, VBC6, VBC6A** | **BC7, VBC7, VBC7A** |
| Terminals (1) | |  Screw terminals with cable clamp | |
| Connection capacity | | | |
| Main conductors (poles) | | | |
| Rigid: solid and stranded | 1 or 2 x | 1 ... 4 mm² | |
| Flexible without ferrule | 1 or 2 x | 1 ... 2.5 mm² | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 22 ... 10 | |
| Stripping length | | 9 mm | |
| Tightening torques | | 0.8 ... 1.1 Nm / 7 lb.in | |
| Connection capacity – auxiliary conductors (built-in auxiliary terminals + coil terminals) | | | |
| Rigid: solid and stranded | 1 or 2 x | 1 ... 4 mm² | |
| Flexible without ferrule | 1 or 2 x | 1 ... 2.5 mm² | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 22 ... 10 | |
| Stripping length | | 9 mm | |
| Tightening torques | | | |
| Coil terminals | | 0.8 ... 1.1 Nm / 7 lb.in | |
| Built-in auxiliary terminals | | 0.8 ... 1.1 Nm / 7 lb.in | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | |
| Main terminals | | IP20 | |
| Coil terminals | | IP20 | |
| Built-in auxiliary terminals | | IP20 | |
| Screw terminals | | (Delivered in open position, screws of unused terminals must be tightened) | |
| All terminals | | M3 | |
| Screwdriver type | | Flat Ø 5.5 mm / Pozidriv 1 | |

(1) Soldering pin connection acc. to DIN 40801: 0.8 x 1 mm / 0.8 x 2.54 mm
Flat pin connection acc. to DIN 46248: 1 x 6.3 mm / 1 x 2.8 mm

# K6, KC6 4-pole mini contactor relays
## Technical data



### Main pole – Utilization characteristics according to IEC

| | | |
|---|---|---|
| Contactor types | AC operated | **K6** |
| | DC operated | **KC6** |
| Standards | | IEC/EN 60947-1, IEC/EN 60947-5-1 |
| Rated operational voltage Uemax | | 690 V AC, 250 V DC |
| Rated frequency (without derating) | | DC or 50 / 60 Hz |
| Conventional free-air thermal current Ith θ ≤ 40 °C | | 6 A |
| Ie / Rated operational current AC-15 | 24 V | 4 A |
| | 110-120 V | 4 A |
| | 220-230-240 V | 4 A |
| | 380-400 V | 3 A |
| | 440 V | 3 A |
| | 480-500 V | 2 A |
| Ie / Rated operational current DC-13 | 24 V | 2.5 A |
| | 110 V | 0.7 A |
| | 220-240 V | 0.4 A |
| Short-circuit protection device for contactors - fuse type gG | | 6 A |
| Minimum switching capacity | | 17 V / 5 mA |
| Maximum electrical switching frequency | AC-15 | 600 cycles/h |
| | DC-13 | 600 cycles/h |

### Main pole – Utilization characteristics according to UL/NEMA/CSA

| | | |
|---|---|---|
| Contactor types | AC operated | **K6** |
| | DC operated | **KC6** |
| Standards | | UL/CSA 60947-1, UL/CSA 60947-5-1 |
| Maximum operational voltage | | 600 V AC |
| Pilot duty | | A600 |

# K6, KC6 4-pole mini contactor relays
## Technical data



### General technical data

| | | |
|---|---|---|
| Contactor types | AC operated | **K6** |
| | DC operated | **KC6** |
| Rated insulation voltage Ui | | |
| acc. to IEC/EN 60947-5-1 | | 690 V |
| acc. to UL/CSA 60947-5-1 | | 600 V |
| Rated impulse withstand voltage Uimp | | 6 kV |
| Electromagnetic compatibility | | |
| Ambient air temperature close to contactor relay | Operation in free air | -25 ... +55 °C |
| | Storage | -40 ... +80 °C |
| Climatic withstand | | Acc. to IEC/EN 60068-2-30 |
| Maximum operating altitude (without derating) | | 2000 m |
| Mechanical durability | | $10^7$ operating cycles |
| Resistance to shock | | Half-sine |
| acc. to IEC/EN 60068-2-27 | | 15 g / 11ms |
| acc. to IEC/EN 60947-1 Annex. Q | | Category E |
| Resistance to vibrations | | Sinusoidal |
| acc. to IEC/EN 60068-2-6 | | 5 g / 3 ... 150 Hz |
| acc. to IEC/EN 60947-1 Annex. Q | | Category E |

### Magnet system characteristics for K6 contactor relays

| | | |
|---|---|---|
| Contactor types | AC operated | **K6** |
| Coil operating limits acc. to IEC/EN 60947-5-1 | AC supply | 0.85 ... 1.1 x Uc |
| AC control voltage | | |
| Rated control circuit voltage Uc | | See ordering tables |
| Coil consumption | Average pull-in value | 3.5 VA |
| | Average holding value | 3.5 VA |
| Drop-out voltage in % of Uc min. | | 20 ... 75 % |

### Magnet system characteristics for KC6 contactor relays

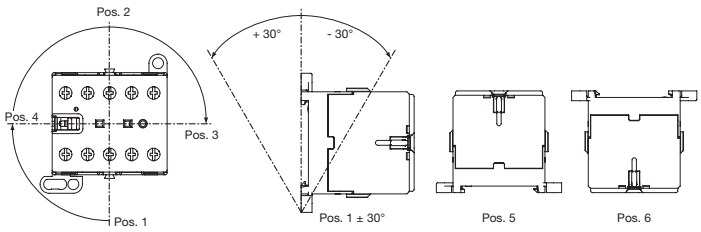
| | | |
|---|---|---|
| Contactor types | DC operated | **KC6** |
| Coil operating limits acc. to IEC/EN 60947-5-1 | DC supply | 0.85 ... 1.1 x Uc |
| DC control voltage | | |
| Rated control circuit voltage Uc | | See ordering tables |
| Coil consumption (1) | Average pull-in value | 3.5 W |
| | Average holding value | 3.5 W |
| Drop-out voltage in % of Uc min. | | 10 ... 75 % |

(1) Low consumption mini contactors: see coil consumption on ordering details pages.

# K6, KC6 4-pole mini contactor relays
Technical data



## Mounting characteristics and conditions for use

| | | |
|---|---|---|
| Contactor types | AC operated | **K6** |
| | DC operated | **KC6** |
| Mounting positions | |  |
| Mounting distances | | The contactors can be assembled side by side. |
| Fixing | | |
| On rail acc. to IEC/EN 60715 | | 35 x 7.5 mm or 35 x 15 mm |
| By screws (not supplied) | | 2 x M4 screws placed diagonally |

## Connecting characteristics

| | | |
|---|---|---|
| Contactor types | AC operated | **K6** |
| | DC operated | **KC6** |
| Terminals (1) | | <br>Screw terminals with cable clamp |
| Connection capacity | | |
| Main conductors (poles) | | |
| Rigid: solid and stranded | 1 or 2 x | 1 ... 4 mm² |
| Flexible without ferrule | 1 or 2 x | 1 ... 2.5 mm² |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 22 ... 10 |
| Stripping length | | 9 mm |
| Tightening torques | | 0.8 ... 1.1 Nm / 7 lb.in |
| Degree of protection acc. to IEC/EN60947-1 and IEC/EN 60529 | | |
| All | | IP20 |
| Screw terminals | | (Delivered in open position, screws of unused terminals must be tightened) |
| All terminals | | M3 |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 1 |

(1) Soldering pin connection acc. to DIN 40801: 0.8 x 1 mm / 0.8 x 2.54 mm
Flat pin connection acc. to DIN 46248: 1 x 6.3 mm / 1 x 2.8 mm

# Accessories for B mini contactors




2CDC211012S0010

CAF6-11N




2CDC211008S0010

CA6-11E



2CDC211018S0011

CA6-11E-P




2CDC211020S0011

CA6-11E-F



2CDC211007S0010

RV-BC6/250



SST27792R

BSM6-30



2CDC231012S0011

LT6-B

| Suitable for | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| **Front mounted instantaneous auxiliary contact blocks (1) (2) (3)** | | | | | |
| B6-, B7-40-00, BC6-, BC7-40-00<br>VB6, VB7, VBC6, VBC7, VB6A, VB7A<br>VBC6A, VBC7A | 1 1 | CAF6-11E | GJL1201330R0002 | 10 | 0.020 |
| | 2 0 | CAF6-20E | GJL1201330R0006 | 10 | 0.020 |
| | 0 2 | CAF6-02E | GJL1201330R0010 | 10 | 0.020 |
| B6-, B7-30-10, BC6-, BC7-30-10<br>VB6, VB7, VBC6, VBC7, VB6A, VB7A<br>VBC6A, VBC7A | 1 1 | CAF6-11M | GJL1201330R0003 | 10 | 0.020 |
| | 2 0 | CAF6-20M | GJL1201330R0007 | 10 | 0.020 |
| | 0 2 | CAF6-02M | GJL1201330R0011 | 10 | 0.020 |
| B6-, B7-30-01, BC6-, BC7-30-01<br>VB6, VB7, VBC6, VBC7, VB6A, VB7A<br>VBC6A, VBC7A | 1 1 | CAF6-11N | GJL1201330R0004 | 10 | 0.020 |
| | 2 0 | CAF6-20N | GJL1201330R0008 | 10 | 0.020 |
| | 0 2 | CAF6-02N | GJL1201330R0012 | 10 | 0.020 |
| **Side mounted instantaneous auxiliary contact block (1) (2) (3)** | | | | | |
| B6-, B7-40-00, BC6-, BC7-40-00 | 1 1 | CA6-11E | GJL1201317R0002 | 10 | 0.030 |
| B6-, B7-30-10, BC6-, BC7-30-10 | 1 1 | CA6-11M | GJL1201317R0003 | 10 | 0.030 |
| B6-, B7-30-01, BC6-, BC7-30-01 | 1 1 | CA6-11N | GJL1201317R0004 | 10 | 0.030 |
| **Side mounted instantaneous auxiliary contact block with soldering pins (1) (2) (3)** | | | | | |
| B6-, B7-40-00-P, BC6-,BC7-40-00-P | 1 1 | CA6-11E-P | GJL1201319R0002 | 10 | 0.025 |
| B6-, B7-30-10-P, BC6-, BC7-30-10-P | 1 1 | CA6-11M-P | GJL1201319R0003 | 10 | 0.025 |
| B6-, B7-30-01-P, BC6-, BC7-30-01-P | 1 1 | CA6-11N-P | GJL1201319R0004 | 10 | 0.025 |
| **Side mounted instantaneous auxiliary contact block with flat pin connection (1) (2) (3)** | | | | | |
| B6-, B7-40-00-F, BC6-,BC7-40-00-F | 1 1 | CA6-11E-F | GJL1201318R0002 | 10 | 0.025 |
| B6-, B7-30-10-F, BC6-, BC7-30-10-F | 1 1 | CA6-11M-F | GJL1201318R0003 | 10 | 0.025 |
| B6-, B7-30-01-F, BC6-, BC7-30-01-F | 1 1 | CA6-11N-F | GJL1201318R0004 | 10 | 0.025 |
| **Soldering socket (Ith = 10 A, AC-3: 500 V / 8 A, 690 V / 3.5 A, UL: 300 V / 8 A)** | | | | | |
| B6, B7, BC6, BC7 | | LB6 | GJL1201902R0001 | 10 | 0.020 |
| 2-pole aux.contact blocks CA | | LB6-CA | GJL1201903R0001 | 10 | 0.010 |

(1) Not allowed for mounting on B6S, B7S and low consumption contactors.
(2) CA6 and CAF6 must not be fitted simultaneously.
(3) The auxiliary contacts in the front or side blocks are not Mirror contacts.

| Suitable for | Rated control circuit voltage UC V DC | Connection type | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|---|
| **Surge suppressors for contactor coils** | | | | | | |
| BC6, BC7 | 24 ... 60 | Cable lug | RV-BC6/60 | GHV2501902R0002 | 10 | 0.005 |
| | 50 ... 250 | Cable lug | RV-BC6/250 | GHV2501903R0002 | 10 | 0.005 |

Note: Mini contactors for AC operation have an integrated protective circuit

| | | | | |
|---|---|---|---|---|
| **Connecting links with manual motor starters** | | | | |
| To connect B..VB.. mini contactor to MS116, MS132 | BEA7/132 | 1SBN080906R1002 | 10 | 0.013 |
| **Connection sets for reversing contactors** | | | | |
| VB6, VB7, VBC6, VBC7, VB6A, VB7A, VBC6A, VBC7A, cross-section 1.8 mm² | BSM6-30 | GJL1201908R0001 | 1 | 0.010 |
| **Parallel connecting link** | | | | |
| B6, B7, BC6, BC7 | LP6 | GJL1201907R0001 | 100 | 0.009 |
| **Cover cap, transparent fitting to DIN rail design, sealable** | | | | |
| B6, B7, BC6, BC7 | LT6-B | GJL1201906R0001 | 10 | 0.015 |
| **Plastic label for markings** | | | | |
| B6, B7, BC6, BC7 | BA5-50 | 1SBN110000R1000 | 50 | 0.020 |

# Accessories for K mini contactor relays



2CDC211019S0011

CAF6-11K



2CDC211009S0010

CA6-11K


2CDC211011S0010

CA6-11K-P



2CDC211010S0010

CA6-11K-F


2CDC211006S0010

LT6-B


2CDC211007S0010

RV-BC6/250

| Suitable for | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| **Front mounted instantaneous auxiliary contact blocks (1) (2) (3)** | | | | | |
| K6, KC6 | 1 1 | CAF6-11K | GJL1201330R0001 | 10 | 0.020 |
| | 2 0 | CAF6-20K | GJL1201330R0005 | 10 | 0.020 |
| | 0 2 | CAF6-02K | GJL1201330R0009 | 10 | 0.020 |
| **Side mounted instantaneous auxiliary contact block (1) (2) (3)** | | | | | |
| K6, KC6 | 1 1 | CA6-11K | GJL1201317R0001 | 10 | 0.030 |
| **Side mounted instantaneous auxiliary contact block with soldering pins (1) (2) (3)** | | | | | |
| K6..P, KC6..P | 1 1 | CA6-11K-P | GJL1201319R0001 | 10 | 0.025 |
| **Side mounted instantaneous auxiliary contact block with flat pin connection (1) (2) (3)** | | | | | |
| K6..F, KC6..F | 1 1 | CA6-11K-F | GJL1201318R0001 | 10 | 0.025 |
| **Soldering socket ( Ie < 8 A )** | | | | | |
| K6, KC6 | | LB6 | GJL1201902R0001 | 10 | 0.020 |
| 2-pole auxiliary contact blocks CA | | LB6-CA | GJL1201903R0001 | 10 | 0.010 |

(1) Not allowed for mounting on K6S and low consumption contactor relays.
(2) CA6 and CAF6 must not be fitted simultaneously.
(3) The auxiliary contacts in the front or side blocks are not Mechanically linked contacts.

| Suitable for | Rated control circuit voltage UC V DC | Connection type | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|---|
| **Surge suppressors for contactor coils** | | | | | | |
| KC6 | 24 ... 60 | Cable lug | RV-BC6/60 | GHV2501902R0002 | 10 | 0.005 |
| | 50 ... 250 | Cable lug | RV-BC6/250 | GHV2501903R0002 | 10 | 0.005 |

Note: Mini contactors for AC operation have an integrated protective circuit

| | | | | | | |
|---|---|---|---|---|---|---|
| **Cover cap, transparent fitting to DIN rail design, sealable** | | | | | | |
| K6, KC6 | | | LT6-B | GJL1201906R0001 | 10 | 0.015 |

# B6, B7, BC6, BC7 3- and 4-pole mini contactors
# VB6, VB7, VBC6, VBC7 3- and 4-pole mini reversing contactors
## Technical data



### Auxiliary contacts for front mounting and side mounting according to IEC

| Types | | **CA6, CAF6** |
|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-5-1 |
| Rated operational voltage Ue max | | 690 V |
| Rated frequency (without derating) | | DC or 50 / 60 Hz |
| Conventional free-air thermal current Ith θ ≤ 40 °C | | 6 A |
| Ie / Rated operational current AC-15 | 24 V 50/60 Hz | 4 A |
| | 110-120 V 50/60 Hz | 4 A |
| | 220-230-240 V 50/60 Hz | 4 A |
| | 380-400 V 50/60 Hz | 3 A |
| | 440 V 50/60 Hz | 3 A |
| Ie / Rated operational current DC-13 | 24 V DC | 2.5 A |
| | 110 V DC | 0.7 A |
| | 220 - 240 V DC | 0.4 A |
| Short-circuit protection device - fuse type gG | | 6 A |
| Minimum switching capacity | | 17 V / 5 mA |
| Maximum electrical switching frequency | AC-15 | 600 cycles/h |
| | DC-13 | 600 cycles/h |

### Auxiliary contacts for front mounting and side mounting according to UL/CSA

| Types | **CA6, CAF6** |
|---|---|
| Standards | UL/CSA 60947-1, UL/CSA 60947-5-1 |
| Max. operational voltage | 600 V AC |
| Pilot duty | A600 |
| AC thermal rated current | 5 A |

### Connection characteristics

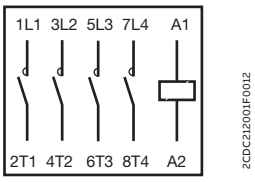
| Types | | **CA6, CAF6** |
|---|---|---|
| Terminals (1) | |  Screw terminals with cable clamp |
| Connection capacity – auxiliary conductors (built-in auxiliary terminals + coil terminals) | | |
| Rigid: solid and stranded | 1 or 2 x | 1 ... 4 mm² |
| Flexible without ferrule | 1 or 2 x | 1 ... 2.5 mm² |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 22 ... 10 |
| Stripping length | | 9 mm |
| Tightening torques | | 0.8 ... 1.1 Nm / 7 lb.in |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | |
| Auxiliary terminals | | IP20 |
| Screw terminals | | (Delivered in open position, screws of unused terminals must be tightened) |
| All terminals | | M3 |
| Screwdriver type | | Flat Ø 5.5 mm / Pozidriv 1 |

(1) Soldering pin connection acc. to DIN 40801: 0.8 x 1 mm / 0.8 x 2.54 mm
Flat pin connection acc. to DIN 46248: 1 x 6.3 mm / 1 x 2.8 mm

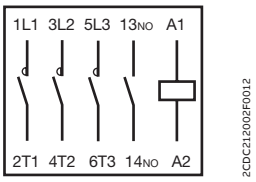
# B mini contactors and K mini contactor relays

## Terminal marking and positioning

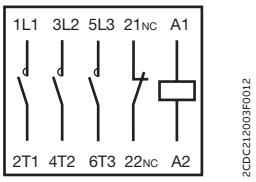
### Mini contactors



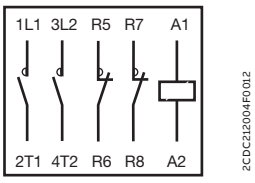

B6(7)-40-00 ...
BC6(7)-40-00 ...



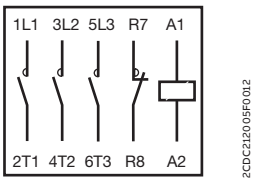

B6(7)-30-10 ...
BC6(7)-30-10 ...




B6(7)-30-01 ...
BC6(7)-30-01 ...

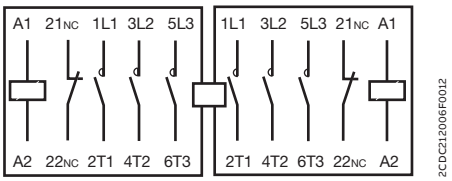



B6(7)-22-00 ...
BC6(7)-22-00 ...

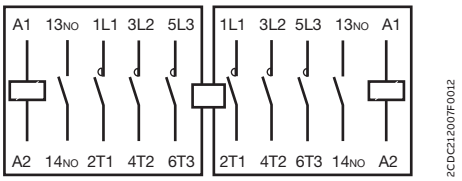



B6(7)-31-00 ...
BC6(7)-31-00 ...

### Compact reversing contactors

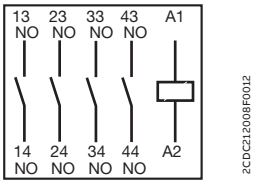



VB6(7)-30-01 ...
VBC6(7)-30-01 ...

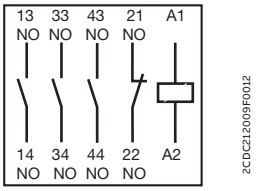



VB6(7)-30-10 ...
VBC6(7)-30-10 ...

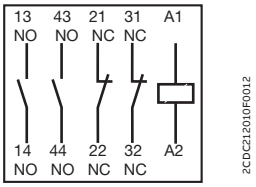
### Mini contactor relays




K6-40E ...
KC6-40E ...



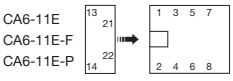

K6-31Z ...
KC6-31Z ...




K6-22Z ...
KC6-22Z ...

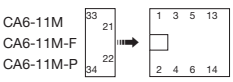
### Auxiliary switches

#### CA6...



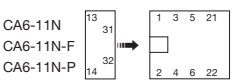

CA6-11E
CA6-11E-F
CA6-11E-P

B(C)6(7)-40-00
B(C)6(7)-40-00-F
B(C)6(7)-40-00-P



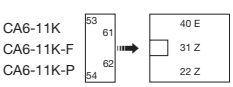

CA6-11M
CA6-11M-F
CA6-11M-P

B(C)6(7)-30-10
B(C)6(7)-30-10-F
B(C)6(7)-30-10-P




CA6-11N
CA6-11N-F
CA6-11N-P

B(C)6(7)-30-01
B(C)6(7)-30-01-F
B(C)6(7)-30-01-P

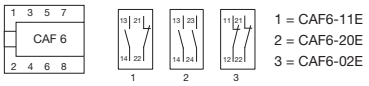



CA6-11K
CA6-11K-F
CA6-11K-P

K(C)6 .....
K(C)6 ....-F
K(C)6 ....-P

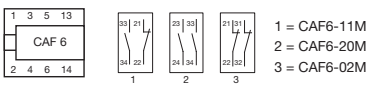
#### CAF...

B(C)6(7)-40-00



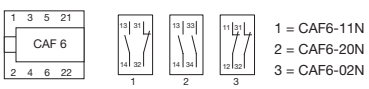

1 = CAF6-11E
2 = CAF6-20E
3 = CAF6-02E

B(C)6(7)-30-10



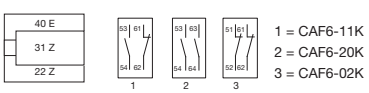

1 = CAF6-11M
2 = CAF6-20M
3 = CAF6-02M

B(C)6(7)-30-01




1 = CAF6-11N
2 = CAF6-20N
3 = CAF6-02N

K(C)6 .....

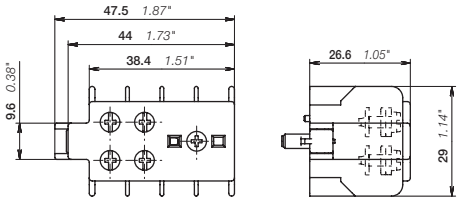



1 = CAF6-11K
2 = CAF6-20K
3 = CAF6-02K

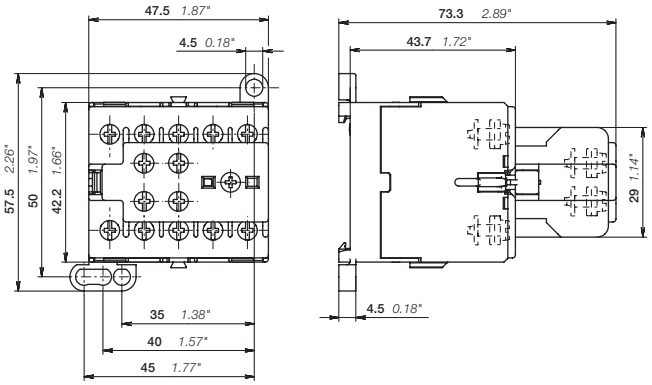
# B mini contactors and K mini contactor relays

## Dimension drawings with accessories

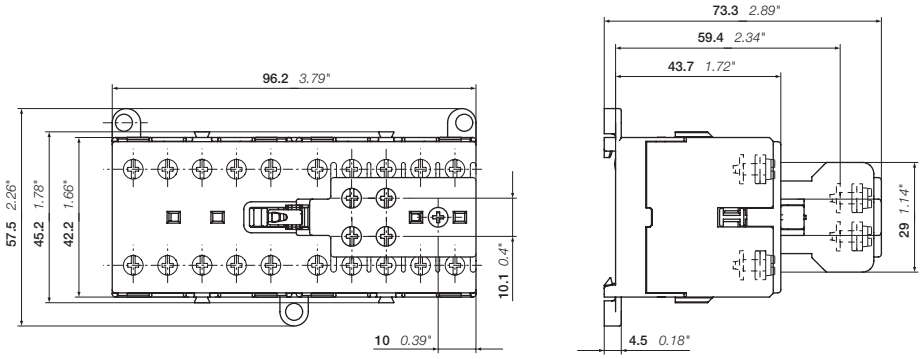
### Front mounted auxiliary contact blocks, with screw terminals




CAF6

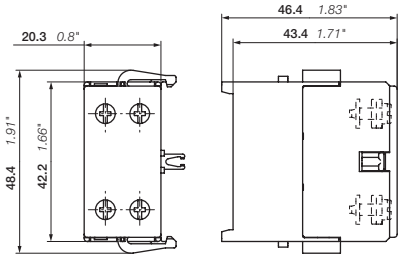



Mini contactors or contactor relays + CAF6

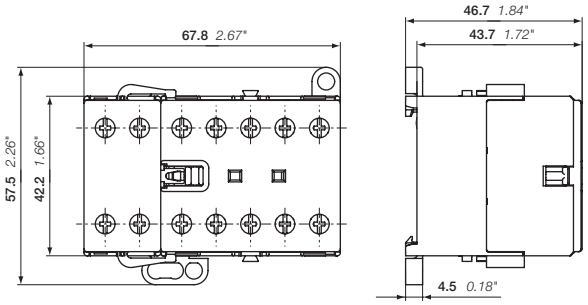



Mini reversing contactors + CAF6 (max. 2 contact blocks)

### Side mounted auxiliary contact blocks, with screw terminals




CA6-11E, CA6-11M, CA6-11N

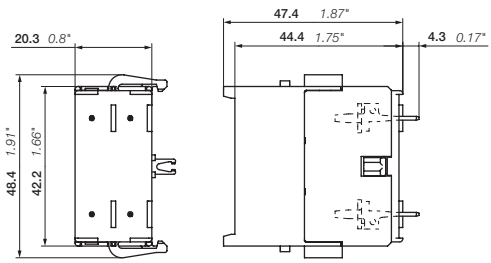



Mini contactors or contactor relays + CA6-11E, CA6-11M, CA6-11N

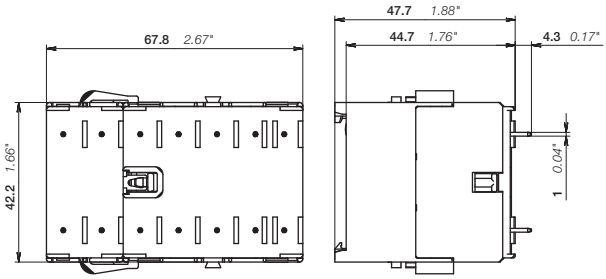
# B mini contactors and K mini contactor relays

## Dimension drawings with accessories

### Side mounted auxiliary contact blocks, with soldering pins

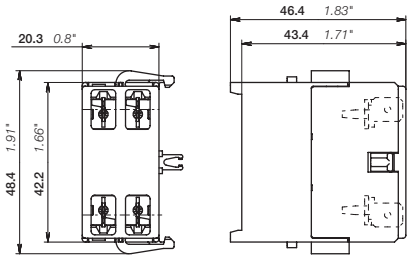



CA6-11E-P, CA6-11M-P, CA6-11N-P

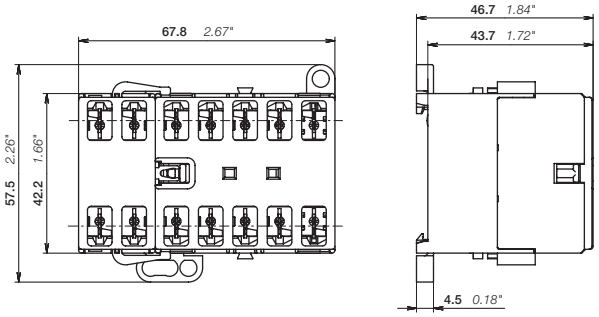



Mini contactors or contactor relays + CA6-11E-P, CA6-11M-P, CA6-11N-P

### Side mounted auxiliary contact blocks, with flat pin connection

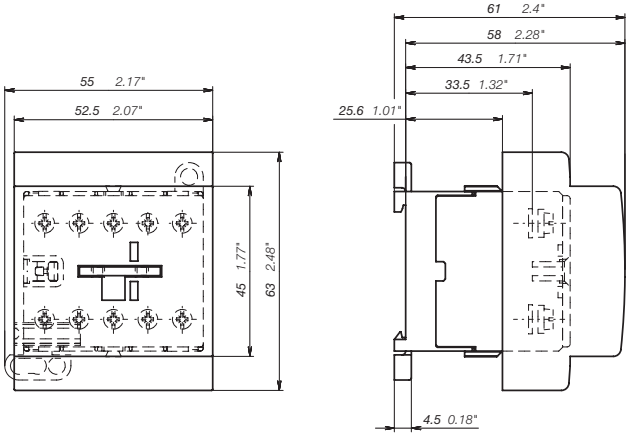



CA6-11E-F, CA6-11M-F, CA6-11N-F




Mini contactors or contactor relays + CA6-11E-F, CA6-11M-F, CA6-11N-F

### Front mounted cover cap for DIN rail panel installation

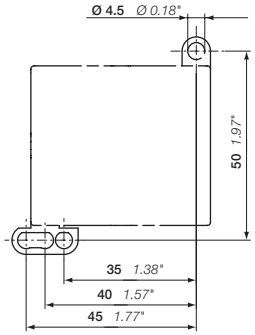



Mini contactors or contactor relays + LT6-B cover cap

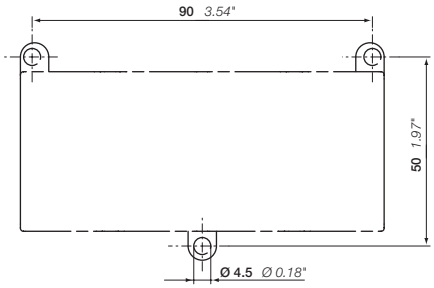
# B mini contactors and K mini contactor relays

## Dimension drawings with accessories

### Drilling plans for wall mounting

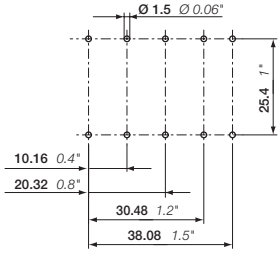



Mini contactors or contactor relays with screw terminals and flat pin connection

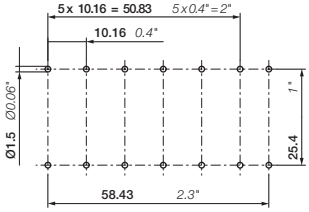



Mini reversing contactors with screw terminals and flat pin connection

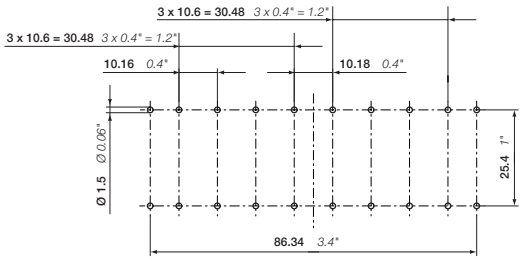
### Drilling plans for PCBA




Mini contactors or contactor relays with soldering pins




Mini contactors or contactor relays with soldering pins + CA6-11E-P, CA6-11M-P, CA6-11N-P




Mini reversing contactors with soldering pins

Main dimensions mm, inches

# Notes



**For more information please find our electronic data sheets online, for example:**

new.abb.com/products/**1SAL102617R9901**

# M mini contactors and contactor relays


**4/**59 **Presentation**

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**3-pole mini contactors - 4 to 5.5 kW**

**With screw terminals**

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| | | |
|---|---|---|
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**4-pole mini contactors - 4 to 5.5 kW**

**With screw terminals**

| | | |
|---|---|---|
| **4/**71 | MC1A | AC operated |
| **4/**72 | MC2A | AC operated |
| **4/**73 | MC1C, MC2C | DC operated |
| **4/**74 | MC1I, MC1K | DC operated - low consumption |

**For ring tongue ferrules**

| | | |
|---|---|---|
| **4/**75 | MC1A..R | AC operated |
| **4/**76 | MC1C..R | DC operated |
| **4/**77 | MC1K..R | DC operated - low consumption |

**4-pole mini contactor relays**

**With screw terminals**

| | | |
|---|---|---|
| **4/**78 | MCRA | AC operated |
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**For ring tongue ferrules**

| | | |
|---|---|---|
| **4/**81 | MCRA..R | AC operated |
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# M mini contactors and contactor relays
## Reliability, always




The M contactors range is a performance-dimension optimized solution for all the purposes.
Its high reliability, even in extreme conditions, combined to the small sizes and the safe connections lead to easy design and compact panels.

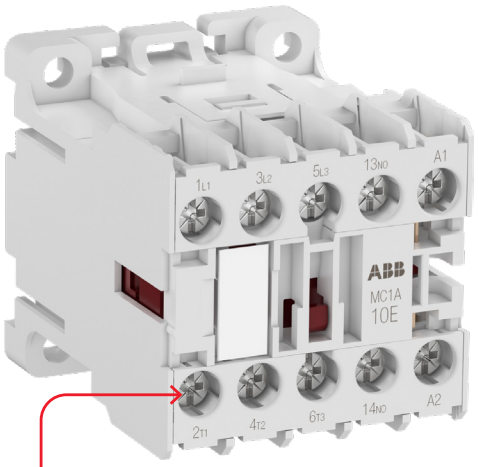
### Space-saving
**Small dimensions for big projects**
The M range devices are a great solution when high performances are needed but the space is limited. The small dimensions of the products and the possibility to mount them side by side will maximize the cost efficiency of the cabinets without making compromises.

### Reliability in extreme conditions
**Made for all the applications**
The technology used in the design of the contactors and the wide set of variants available guarantee reliability of operation with heavy working conditions as well. Instability of the network, high altitude and extreme temperatures will not be a limit anymore.

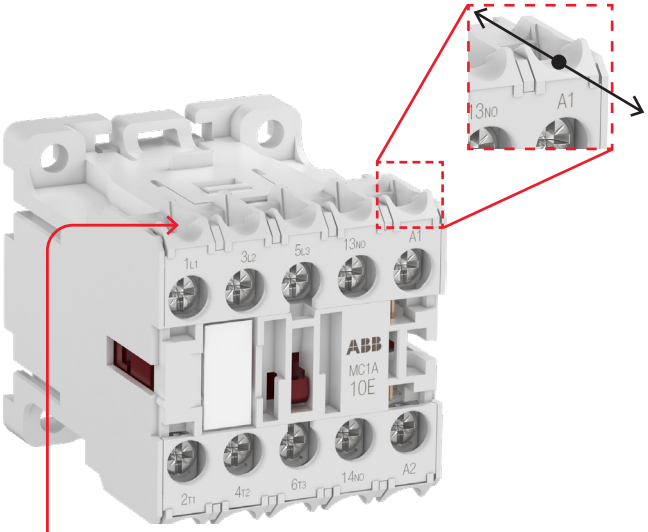
### Optimum interface
**Never without a solution**
A wide set of coils is provided for matching all the requirements: pure AC or DC for very fast switching, with low energy consumption for direct control by PLC and with extended operating limits to face voltage fluctuations.
A complete offer for realizing your projects.

# M mini contactors and contactor relays
## Efficient - High performances in small dimensions

**AC**
**or**
**DC**

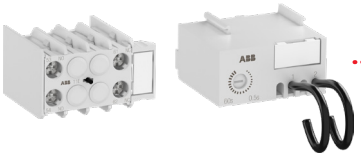



**Lugs easy connection**




### Screw
**Screw terminals**
The same screw is used for all the terminals and circuits of the device for an efficient and fast screwing. The connection is always stable, the range of usable wire dimensions wide and the maintenance easy.

### Ring tongue ferrules
**With specific screw terminal**
A large set of contactors and contactor relays is equipped with specific screw terminals; these allow quick and simple installations using ring tongue ferrules. A must for applications with shocks and vibrations and when the solidity of the connection is a crucial factor.



**Wide range of accessories**
Up to 6 auxiliary contacts can be mounted on the devices, on the side or the front and with both the connection types. Electronic timers, surge suppressors and parallel connection links are also available in the assortment.



**Assemble your reversing starter**
Thanks to the mechanical interlock and the connection sets a compact reversing starter can be easily assembled for motor controlling in both directions. Auxiliary contact blocks can be installed on the front or on both sides of the reversing contactor.



**Compact protection**
The M mini contactors are fully compatible with manual motor starters and thermal overload relays for creating a very compact but still effective solution to defend your loads against current overloads and phase failures.

# M mini contactors
## Powerful - as a contactor, but mini

**No more compromises.**
Feel free to plan your panels without limitations - Having the large assortment of M mini contactors by your side, with their high level of design, the superior quality of materials, and wide set of accessories, there will be no more constraints to your control possibilities, in all applications

### Plugging and inching motor control
M mini contactors are suitable for use in the control of AC-4 motors up to 4 kW at 400 V.



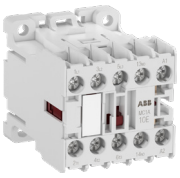
### Household appliances
Thanks to plastic material compliant to the IEC 60335-1 standard clause 30, M mini contactors can be safely used in unattended household appliances

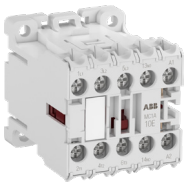




### Harsh conditions
The standard main features of the M mini contactors are also compatible with all applications having harsh operating conditions: High temperature and altitude resistance, extended operating limit coils against network instability/voltage fluctuation, pure AC or DC coils for fast switching, high-performance materials.

# M mini contactors





| | | | | Screw terminals | | Screw terminals for ring tongue ferrules | |
|---|---|---|---|---|---|---|---|
| **AC Control supply** | | | | | | | |
| 3-pole contactors | Coil consumption (50 Hz) 5.3 VA | | Type | **MC1A..T** | **MC2A..T** | **MC1A..R** | **MC2A..R** |
| 4-pole contactors | Coil consumption (50 Hz) 5.3 VA | | Type | **MC1A..T** | **MC2A..T** | **MC1A..R** | **–** |
| **DC Control supply** | | | | | | | |
| 3-pole contactors | Coil consumption 3 W | | Type | **MC1C..T** | **MC2C..T** | **MC1C..R** | **–** |
| 3-pole low consumption contactors | Coil consumption 1.2 / 2 W | | Type | **MC1I..T / MC1K..T** | **MC2I..T / MC2K..T** | **MC1K..R** | **–** |
| 3-pole extended limits coil contactors | Coil consumption 4 W | | Type | **MC1C..TW** | **MC2C..TW** | **–** | **–** |
| 4-pole contactors | Coil consumption 3 W | | Type | **MC1C..T** | **–** | **MC1C..R** | **–** |
| 4-pole low consumption contactors | Coil consumption 1.2 / 2 W | | Type | **MC1I..T / MC1K..T** | **–** | **MC1K..R** | **–** |
| 4-pole extended limits coil contactors | Coil consumption 4 W | | Type | **MC1C..TW** | **MC2C..TW** | **–** | **–** |
| IEC Rated operational power AC-3 | 230 V | | kW | 2.2 | 3 | 2.2 | 3 |
| | 400 V | | kW | 4 | 5.5 | 4 | 5.5 |
| | 500 V | | kW | 4 | 5.5 | 4 | 5.5 |
| | 690 V | | kW | 4 (1) | 4 (1) | 4 (1) | 4 (1) |
| Rated operational current AC-1 | 400 V, θ ≤ 55 °C | | A | 20 | 20 | 20 | 20 |
| UL/CSA 3-phase motor rating | 200 V AC | | hp | 3 | 3 | 3 | 3 |
| | 240 V AC | | hp | 3 | 3 | 3 | 3 |
| | 380-425 V AC | | hp | 3 | 5 | 3 | 5 |
| | 440-480 V AC | | hp | 5 | 7.5 | 5 | 7.5 |
| | 500-600 V AC | | hp | 5 | 10 | 5 | 10 |
| General use rating | | | A | 20 (600 V) | 20 (600 V) | 20 (600 V) | 20 (600 V) |

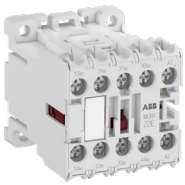
| **Main accessories** | | |
|---|---|---|
| Auxiliary contact blocks | Front mounting | MACN / MARN |
| | Side mounting | MACL / MARL |
| Electronic timers | | MREBC |
| Connection sets | For reversing contactors | WKMIU |
| Surge suppressors | | MP0 |

| **Overload relays** | | |
|---|---|---|
| Thermal overload relays | Class 10 | T16 |
| Thermal and phase failure protection, with single setup possible | | |

(1) Valid for N.O. contacts only.

# M mini contactor relays





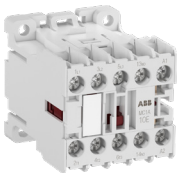
| | | | | Screw terminals | Screw terminals for ring tongue ferrules |
|---|---|---|---|---|---|
| **AC Control supply** | | | | | |
| 4-pole contactor relays | Coil consumption (50 Hz) 5.3 VA | | Type | **MCRA..T** | **MCRA..R** |
| **DC Control supply** | | | | | |
| 4-pole contactor relays | Coil consumption 3 W | | Type | **MCRC..T** | **MCRC..R** |
| 4-pole low consumption contactor relays | Coil consumption 1.2 / 2 W | | Type | **MCRI..T / MCRK..T** | **MCRK..R** |
| 4-pole extended limits coil contactor relays | Coil consumption 4 W | | Type | **MCRC..TW** | **–** |
| IEC Rated operational current AC-15 | 240 V | | A | 6 | 6 |
| | 400 V | | A | 4 | 4 |
| Rated operational current DC-13 | 24 V | | A | 5 | 5 |
| UL/CSA Pilot duty | | | | A600, Q600 | |

| **Main accessories** | | |
|---|---|---|
| Auxiliary contact blocks | Front mounting | MARN |
| | Side mounting | MARL |
| Electronic timers | | MREBC |
| Surge suppressor | | MP0 |

# MC1A 3-pole mini contactors with screw terminals

4 kW

AC operated




MC1A310AT

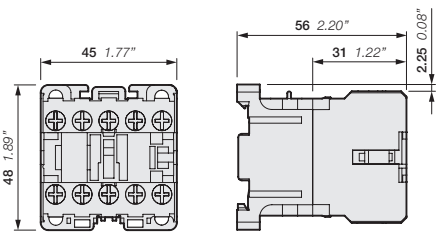
MC1A 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.



| IEC | | UL/CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current Θ ≤ 55 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50 Hz | V 60 Hz | | | | kg |
| 4 | 20 | 5 | 20 | 24 | 24 | 1 0 | MC1A310AT1 | 1SAL102617R9901 | 0.170 |
| | | | | | | 0 1 | MC1A301AT1 | 1SAL102638R9901 | 0.170 |
| | | | | 48 | 48 | 1 0 | MC1A310AT9 | 1SAL100298R9901 | 0.170 |
| | | | | | | 0 1 | MC1A301AT9 | 1SAL100320R9901 | 0.170 |
| | | | | 110...115 | 110...120 | 1 0 | MC1A310ATJ | 1SAL100213R9901 | 0.170 |
| | | | | | | 0 1 | MC1A301ATJ | 1SAL100223R9901 | 0.170 |
| | | | | 120 | 120 | 1 0 | MC1A310AT4 | 1SAL102620R9901 | 0.170 |
| | | | | | | 0 1 | MC1A301AT4 | 1SAL102641R9901 | 0.170 |
| | | | | – | 208...220 | 1 0 | MC1A310ATM | 1SAL102611R9901 | 0.170 |
| | | | | | | 0 1 | MC1A301ATM | 1SAL220348R9901 | 0.170 |
| | | | | 220...230 | 220...230 | 1 0 | MC1A310AT6 | 1SAL102622R9901 | 0.170 |
| | | | | | | 0 1 | MC1A301AT6 | 1SAL102643R9901 | 0.170 |
| | | | | 220...240 | 240...277 | 1 0 | MC1A310ATN | 1SAL100214R9901 | 0.170 |
| | | | | | | 0 1 | MC1A301ATN | 1SAL100224R9901 | 0.170 |
| | | | | 240 | 240 | 1 0 | MC1A310AT7 | 1SAL102623R9901 | 0.170 |
| | | | | | | 0 1 | MC1A301AT7 | 1SAL102995R9901 | 0.170 |
| | | | | 380...400 | 440 | 1 0 | MC1A310ATU | 1SAL100215R9901 | 0.170 |
| | | | | | | 0 1 | MC1A301ATU | 1SAL100225R9901 | 0.170 |
| | | | | 415...440 | 480 | 1 0 | MC1A310ATW | 1SAL102615R9901 | 0.170 |
| | | | | | | 0 1 | MC1A301ATW | 1SAL102636R9901 | 0.170 |
| | | | | 500 | 600 | 1 0 | MC1A310ATY | 1SAL102616R9901 | 0.170 |
| | | | | | | 0 1 | MC1A301ATY | 1SAL102637R9901 | 0.170 |



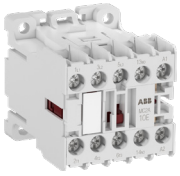

MC1A

Main dimensions mm, inches

# MC2A 3-pole mini contactors with screw terminals

## 5.5 kW

## AC operated



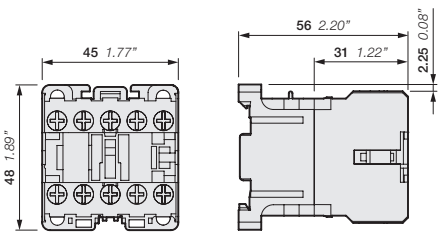

MC2A310AT

MC2A 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC | | UL/CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 55 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50 Hz | V 60 Hz | | | | kg |
| 5.5 | 20 | 7.5 | 20 | 24 | 24 | 1 0 | MC2A310AT1 | 1SAL103577R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301AT1 | 1SAL103569R9902 | 0.170 |
| | | | | 48 | 48 | 1 0 | MC2A310AT9 | 1SAL103268R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301AT9 | 1SAL103269R9902 | 0.170 |
| | | | | 110...115 | 110...120 | 1 0 | MC2A310ATJ | 1SAL103573R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301ATJ | 1SAL103565R9902 | 0.170 |
| | | | | 120 | 120 | 1 0 | MC2A310AT4 | 1SAL101644R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301AT4 | 1SAL101641R9902 | 0.170 |
| | | | | – | 208...220 | 1 0 | MC2A310ATM | 1SAL103835R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301ATM | 1SAL100046R9902 | 0.170 |
| | | | | 220...230 | 220...230 | 1 0 | MC2A310AT6 | 1SAL103579R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301AT6 | 1SAL103571R9902 | 0.170 |
| | | | | 220...240 | 240...277 | 1 0 | MC2A310ATN | 1SAL103574R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301ATN | 1SAL103566R9902 | 0.170 |
| | | | | 240 | 240 | 1 0 | MC2A310AT7 | 1SAL101875R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301AT7 | 1SAL101877R9902 | 0.170 |
| | | | | 380...400 | 440 | 1 0 | MC2A310ATU | 1SAL103575R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301ATU | 1SAL103567R9902 | 0.170 |
| | | | | 415...440 | 480 | 1 0 | MC2A310ATW | 1SAL135704R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301ATW | 1SAL135705R9902 | 0.170 |
| | | | | 500 | 600 | 1 0 | MC2A310ATY | 1SAL101876R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301ATY | 1SAL101907R9902 | 0.170 |




MC2A

Main dimensions mm, inches

# MC1C 3-pole mini contactors with screw terminals

4 kW

DC operated




MC1C310AT

MC1C 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

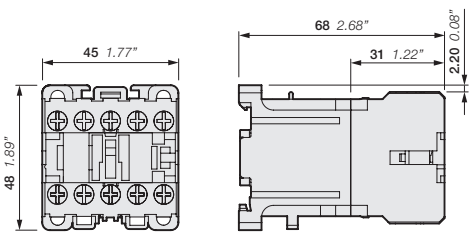
These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.



| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 55 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | Pkg (1pce) |
| kW | A | hp | A | V DC | | | | kg |
| **MC1C mini contactors** | | | | | | | | |
| 4 | 20 | 5 | 20 | 12 | 1 0 | MC1C310ATB | 1SAL100210R9901 | 0.250 |
| | | | | | 0 1 | MC1C301ATB | 1SAL100220R9901 | 0.250 |
| | | | | 24 | 1 0 | MC1C310ATD | 1SAL100216R9901 | 0.250 |
| | | | | | 0 1 | MC1C301ATD | 1SAL100226R9901 | 0.250 |
| | | | | 24 with Diode | 1 0 | MC1C310ATDD | 1SAL113312R9901 | 0.250 |
| | | | | | 0 1 | MC1C301ATDD | 1SAL113328R9901 | 0.250 |
| **MC1C mini contactors with extended operating limits coil** | | | | | | | | |
| 4 | 20 | 5 | 20 | 24* | 1 0 | MC1C310ATWD | 1SAL220373R9901 | 0.250 |
| | | | | | 0 1 | MC1C301ATWD | 1SAL220372R9901 | 0.250 |
| | | | | 48* | 1 0 | MC1C310ATWG | 1SAL100380R9901 | 0.250 |
| | | | | | 0 1 | MC1C301ATWG | 1SAL200795R9901 | 0.250 |
| | | | | 110* | 1 0 | MC1C310ATWJ | 1SAL220371R9901 | 0.250 |
| | | | | | 0 1 | MC1C301ATWJ | 1SAL220370R9901 | 0.250 |
| | | | | 125* | 1 0 | MC1C310ATWL | 1SAL220460R9901 | 0.250 |
| | | | | | 0 1 | MC1C301ATWL | 1SAL220459R9901 | 0.250 |
| | | | | 220* | 1 0 | MC1C310ATWN | 1SAL220369R9901 | 0.250 |
| | | | | | 0 1 | MC1C301ATWN | 1SAL220368R9901 | 0.250 |

* With the extended operating limits coils:
- at nominal voltage, Uc, a higher number of additional auxiliary contacts can be attached to the device
- a wider range of voltages, -30% ≤ Uc ≤ +30%, can be used for the operation with a limitation of the number of auxiliary contacts.




MC1C

Main dimensions mm, inches

# MC2C 3-pole mini contactors with screw terminals

## 5.5 kW

## DC operated




MC2C310AT

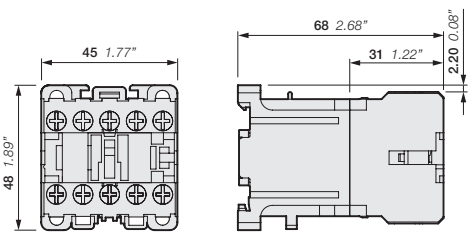
MC2C 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 55 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | Pkg (1 pce) |
| kW | A | hp | A | V DC | | | | kg |
| **MC2C mini contactors** | | | | | | | | |
| 5.5 | 20 | 7.5 | 20 | 12 | 1 0 | MC2C310ATB | 1SAL103588R9902 | 0.250 |
| | | | | | 0 1 | MC2C301ATB | 1SAL103589R9902 | 0.250 |
| | | | | 24 | 1 0 | MC2C310ATD | 1SAL103584R9902 | 0.250 |
| | | | | | 0 1 | MC2C301ATD | 1SAL103580R9902 | 0.250 |
| | | | | 24 with Diode | 1 0 | MC2C310ATDD | 1SAL101926R9902 | 0.250 |
| | | | | | 0 1 | MC2C301ATDD | 1SAL101955R9902 | 0.250 |
| **MC2C mini contactors with extended operating limits coil** | | | | | | | | |
| 5.5 | 20 | 7.5 | 20 | 24* | 1 0 | MC2C310ATWD | 1SAL102378R9902 | 0.250 |
| | | | | | 0 1 | MC2C301ATWD | 1SAL102379R9902 | 0.250 |
| | | | | 48* | 1 0 | MC2C310ATWG | 1SAL101951R9902 | 0.250 |
| | | | | | 0 1 | MC2C301ATWG | 1SAL101958R9902 | 0.250 |
| | | | | 110* | 1 0 | MC2C310ATWJ | 1SAL102381R9902 | 0.250 |
| | | | | | 0 1 | MC2C301ATWJ | 1SAL102382R9902 | 0.250 |
| | | | | 125* | 1 0 | MC2C310ATWL | 1SAL204887R9902 | 0.250 |
| | | | | | 0 1 | MC2C301ATWL | 1SAL204886R9902 | 0.250 |
| | | | | 220* | 1 0 | MC2C310ATWN | 1SAL100442R9902 | 0.250 |
| | | | | | 0 1 | MC2C301ATWN | 1SAL100435R9902 | 0.250 |

* With the extended operating limits coils:
- at nominal voltage, Uc, a higher number of additional auxiliary contacts can be attached to the device
- a wider range of voltages, -30% ≤ Uc ≤ +30%, can be used for the operation with a limitation of the number of auxiliary contacts.




MC2C

Main dimensions mm, inches

# MC1I, MC1K, MC2I, MC2K 3- pole mini contactors with screw terminals

4 to 5.5 kW

DC operated - low consumption




MC1I310AT




MC2I310AT




MC1K310AT



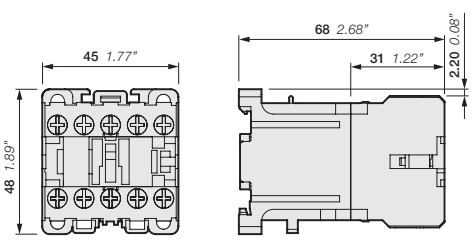

MC2K310AT

MC..I and MC..K 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- only for K variants: add-on auxiliary contact blocks for front or side mounting (up to 2 additional contacts)
- wide range of accessories
- suitable for rail or wall mounting.

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) |
|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 55 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | |
| kW | A | hp | A | V DC | | | | kg |
| **DC operation 24 V / 1.2 W** | | | | | | | | |
| 4 | 20 | 7.5 | 20 | 24 | 1 0 | MC1I310ATD | 1SAL100572R9901 | 0.250 |
| | | | | | 0 1 | MC1I301ATD | 1SAL100573R9901 | 0.250 |
| 5.5 | 20 | 7.5 | 20 | 24 | 1 0 | MC2I310ATD | 1SAL100559R9902 | 0.250 |
| | | | | | 0 1 | MC2I301ATD | 1SAL100538R9902 | 0.250 |
| **DC operation 24 V / 2 W** | | | | | | | | |
| 4 | 20 | 7.5 | 20 | 24 | 1 0 | MC1K310ATD | 1SAL100576R9901 | 0.250 |
| | | | | | 0 1 | MC1K301ATD | 1SAL100577R9901 | 0.250 |
| 5.5 | 20 | 7.5 | 20 | 24 | 1 0 | MC2K310ATD | 1SAL103590R9902 | 0.250 |
| | | | | | 0 1 | MC2K301ATD | 1SAL103591R9902 | 0.250 |



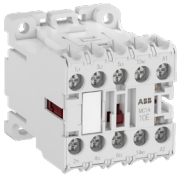

MC1I, MC1K, MC2I, MC2K

Main dimensions mm, inches

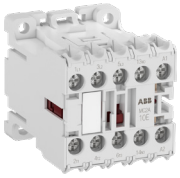
# MC1A..R, MC2A..R 3-pole mini contactors for ring tongue ferrules

4 to 5.5 kW

AC operated




MC1A310AR



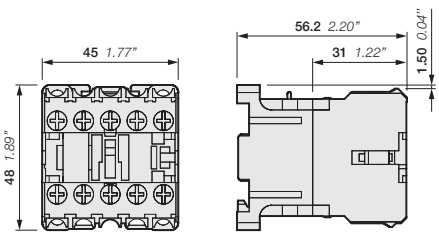

MC2A310AR

MC1A..R and MC2A..R 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive circuits up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC | | UL/CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 55 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50 Hz | V 60 Hz | | | | kg |
| **MC1A mini contactors** | | | | | | | | | |
| 4 | 20 | 5 | 20 | 24 | 24 | 1 0 | MC1A310AR1 | 1SAL103386R9901 | 0.170 |
| | | | | | | 0 1 | MC1A301AR1 | 1SAL103399R9901 | 0.170 |
| | | | | 110 ... 115 | 110 ... 120 | 1 0 | MC1A310ARJ | 1SAL100182R9901 | 0.170 |
| | | | | | | 0 1 | MC1A301ARJ | 1SAL100175R9901 | 0.170 |
| | | | | 220 ... 230 | 220 ... 230 | 1 0 | MC1A310AR6 | 1SAL102157R9901 | 0.170 |
| | | | | | | 0 1 | MC1A301AR6 | 1SAL102158R9901 | 0.170 |
| **MC2A mini contactors** | | | | | | | | | |
| 5.5 | 20 | 7.5 | 20 | 24 | 24 | 1 0 | MC2A310AR1 | 1SAL103412R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301AR1 | 1SAL103425R9902 | 0.170 |
| | | | | 110 ... 115 | 110 ... 120 | 1 0 | MC2A310ARJ | 1SAL103414R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301ARJ | 1SAL103427R9902 | 0.170 |
| | | | | 220 ... 230 | 220 ... 230 | 1 0 | MC2A310AR6 | 1SAL102175R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301AR6 | 1SAL102176R9902 | 0.170 |




MC1A..R, MC2A..R

Main dimensions mm, inches

# MC1C..R 3-pole mini contactors for ring tongue ferrules

4 kW

DC operated



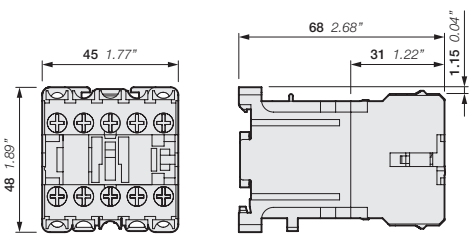

MC1C310AR

MC1C..R 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive circuits up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 55 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | Pkg (1 pce) |
| kW | A | hp | A | V DC | | | | kg |
| 4 | 20 | 5 | 20 | 12 | 1 0 | MC1C310ARB | 1SAL101847R9901 | 0.250 |
| | | | | | 0 1 | MC1C301ARB | 1SAL101848R9901 | 0.250 |



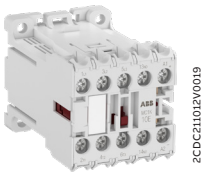

MC1C..R

Main dimensions mm, inches

# MC1K..R 3-pole mini contactors for ring tongue ferrules

## 4 kW

## DC operated - low consumption



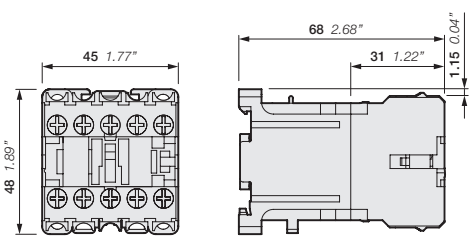

MC1K310AR

MC1K..R 3-pole interface mini contactors are high performance but space saving solution for the control of small motors and resistive circuits up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- add-on auxiliary contact blocks for front or side mounting (up to 2 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 55 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | Pkg (1 pce) |
| kW | A | hp | A | V DC | | | | kg |
| **DC operation 24 V / 2 W** | | | | | | | | |
| 4 | 20 | 5 | 20 | 24 | 1 0 | MC1K310ARD | 1SAL103446R9901 | 0.250 |
| | | | | | 0 1 | MC1K301ARD | 1SAL101858R9901 | 0.250 |



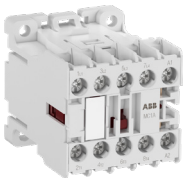

MC1K..R

Main dimensions mm, inches

# MC1A 4-pole mini contactors with screw terminals

4 to 5.5 kW

AC operated




MC1A400AT

MC1A 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

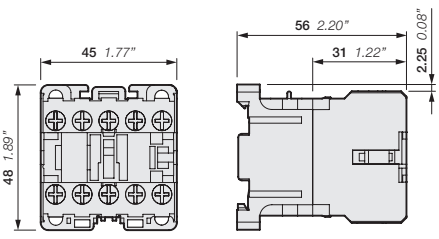
These contactors are designed with 4 main poles:

- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.



| IEC | UL/CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 55 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| A | hp | A | V 50 Hz | V 60 Hz | | | | kg |
| **4 N.O. main poles** | | | | | | | | |
| 20 | 5 | 20 | 24 | 24 | 0 0 | MC1A400AT1 | 1SAL102986R9901 | 0.170 |
| | | | 48 | 48 | 0 0 | MC1A400AT9 | 1SAL100296R9901 | 0.170 |
| | | | 110 ... 115 | 110 ... 120 | 0 0 | MC1A400ATJ | 1SAL100363R9901 | 0.170 |
| | | | 120 | 120 | 0 0 | MC1A400AT4 | 1SAL102989R9901 | 0.170 |
| | | | – | 208 ... 220 | 0 0 | MC1A400ATM | 1SAL102980R9901 | 0.170 |
| | | | 220 ... 230 | 220 ... 230 | 0 0 | MC1A400AT6 | 1SAL102991R9901 | 0.170 |
| | | | 220 ... 240 | 240 ... 277 | 0 0 | MC1A400ATN | 1SAL100364R9901 | 0.170 |
| | | | 240 | 240 | 0 0 | MC1A400AT7 | 1SAL103101R9901 | 0.170 |
| | | | 380 ... 400 | 440 | 0 0 | MC1A400ATU | 1SAL100365R9901 | 0.170 |
| | | | 415 ... 440 | 480 | 0 0 | MC1A400ATW | 1SAL102984R9901 | 0.170 |
| | | | 500 | 600 | 0 0 | MC1A400ATY | 1SAL102985R9901 | 0.170 |
| **2 N.O. + 2 N.C. main poles** | | | | | | | | |
| 20 | 5 | 20 | 24 | 24 | 0 0 | MC1AB00AT1 | 1SAL103007R9901 | 0.170 |
| | | | 48 | 48 | 0 0 | MC1AB00AT9 | 1SAL100400R9901 | 0.170 |
| | | | 110 ... 115 | 110 ... 120 | 0 0 | MC1AB00ATJ | 1SAL100373R9901 | 0.170 |
| | | | 120 | 120 | 0 0 | MC1AB00AT4 | 1SAL103010R9901 | 0.170 |
| | | | – | 208 ... 220 | 0 0 | MC1AB00ATM | 1SAL103001R9901 | 0.170 |
| | | | 220 ... 230 | 220 ... 230 | 0 0 | MC1AB00AT6 | 1SAL103012R9901 | 0.170 |
| | | | 240 | 240 | 0 0 | MC1AB00AT7 | 1SAL103099R9901 | 0.170 |
| | | | 220 ... 240 | 240 ... 277 | 0 0 | MC1AB00ATN | 1SAL100374R9901 | 0.170 |
| | | | 380 ... 400 | 440 | 0 0 | MC1AB00ATU | 1SAL100375R9901 | 0.170 |
| | | | 415 ... 440 | 480 | 0 0 | MC1AB00ATW | 1SAL101834R9901 | 0.170 |
| | | | 500 | 600 | 0 0 | MC1AB00ATY | 1SAL103006R9901 | 0.170 |

Note: Other contact configuration available. Please consult your ABB local sales organization.



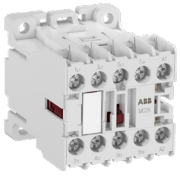

MC1A

Main dimensions mm, inches

# MC2A 4-pole mini contactors with screw terminals

4 to 5.5 kW

AC operated




MC2A400AT



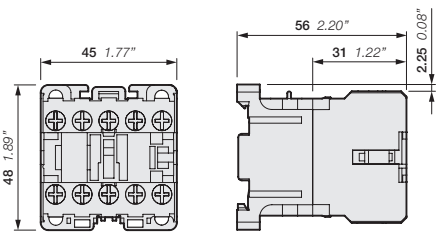
MC2A 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 4 main poles:

- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC | UL/CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 55 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| A | hp | A | V 50 Hz | V 60 Hz | | | | kg |
| **4 N.O. main poles** | | | | | | | | |
| 20 | 7.5 | 20 | 24 | 24 | 0 0 | MC2A400AT1 | 1SAL101645R9902 | 0.170 |
| | | | 48 | 48 | 0 0 | MC2A400AT9 | 1SAL116195R9902 | 0.170 |
| | | | 110 ... 115 | 110 ... 120 | 0 0 | MC2A400ATJ | 1SAL116184R9902 | 0.170 |
| | | | 120 | 120 | 0 0 | MC2A400AT4 | 1SAL101647R9902 | 0.170 |
| | | | – | 208 ... 220 | 0 0 | MC2A400ATM | 1SAL101912R9902 | 0.170 |
| | | | 220 ... 230 | 220 ... 230 | 0 0 | MC2A400AT6 | 1SAL103595R9902 | 0.170 |
| | | | 220 ... 240 | 240 ... 277 | 0 0 | MC2A400ATN | 1SAL116177R9902 | 0.170 |
| | | | 240 | 240 | 0 0 | MC2A400AT7 | 1SAL101910R9902 | 0.170 |
| | | | 380 ... 400 | 440 | 0 0 | MC2A400ATU | 1SAL103292R9902 | 0.170 |
| | | | 415 ... 440 | 480 | 0 0 | MC2A400ATW | 1SAL116193R9902 | 0.170 |
| | | | 500 | 600 | 0 0 | MC2A400ATY | 1SAL101915R9902 | 0.170 |
| **2 N.O. + 2 N.C. main poles** | | | | | | | | |
| 20 | 7.5 | 20 | 24 | 24 | 0 0 | MC2AB00AT1 | 1SAL101648R9902 | 0.170 |
| | | | 48 | 48 | 0 0 | MC2AB00AT9 | 1SAL248068R9902 | 0.170 |
| | | | 110 ... 115 | 110 ... 120 | 0 0 | MC2AB00ATJ | 1SAL110548R9902 | 0.170 |
| | | | 120 | 120 | 0 0 | MC2AB00AT4 | 1SAL101650R9902 | 0.170 |
| | | | – | 208 ... 220 | 0 0 | MC2AB00ATM | 1SAL101918R9902 | 0.170 |
| | | | 220 ... 230 | 220 ... 230 | 0 0 | MC2AB00AT6 | 1SAL103027R9902 | 0.170 |
| | | | 220 ... 240 | 240 ... 277 | 0 0 | MC2AB00ATN | 1SAL135699R9902 | 0.170 |
| | | | 240 | 240 | 0 0 | MC2AB00AT7 | 1SAL101917R9902 | 0.170 |
| | | | 380 ... 400 | 440 | 0 0 | MC2AB00ATU | 1SAL101919R9902 | 0.170 |
| | | | 415 ... 440 | 480 | 0 0 | MC2AB00ATW | 1SAL247441R9902 | 0.170 |
| | | | 500 | 600 | 0 0 | MC2AB00ATY | 1SAL101923R9902 | 0.170 |

Note: Other contact configuration available. Please consult your ABB local sales organization.




MC2A

Main dimensions mm, inches

# MC1C, MC2C 4-pole mini contactors with screw terminals

4 to 5.5 kW

DC operated




MC1C400AT




MC2C400AT

MC1C, MC2C 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 4 main poles:

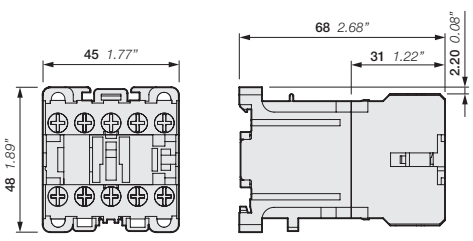
- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.



| IEC | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 55 °C AC-1 A | 3-phase motor rating 480 V hp | General use rating 600 V AC A | V DC | | | | Pkg (1 pce) kg |
| **4 N.O. main poles** | | | | | | | |
| 20 | 5 | 20 | 12 | 0 0 | MC1C400ATB | 1SAL100360R9901 | 0.250 |
| | | | 24 | 0 0 | MC1C400ATD | 1SAL100366R9901 | 0.250 |
| | | | 24 with Diode | 0 0 | MC1C400ATDD | 1SAL101841R9901 | 0.250 |
| **4 N.O. main poles mini contactors with extended operating limits coil** | | | | | | | |
| 20 | 5 | 20 | 24* | 0 0 | MC1C400ATWD | 1SAL220344R9901 | 0.250 |
| | | | 48* | 0 0 | MC1C400ATWG | 1SAL220364R9901 | 0.250 |
| | | | 110* | 0 0 | MC1C400ATWJ | 1SAL220342R9901 | 0.250 |
| | | | 125* | 0 0 | MC1C400ATWL | 1SAL220462R9901 | 0.250 |
| | | | 220* | 0 0 | MC1C400ATWN | 1SAL220340R9901 | 0.250 |
| 20 | 7.5 | 20 | 24* | 0 0 | MC2C400ATWD | 1SAL101961R9902 | 0.250 |
| | | | 48* | 0 0 | MC2C400ATWG | 1SAL101962R9902 | 0.250 |
| | | | 110* | 0 0 | MC2C400ATWJ | 1SAL101963R9902 | 0.250 |
| | | | 125* | 0 0 | MC2C400ATWL | 1SAL101964R9902 | 0.250 |
| | | | 220* | 0 0 | MC2C400ATWN | 1SAL100445R9902 | 0.250 |
| **2 N.O. + 2 N.C. main poles mini contactors with extended operating limits coil** | | | | | | | |
| 20 | 5 | 20 | 24* | 0 0 | MC1CB00ATWD | 1SAL220345R9901 | 0.250 |
| | | | 48* | 0 0 | MC1CB00ATWG | 1SAL220366R9901 | 0.250 |
| | | | 110* | 0 0 | MC1CB00ATWJ | 1SAL220343R9901 | 0.250 |
| | | | 125* | 0 0 | MC1CB00ATWL | 1SAL220461R9901 | 0.250 |
| | | | 220* | 0 0 | MC1CB00ATWN | 1SAL220341R9901 | 0.250 |
| 20 | 7.5 | 20 | 24* | 0 0 | MC2CB00ATWD | 1SAL101965R9902 | 0.250 |
| | | | 48* | 0 0 | MC2CB00ATWG | 1SAL101966R9902 | 0.250 |
| | | | 110* | 0 0 | MC2CB00ATWJ | 1SAL101967R9902 | 0.250 |
| | | | 125* | 0 0 | MC2CB00ATWL | 1SAL204888R9902 | 0.250 |
| | | | 220* | 0 0 | MC2CB00ATWN | 1SAL101968R9902 | 0.250 |

Note : Other contact configuration available. Please consult your ABB local sales organization.

* With the extended operating limits coils:
  - at nominal voltage, Uc, a higher number of additional auxiliary contacts can be attached to the device
  - a wider range of voltages, -30% ≤ Uc ≤ +30%, can be used for the operation with a limitation of the number of auxiliary contacts.




MC1C, MC2C

Main dimensions mm, inches

# MC1I, MC1K 4-pole mini contactors with screw terminals

## 4 kW

## DC operated - low consumption




MC1I400AT



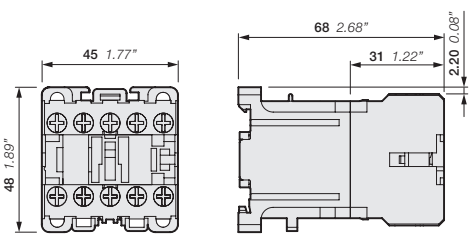

MC1K400AT

MC1I, MC1K 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 4 main poles:

- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- only for K variants: add-on auxiliary contact blocks for front or side mounting (up to 2 additional contacts)
- wide range of accessories
- suitable for rail or wall mounting.

| IEC | UL/CSA | | Rated control circuit voltage | Type | Order code | Weight |
|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 55 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | Uc | | | Pkg (1 pce) |
| A | hp | A | V DC | | | kg |
| **DC operation 24 V / 1.2 W** | | | | | | |
| 20 | 5 | 20 | 24 | MC1I400ATD | 1SAL101840R9901 | 0.250 |
| **DC operation 24 V / 2 W** | | | | | | |
| 20 | 5 | 20 | 24 | MC1K400ATD | 1SAL100569R9901 | 0.250 |



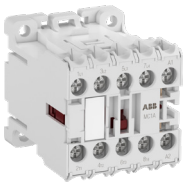

MC1I, MC1K

Main dimensions mm, inches

# MC1A..R 4-pole mini contactors for ring tongue ferrules

4 kW

AC operated



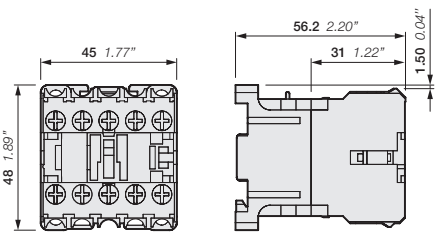

MC1A400AR

MC1A..R 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive circuits up to 690 V AC and 220 V DC.

These contactors are designed with 4 main poles:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC | UL/CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 55 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| A | hp | A | V 50 Hz | V 60 Hz | | | | kg |
| **4 N.O. main poles** | | | | | | | | |
| 20 | 5 | 20 | 24 | 24 | 0 0 | MC1A400AR1 | 1SAL102160R9901 | 0.170 |
| | | | 110 ... 115 | 110 ... 120 | 0 0 | MC1A400ARJ | 1SAL102166R9901 | 0.170 |
| | | | 220 ... 230 | 220 ... 230 | 0 0 | MC1A400AR6 | 1SAL102164R9901 | 0.170 |
| **2 N.O. + 2 N.C. main poles** | | | | | | | | |
| 20 | 5 | 20 | 24 | 24 | 0 0 | MC1AB00AR1 | 1SAL102172R9901 | 0.170 |
| | | | 110 ... 115 | 110 ... 120 | 0 0 | MC1AB00ARJ | 1SAL102174R9901 | 0.170 |
| | | | 220 ... 230 | 220 ... 230 | 0 0 | MC1AB00AR6 | 1SAL102173R9901 | 0.170 |



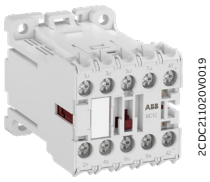

MC1A..R

Main dimensions mm, inches

# MC1C..R 4-pole mini contactors for ring tongue ferrules

4 kW

DC operated



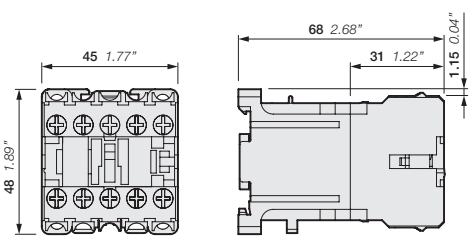

MC1C400AR

MC1C..R 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive circuits up to 690 V AC and 220 V DC.

These contactors are designed with 4 main poles:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 55 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | Pkg (1 pce) |
| A | hp | A | V DC | | | | kg |
| **4 N.O. main poles** | | | | | | | |
| 20 | 5 | 20 | 12 | 0 0 | MC1C400ARB | 1SAL101859R9901 | 0.250 |



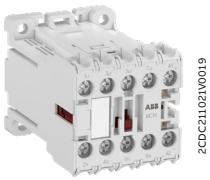

MC1C..R

Main dimensions mm, inches

# MC1K..R 4-pole mini contactors for ring tongue ferrules

## 4 kW

## DC operated - low consumption



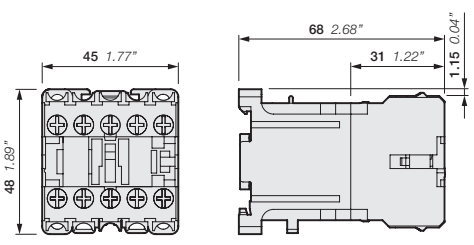

MC1K400AR

MC1K..R 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive circuits up to 690 V AC and 220 V DC.

These contactors are designed with 4 main poles:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- add-on auxiliary contact blocks for front or side mounting (up to 2 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC | UL/CSA | | Rated control circuit voltage Uc | Type | Order code | Weight |
|---|---|---|---|---|---|---|
| Rated operational current θ ≤ 55 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | Pkg (1 pce) |
| A | hp | A | V DC | | | kg |
| 20 | 5 | 20 | 24 | MC1K400ARD | 1SAL101860R9901 | 0.250 |




MC1K..R

Main dimensions mm, inches

# MCRA 4-pole mini contactor relays with screw terminals

## AC operated




MCRA040AT

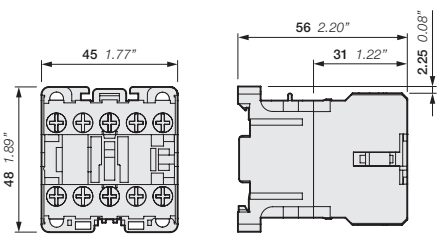
MCRA 4-pole mini contactor relays are a high performance but space saving solution used for control functions or for switching small loads up to 6 A.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) |
|---|---|---|---|---|---|
| V 50 Hz | V 60 Hz | | | | kg |
| **4 N.O. poles** | | | | | |
| 24 | 24 | 4 0 | MCRA040AT1 | 1SAH102013R9900 | 0.170 |
| 48 | 48 | 4 0 | MCRA040AT9 | 1SAH108237R9900 | 0.170 |
| 110 ... 115 | 110 ... 120 | 4 0 | MCRA040ATJ | 1SAH100003R9900 | 0.170 |
| 120 | 120 | 4 0 | MCRA040AT4 | 1SAH102016R9900 | 0.170 |
| – | 208 ... 220 | 4 0 | MCRA040ATM | 1SAH102007R9900 | 0.170 |
| 220 ... 230 | 220 ... 230 | 4 0 | MCRA040AT6 | 1SAH102018R9900 | 0.170 |
| 220 ... 240 | 240 ... 277 | 4 0 | MCRA040ATN | 1SAH100004R9900 | 0.170 |
| 240 | 240 | 4 0 | MCRA040AT7 | 1SAH103106R9900 | 0.170 |
| 380 ... 400 | 440 | 4 0 | MCRA040ATU | 1SAH100005R9900 | 0.170 |
| 415 ... 440 | 480 | 4 0 | MCRA040ATW | 1SAH102011R9900 | 0.170 |
| 500 | 600 | 4 0 | MCRA040ATY | 1SAH102012R9900 | 0.170 |
| **3 N.O. + 1 N.C. poles** | | | | | |
| 24 | 24 | 3 1 | MCRA031AT1 | 1SAH102034R9900 | 0.170 |
| 48 | 48 | 3 1 | MCRA031AT9 | 1SAH108238R9900 | 0.170 |
| 110 ... 115 | 110 ... 120 | 3 1 | MCRA031ATJ | 1SAH100013R9900 | 0.170 |
| 120 | 120 | 3 1 | MCRA031AT4 | 1SAH102037R9900 | 0.170 |
| – | 208 ... 220 | 3 1 | MCRA031ATM | 1SAH102028R9900 | 0.170 |
| 220 ... 230 | 220 ... 230 | 3 1 | MCRA031AT6 | 1SAH102039R9900 | 0.170 |
| 220 ... 240 | 240 ... 277 | 3 1 | MCRA031ATN | 1SAH100014R9900 | 0.170 |
| 240 | 240 | 3 1 | MCRA031AT7 | 1SAH103105R9900 | 0.170 |
| 380 ... 400 | 440 | 3 1 | MCRA031ATU | 1SAH100015R9900 | 0.170 |
| 415 ... 440 | 480 | 3 1 | MCRA031ATW | 1SAH102032R9900 | 0.170 |
| 500 | 600 | 3 1 | MCRA031ATY | 1SAH102033R9900 | 0.170 |
| **2 N.O. + 2 N.C. poles** | | | | | |
| 24 | 24 | 2 2 | MCRA022AT1 | 1SAH220438R9900 | 0.170 |
| 48 | 48 | 2 2 | MCRA022AT9 | 1SAH108236R9900 | 0.170 |
| 110 ... 115 | 110 ... 120 | 2 2 | MCRA022ATJ | 1SAH100023R9900 | 0.170 |
| 120 | 120 | 2 2 | MCRA022AT4 | 1SAH102058R9900 | 0.170 |
| – | 208 ... 220 | 2 2 | MCRA022ATM | 1SAH102049R9900 | 0.170 |
| 220 ... 230 | 220 ... 230 | 2 2 | MCRA022AT6 | 1SAH102060R9900 | 0.170 |
| 220 ... 240 | 240 ... 277 | 2 2 | MCRA022ATN | 1SAH100024R9900 | 0.170 |
| 240 | 240 | 2 2 | MCRA022AT7 | 1SAH102061R9900 | 0.170 |
| 380 ... 400 | 440 | 2 2 | MCRA022ATU | 1SAH100025R9900 | 0.170 |
| 415 ... 440 | 480 | 2 2 | MCRA022ATW | 1SAH102053R9900 | 0.170 |
| 500 | 600 | 2 2 | MCRA022ATY | 1SAH102054R9900 | 0.170 |

Note : Other contact configuration available. Please consult your ABB local sales organization.




MCRA

Main dimensions mm, inches

# MCRC 4-pole mini contactor relays with screw terminals

## DC operated




MCRC040AT

MCRC 4-pole mini contactor relays are a high performance but space saving solution used for control functions or for switching small loads up to 6 A.

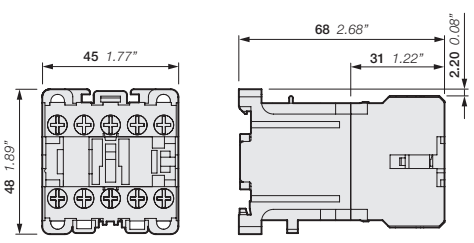
These contactors are designed with 4 poles with various contact combinations:

- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| Rated control circuit voltage Uc<br>V DC | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce)<br>kg |
|---|---|---|---|---|
| **4 N.O. poles** | | | | |
| 12 | 4 0 | MCRC040ATB | 1SAH100000R9900 | 0.235 |
| 24 | 4 0 | MCRC040ATD | 1SAH100006R9900 | 0.235 |
| 24 with Diode | 4 0 | MCRC040ATDD | 1SAH113311R9900 | 0.235 |
| **3 N.O. + 1 N.C. poles** | | | | |
| 12 | 3 1 | MCRC031ATB | 1SAH100010R9900 | 0.235 |
| 24 | 3 1 | MCRC031ATD | 1SAH100016R9900 | 0.235 |
| 24 with Diode | 3 1 | MCRC031ATDD | 1SAH113325R9900 | 0.235 |
| **2 N.O. + 2 N.C. poles** | | | | |
| 12 | 2 2 | MCRC022ATB | 1SAH100020R9900 | 0.235 |
| 24 | 2 2 | MCRC022ATD | 1SAH100026R9900 | 0.235 |
| 24 with Diode | 2 2 | MCRC022ATDD | 1SAH113324R9900 | 0.235 |
| **4 N.O. poles MCRC mini contactors relays with extended operating limits coil** | | | | |
| 24* | 4 0 | MCRC040ATWD | 1SAH220410R9900 | 0.235 |
| 48* | 4 0 | MCRC040ATWG | 1SAH220463R9900 | 0.235 |
| 110* | 4 0 | MCRC040ATWJ | 1SAH220407R9900 | 0.235 |
| 125* | 4 0 | MCRC040ATWL | 1SAH220458R9900 | 0.235 |
| 220* | 4 0 | MCRC040ATWN | 1SAH220404R9900 | 0.235 |
| **3 N.O. + 1 N.C. poles mini contactors relays with extended operating limits coil** | | | | |
| 24* | 3 1 | MCRC031ATWD | 1SAH220409R9900 | 0.235 |
| 48* | 3 1 | MCRC031ATWG | 1SAH100070R9900 | 0.235 |
| 110* | 3 1 | MCRC031ATWJ | 1SAH220406R9900 | 0.235 |
| 125* | 3 1 | MCRC031ATWL | 1SAH220457R9900 | 0.235 |
| 220* | 3 1 | MCRC031ATWN | 1SAH220403R9900 | 0.235 |
| **2 N.O. + 2 N.C. poles mini contactors relays with extended operating limits coil** | | | | |
| 17 ... 32 | 2 2 | MCRC022ATWD | 1SAH220408R9900 | 0.235 |
| 34 ... 62 | 2 2 | MCRC022ATWG | 1SAH100082R9900 | 0.235 |
| 77 ... 143 | 2 2 | MCRC022ATWJ | 1SAH107171R9900 | 0.235 |
| 87 ... 162 | 2 2 | MCRC022ATWL | 1SAH220456R9900 | 0.235 |
| 154 ... 286 | 2 2 | MCRC022ATWN | 1SAH220402R9900 | 0.235 |

Note : Other contact configuration available. Please consult your ABB local sales organization.

* With the extended operating limits coils:
  - at nominal voltage, Uc, a higher number of additional auxiliary contacts can be attached to the device
  - a wider range of voltages, -30% ≤ Uc ≤ +30%, can be used for the operation with a limitation of the number of auxiliary contacts.




MCRC

Main dimensions mm, inches

# MCRI, MCRK 4-pole mini contactor relays with screw terminals

## DC operated - low consumption




MCRI040AT



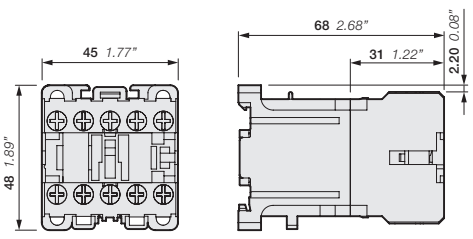

MCRK040AT

MCRI, MCRK 4-pole mini contactor relays are a high performance but space saving solution used for control functions or for switching small loads up to 6 A.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- only for K variants: add-on auxiliary contact blocks for front or side mounting (up to 2 additional contacts)
- wide range of accessories
- suitable for rail or wall mounting.

| Rated control circuit voltage Uc<br>V DC | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce)<br>kg |
|---|---|---|---|---|
| **DC operation 24 V / 1.2 W** | | | | |
| 24 | 4 0 | MCRI040ATD | 1SAH100530R9900 | 0.235 |
| | 3 1 | MCRI031ATD | 1SAH100531R9900 | 0.235 |
| | 2 2 | MCRI022ATD | 1SAH100532R9900 | 0.235 |
| **DC operation 24 V / 2 W** | | | | |
| 24 | 4 0 | MCRK040ATD | 1SAH100533R9900 | 0.235 |
| | 3 1 | MCRK031ATD | 1SAH100534R9900 | 0.235 |
| | 2 2 | MCRK022ATD | 1SAH100535R9900 | 0.235 |




MCRI, MCRK

Main dimensions mm, inches

# MCRA..R 4-pole mini contactor relays for ring tongue ferrules

## AC operated




MCRA040AR

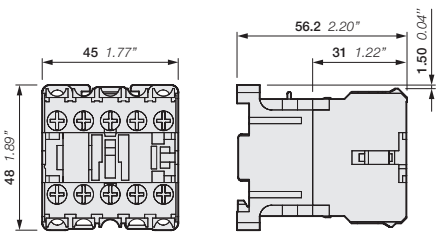
MCRA..R 4-pole mini contactor relays are a high performance but space saving solution used for control functions or for switching small loads up to 6 A.

These contactors are designed with 4 poles with various contact combinations:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.



| Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) |
|---|---|---|---|---|---|
| V 50 Hz | V 60 Hz | | | | kg |
| **4 N.O. poles** | | | | | |
| 24 | 24 | 4 0 | MCRA040AR1 | 1SAH102177R9900 | 0.170 |
| 110 ... 115 | 110 ... 120 | 4 0 | MCRA040ARJ | 1SAH102179R9900 | 0.170 |
| 220 ... 230 | 220 ... 230 | 4 0 | MCRA040AR6 | 1SAH102178R9900 | 0.170 |
| **3 N.O. + 1 N.C. poles** | | | | | |
| 24 | 24 | 3 1 | MCRA031AR1 | 1SAH102180R9900 | 0.170 |
| 110 ... 115 | 110 ... 120 | 3 1 | MCRA031ARJ | 1SAH102182R9900 | 0.170 |
| 220 ... 230 | 220 ... 230 | 3 1 | MCRA031AR6 | 1SAH102181R9900 | 0.170 |
| **2 N.O. + 2 N.C. poles** | | | | | |
| 24 | 24 | 2 2 | MCRA022AR1 | 1SAH102183R9900 | 0.170 |
| 110 ... 115 | 110 ... 120 | 2 2 | MCRA022ARJ | 1SAH100485R9900 | 0.170 |
| 220 ... 230 | 220 ... 230 | 2 2 | MCRA022AR6 | 1SAH102184R9900 | 0.170 |

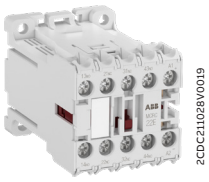



MCRA..R

Main dimensions mm, inches

# MCRC..R 4-pole mini contactor relays for ring tongue ferrules

## DC operated



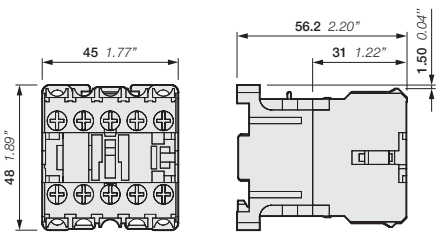

MCRC040AR

MCRC..R 4-pole mini contactor relays are a high performance but space saving solution used for control functions or for switching small loads up to 6 A.

These contactors are designed with 4 poles with various contact combinations:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| Rated control circuit voltage Uc<br>V DC | Auxiliary contacts fitted | Type | Order code | Weight<br>Pkg (1 pce)<br>kg |
|---|---|---|---|---|
| 12 | 4 0 | MCRC040ARB | 1SAH101994R9900 | 0.245 |
| | 3 1 | MCRC031ARB | 1SAH101996R9900 | 0.245 |
| | 2 2 | MCRC022ARB | 1SAH101998R9900 | 0.245 |




MCRC..R

Main dimensions mm, inches

# MCRK..R 4-pole mini contactor relays for ring tongue ferrules

## DC operated - low consumption



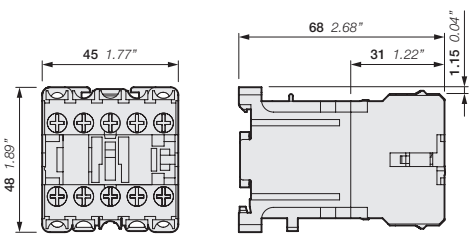

MCRK040AR

MCRK 4-pole mini contactor relays are a high performance but space saving solution used for control functions or for switching small loads up to 6 A.

These contactors are designed with 4 main poles with various contact combinations:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- add-on auxiliary contact blocks for front or side mounting (up to 2 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| Rated control circuit voltage Uc<br>V DC | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce)<br>kg |
|---|---|---|---|---|
| **DC operation 24 V / 2 W** | | | | |
| 24 | 4 0 | MCRK040ARD | 1SAH101995R9900 | 0.245 |
| | 3 1 | MCRK031ARD | 1SAH101997R9900 | 0.245 |
| | 2 2 | MCRK022ARD | 1SAH100540R9900 | 0.245 |

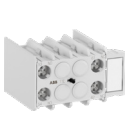



MCRK..R

Main dimensions mm, inches

# Auxiliary contact blocks for MC1 and MC2 mini contactors

With screw terminals and specific screw terminals for ring tongue ferrules




MACN211AT



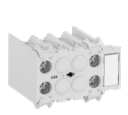

MACN422AT




MACL110AT

## Screw terminals

| Suitable for | Auxiliary contacts | Type | Order code | Weight Pkg (1 pce) kg |
|---|---|---|---|---|
| **Front mounted instantaneous auxiliary contact blocks** | | | | |
| All MC1 and MC2 variants<br>Contacts in accordance with EN 50012 | 1 1 | MACN211AT | 1SAL100999R9906 | 0.030 |
| | 0 2 | MACN202AT | 1SAL100998R9906 | 0.030 |
| | 3 1 | MACN431AT | 1SAL100995R9906 | 0.040 |
| | 2 2 | MACN422AT | 1SAL100996R9906 | 0.040 |
| | 1 3 | MACN413AT | 1SAL100997R9906 | 0.040 |
| All MC1 and MC2 variants<br>Contacts in accordance with EN 50005 | 2 0 | MARN220AT | 1SAL100994R9906 | 0.030 |
| | 1 1 | MARN211AT | 1SAL100993R9906 | 0.030 |
| | 0 2 | MARN202AT | 1SAL100992R9906 | 0.030 |
| | 4 0 | MARN440AT | 1SAL100991R9906 | 0.040 |
| | 3 1 | MARN431AT | 1SAL100990R9906 | 0.040 |
| | 2 2 | MARN422AT | 1SAL100989R9906 | 0.040 |
| | 1 3 | MARN413AT | 1SAL100988R9906 | 0.040 |
| | 0 4 | MARN404AT | 1SAL100987R9906 | 0.040 |
| **Side mounted instantaneous auxiliary contact block** | | | | |
| All MC1 and MC2 variants<br>Contacts in accordance with EN 50012 | 1 0 | MACL110AT | 1SAL100560R9906 | 0.017 |
| | 0 1 | MACL101AT | 1SAL100561R9906 | 0.017 |
| All MC1 and MC2 variants<br>Contacts in accordance with EN 50005 | 1 0 | MARL110ATS | 1SAL100519R9906 | 0.017 |
| | 0 1 | MARL101ATS | 1SAL100520R9906 | 0.017 |




MARN211AR




MARN422AR




MACL110AR

## Specific screw terminals for ring tongue ferrules

| Suitable for | Auxiliary contacts | Type | Order code | Weight Pkg (1 pce) kg |
|---|---|---|---|---|
| **Front mounted instantaneous auxiliary contact blocks** | | | | |
| All MC1 and MC2 variants<br>Contacts in accordance with EN 50012 | 1 1 | MACN211AR | 1SAL103557R9906 | 0.030 |
| | 0 2 | MACN202AR | 1SAL103558R9906 | 0.030 |
| | 3 1 | MACN431AR | 1SAL103559R9906 | 0.040 |
| | 2 2 | MACN422AR | 1SAL103560R9906 | 0.040 |
| | 1 3 | MACN413AR | 1SAL103561R9906 | 0.040 |
| All MC1 and MC2 variants<br>Contacts in accordance with EN 50005 | 2 0 | MARN220AR | 1SAL103349R9906 | 0.030 |
| | 1 1 | MARN211AR | 1SAL103350R9906 | 0.030 |
| | 0 2 | MARN202AR | 1SAL103351R9906 | 0.030 |
| | 4 0 | MARN440AR | 1SAL103352R9906 | 0.040 |
| | 3 1 | MARN431AR | 1SAL103353R9906 | 0.040 |
| | 2 2 | MARN422AR | 1SAL103354R9906 | 0.040 |
| | 1 3 | MARN413AR | 1SAL103355R9906 | 0.040 |
| | 0 4 | MARN404AR | 1SAL103300R9906 | 0.040 |
| **Side mounted instantaneous auxiliary contact block** | | | | |
| All MC1 and MC2 variants<br>Contacts in accordance with EN 50012 | 1 0 | MACL110AR | 1SAL103555R9906 | 0.017 |
| | 0 1 | MACL101AR | 1SAL103556R9906 | 0.017 |
| All MC1 and MC2 variants<br>Contacts in accordance with EN 50005 | 1 0 | MARL110ARS | 1SAL103299R9906 | 0.017 |
| | 0 1 | MARL101ARS | 1SAL103298R9906 | 0.017 |

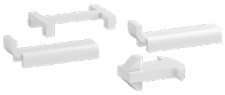
# Other accessories for MC1 and MC2 mini contactors


2CDC211036V0019

MP0AAE1


2CDC211037V0019

MREBC10AC2


2CDC211038V0019

MMH0


2CDC211039V0019

WKMIU


2CDC211040V0019

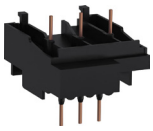
MVB0R


2CDC211041V0019

MVP0C


2CDC211042V0019

MVB0L


2CDC211041V0019

BEMC/132

| Suitable for | Rated control circuit voltage Uc V DC | V 50 Hz | V 60 Hz | Protection type | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|---|---|---|
| **Surge suppressors for contactor coils** | | | | | | | | |
| All MC1 and MC2 DC operated variants | 240 | – | – | Diode | MP0CAE3 | 1SAL100546R9906 | 1 | 0.006 |
| All MC1 and MC2 AC operated variants | – | 12 ... 60 | 12 ... 60 | R/C | MP0AAE1 | 1SAL100544R9906 | 1 | 0.006 |
| | – | 72 ... 240 | 72 ... 240 | R/C | MP0AAE2 | 1SAL100545R9906 | 1 | 0.006 |
| All MC1 and MC2 variants | 24 ... 48 | 24 ... 48 | 24 ... 48 | Varistor | MP0DAE4 | 1SAL100536R9906 | 1 | 0.006 |
| | 50 ... 127 | 50 ... 127 | 50 ... 127 | Varistor | MP0DAE5 | 1SAL204848R9906 | 1 | 0.006 |
| | 130 ... 250 | 130 ... 250 | 130 ... 250 | Varistor | MP0DAE6 | 1SAL204849R9906 | 1 | 0.006 |
| **Connecting links with manual motor starter (2)** | | | | | | | | |
| all MC1 and MC2 variants | | | | | BEMC/132 | 1SAM301920R1001 | 1 | 0.021 |
| **Electronic timers (1)** | | | | | | | | |
| All MC1 and MC2 variants | 24 ... 250 | 24 ... 250 | 24 ... 250 | 0.5 ... 60 sec. | MREBC10AC2 | 1SAL100541R9906 | 1 | 0.040 |
| | | | | 0.2 ... 24 sec | MREBC20AC2 | 1SAL100542R9906 | 1 | 0.040 |
| **DIN rail adapter for electronic timers** | | | | | | | | |
| All MREBC variants | | | | | MVB0R | 1SAL100543R9906 | 1 | 0.003 |
| **Mechanical interlock** | | | | | | | | |
| All MC1 and MC2 variants | | | | | MMH0 | 1SAL100547R9906 | 1 | 0.003 |
| **Parallel connecting link** | | | | | | | | |
| All MC1 and MC2 variants | | | | | MVP0C | 1SAL100600R9906 | 1 | 0.010 |
| **Connection sets for reversing contactors (2)** | | | | | | | | |
| All MC1 and MC2 variants | | | | | WKMIU | 1SAL101421R9906 | 1 | 0.030 |
| **Lütze® rail adapter for contactors and contactor relays** | | | | | | | | |
| All MC1 and MC2 variants | | | | | MVB0L | 1SAL101830R9906 | 30 | 0.002 |

(1) Usage not allowed in combination with low consumption contactors
(2) Usage allowed with current up to 12 A

# Auxiliary contact blocks for MCR mini contactor relays

With screw terminals and specific screw terminals for ring tongue ferrules


2CDC211030V0019

MARN211AT


2CDC211031W0019

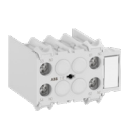
MARN422AT


2CDC211034V0019

MARL110AT

## Screw terminals

| Suitable for | Auxiliary contacts | Type | Order code | Weight Pkg (1 pce) kg |
|---|---|---|---|---|
| **Front mounted instantaneous auxiliary contact blocks** | | | | |
| All MCR variants<br>Contacts in accordance with EN 50005 | 2 0 | MARN220AT | 1SAL100994R9906 | 0.030 |
| | 1 1 | MARN211AT | 1SAL100993R9906 | 0.030 |
| | 0 2 | MARN202AT | 1SAL100992R9906 | 0.030 |
| | 4 0 | MARN440AT | 1SAL100991R9906 | 0.040 |
| | 3 1 | MARN431AT | 1SAL100990R9906 | 0.040 |
| | 2 2 | MARN422AT | 1SAL100989R9906 | 0.040 |
| | 1 3 | MARN413AT | 1SAL100988R9906 | 0.040 |
| | 0 4 | MARN404AT | 1SAL100987R9906 | 0.040 |
| **Side mounted instantaneous auxiliary contact block** | | | | |
| All MCR variants | 1 0 | MARL110AT | 1SAL100513R9906 | 0.017 |
| | 0 1 | MARL101AT | 1SAL100514R9906 | 0.017 |
| | 1 0 | MARL110ATS | 1SAL100519R9906 | 0.017 |
| | 0 1 | MARL101ATS | 1SAL100520R9906 | 0.017 |


2CDC211032V0019

MARN211AR


2CDC211033V0019

MARN422AR


2CDC211035V0019

MARL110AR

## Specific screw terminals for ring tongue ferrules

| Suitable for | Auxiliary contacts | Type | Order code | Weight Pkg (1 pce) kg |
|---|---|---|---|---|
| **Front mounted instantaneous auxiliary contact blocks** | | | | |
| All MCR variants<br>Contacts in accordance with EN 50005 | 2 0 | MARN220AR | 1SAL103349R9906 | 0.030 |
| | 1 1 | MARN211AR | 1SAL103350R9906 | 0.030 |
| | 0 2 | MARN202AR | 1SAL103351R9906 | 0.030 |
| | 4 0 | MARN440AR | 1SAL103352R9906 | 0.040 |
| | 3 1 | MARN431AR | 1SAL103353R9906 | 0.040 |
| | 2 2 | MARN422AR | 1SAL103354R9906 | 0.040 |
| | 1 3 | MARN413AR | 1SAL103355R9906 | 0.040 |
| | 0 4 | MARN404AR | 1SAL103300R9906 | 0.040 |
| **Side mounted instantaneous auxiliary contact block** | | | | |
| All MCR variants | 1 0 | MARL110AR | 1SAL103356R9906 | 0.017 |
| | 0 1 | MARL101AR | 1SAL103357R9906 | 0.017 |
| | 1 0 | MARL110ARS | 1SAL103299R9906 | 0.017 |
| | 0 1 | MARL101ARS | 1SAL103298R9906 | 0.017 |

# Other accessories for MCR mini contactor relays


2CDC211036V0019

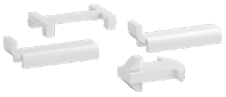
MP0AAE1


2CDC211037V0019

MREBC10AC2


2CDC211040V0019

MVB0R


2CDC211038V0019

MMH0


2CDC211042V0019

MVB0L

| Suitable for | Rated control circuit voltage Uc | | | Protection type | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|
| | V DC | V 50 Hz | V 60 Hz | | | | | kg |
| **Surge suppressors for contactor coils** | | | | | | | | |
| All MCR DC operated variants | 240 | – | – | Diode | MP0CAE3 | 1SAL100546R9906 | 1 | 0.006 |
| All MC1 and MC2 | – | 12 ... 60 | 12 ... 60 | R/C | MP0AAE1 | 1SAL100544R9906 | 1 | 0.006 |
| AC operated variants | – | 72 ... 240 | 72 ... 240 | R/C | MP0AAE2 | 1SAL100545R9906 | 1 | 0.006 |
| All MCR variants | 24 ... 48 | 24 ... 48 | 24 ... 48 | Varistor | MP0DAE4 | 1SAL100536R9906 | 1 | 0.006 |
| | 50 ... 127 | 50 ... 127 | 50 ... 127 | Varistor | MP0DAE5 | 1SAL204848R9906 | 1 | 0.006 |
| | 130 ... 250 | 130 ... 250 | 130 ... 250 | Varistor | MP0DAE6 | 1SAL204849R9906 | 1 | 0.006 |
| **Electronic timers (1)** | | | | | | | | |
| All MCR variants | 24 ... 250 | 24 ... 250 | 24 ... 250 | 0.5 ... 60 sec. | MREBC10AC2 | 1SAL100541R9906 | 1 | 0.040 |
| | | | | 0.2 ... 24 sec | MREBC20AC2 | 1SAL100542R9906 | 1 | 0.040 |
| **DIN rail adapter for electronic timers** | | | | | | | | |
| All MREBC variants | | | | | MVB0R | 1SAL100543R9906 | 1 | 0.003 |
| **Mechanical interlock** | | | | | | | | |
| All MCR variants | | | | | MMH0 | 1SAL100547R9906 | 1 | 0.003 |
| **Lütze® rail adapter for contactors and contactor relays** | | | | | | | | |
| All MCR variants | | | | | MVB0L | 1SAL101830R9906 | 30 | 0.002 |

(1) Usage not allowed in combination with low consumption contactor relays

# MC1, MC2 3-pole and 4-pole mini contactors
## Technical data



### Main pole – Utilization characteristics according to IEC

| Contactor types | AC operated | **MC1A** | **MC2A** |
|---|---|---|---|
| | DC operated | **MC1C** | **MC2C** |
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1 | |
| Rated operational voltage Ue max | | 690 V AC, 440 V DC | |
| Rated frequency (without derating) | | DC or 50 / 60 Hz | |
| Conventional free-air thermal current Ith acc. to IEC/EN 60947-4-1, open contactors, θ ≤ 55 °C, with conductor cross-sectional area | | 20 A | |
| AC-1 Utilization category for air temperature close to contactor θ ≤ 55 °C | | | |
| Ie / Rated operational current AC-1 | 230 V | 20 A | |
| Ue max ≤ 690 V, 50/60 Hz | 400 V | 20 A | |
| | 500 V | 20 A | |
| | 690 V | 20 A | |
| AC-1 Utilization category for air temperature close to contactor 55 < θ ≤ 70°C | | | |
| Ie / Rated operational current AC-1 | 230 V | 16 A | |
| Ue max ≤ 690 V, 50/60 Hz | 400 V | 16 A | |
| | 500 V | 16 A | |
| | 690 V | 16 A | |
| AC-3 / AC-3e Utilization category for air temperature close to contactor θ ≤ 55 °C | | | |
| Ie / Rated operational current AC-3 / AC-3e (1) | 230 V | 9 A | 12 A |
| M 3~ 3-phase motors | 400 V | 9 A | 12 A |
| | 500 V | 8 A | 10 A |
| | 690 V | 5 A (2) | 5 A |
| Rated operational power AC-3 / AC-3e (1) | 230 V | 2.2 kW | 3 kW |
| M 3~ 1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors | 400 V | 4 kW | 5.5 kW |
| | 500 V | 4 kW | 5.5 kW |
| | 690 V | 4 kW (2) | 4 kW |
| AC-4 Utilization category for air temperature close to contactor θ ≤ 55 °C | | | |
| Ie / Rated operational current AC-4 | 230 V | 9 A | 9 A |
| M 3~ 3-phase motors | 400 V | 9 A | 9 A |
| | 500 V | 8 A | 8 A |
| | 690 V | 5 A (2) | 5 A |
| Rated operational power AC-4 | 230 V | 2.2 kW | 2.2 kW |
| M 3~ 1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors | 400 V | 4 kW | 4 kW |
| | 500 V | 4 kW | 4 kW |
| | 690 V | 4 kW (2) | 4 kW |
| Rated making capacity | | 10 x Ie AC-3 acc. to IEC/EN 60947-4-1, 13 x Ie AC-3e acc. to IEC/EN 60947-4-1, 12 x Ie AC-4 acc. to IEC/EN 60947-4-1 | |
| Rated breaking capacity | | 8 x Ie AC-3 acc. to IEC/EN 60947-4-1, 8.5 x Ie AC-3e acc. to IEC/EN 60947-4-1, 10 x Ie AC-4 acc. to IEC/EN 60947-4-1 | |
| Short-circuit protection device for contactors without thermal O/L relay - motor protection excluded fuse type gG | | Type 1: 32 A / Type 2: 20 A | |
| Rated short-time withstand current Icw at 40 °C ambient temperature, in free air from a cold state | 10 s | 72 A | 96 A |
| Maximum breaking capacity cos ϕ = 0.45 | at 400 V | 90 A | 120 A |
| Maximum electrical switching frequency | AC | 300 cycles/h (AC-1), 1200 cycles/h (AC-3), 150 cycles/h (AC-4) | |
| | DC | 600 cycles/h | |

(1) For MC2, AC-3 only
(2) Valid for N.O. contacts only. Other ratings on request.

### DC-1 / DC-3 / DC-5 Utilization category for air temperature close to the contactor θ ≤ 55 °C - valid for MC2 only

| Ie / Rated operational current | Per pole | | | | | | Two poles in series | | | | | | Three poles in series | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 24 V | 48 V | 60 V | 110 V | 220 V | 440 V | 24 V | 48 V | 60 V | 110 V | 220 V | 440 V | 24 V | 48 V | 60 V | 110 V | 220 V | 440 V |
| DC-1 (L/R ≤ 1 ms) | 20 | 20 | 20 | 6 | 0.8 | 0.2 | 20 | 20 | 20 | 20 | 6 | 0.5 | 20 | 20 | 20 | 20 | 20 | 2 |
| DC-3 (L/R ≤ 2 ms) | 20 | 20 | 10 | 2 | 0.3 | 0.1 | 20 | 20 | 20 | 10 | 2 | 0.25 | 20 | 20 | 20 | 16 | 6 | 0.75 |
| DC-5 (L/R ≤ 7.5 ms) | 20 | 10 | 2.5 | 0.5 | 0.25 | - | 20 | 20 | 20 | 4 | 1.25 | 0.15 | 20 | 20 | 20 | 10 | 2.5 | 0.3 |

# MC1, MC2 3-pole and 4-pole mini contactors
## Technical data



### Main pole – Utilization characteristics according to UL/NEMA/CSA

| Contactor types | AC operated | **MC1A** | **MC2A** |
|---|---|---|---|
| | DC operated | **MC1C** | **MC2C** |
| Standards | | UL/CSA 60947-1, UL/CSA 60947-4-1 | |
| Maximum operational voltage | | 600 V AC | |
| UL/CSA general use rating | | 20 A / 600 V | |
| UL/CSA maximum 1-phase motor rating for air temperature close to contactor θ ≤ 40 °C | | | |
| Full load current | 115 V AC | 9.8 A | 9.8 A |
| | 230 V AC | 10 A | 12 A |
| Horse power rating | 115 V AC | 0.5 hp | 0.5 hp |
| | 230 V AC | 1.5 hp | 2 hp |
| UL/CSA maximum 3-phase motor rating for air temperature close to contactor θ ≤ 40 °C | | | |
| Full load current (1) | 200 V AC | 11 A | 11 A |
| | 240 V AC | 9.6 A | 9.6 A |
| | 380-415 V AC | 6.1 A | 9.7 A |
| | 440-480 V AC | 7.6 A | 11 A |
| | 550-600 V AC | 6.1 A | 11 A |
| Horse power rating (1) | 200 V AC | 3 hp | 3 hp |
| | 240 V AC | 3 hp | 3 hp |
| | 380-415 V AC | 3 hp | 5 hp |
| | 440-480 V AC | 5 hp | 7.5 hp |
| | 550-600 V AC | 5 hp | 10 hp |
| Short-circuit protection device for contactors without thermal overload relay - motor protection excluded | | | |
| High fault current | | 50 kA | |
| Fuse rating and type | 600 V | 50 A Class J or 30 A class CC | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

### General technical data

| Contactor types | AC operated | **MC1A** | **MC2A** |
|---|---|---|---|
| | DC operated | **MC1C** | **MC2C** |
| Rated insulation voltage Ui | | | |
| acc. to IEC/EN 60947-4-1 | | 750 V | |
| acc. to UL/CSA 60947-4-1 | | 600 V | |
| Rated impulse withstand voltage Uimp | | 6 kV (1) | |
| Ambient air temperature, close to contactor | | | |
| Operation Fitted with thermal overload relay | | -25 ... +55 °C | |
| Without thermal overload relay | | -40 ... +55 °C | |
| Storage | | -55 ... +80 °C | |
| Climatic withstand | | Acc. to IEC 60947-1 Annex Q | |
| Maximum operating altitude (without derating) | | 3000 m | |
| Mechanical durability | | $10^7$ operating cycles | |
| Electrical durability | | | |
| | AC-1 20 A | 210 000 operating cycles | 260 000 operating cycles |
| | AC-3 400 V | 900 000 operating cycles (9 A) (2) | 800 000 operating cycles (12 A) (2) |
| | AC-4 400 V | 30 000 operating cycles (9 A) (2) | 35 000 operating cycles (9 A) (2) |
| Resistance to shock | | Half-sine | |
| acc. to IEC/EN 60068-2-27 | | 25 g / 11 ms | |
| acc. to IEC/EN 60947-1 Annex. Q | | Category E | |
| Resistance to vibrations | | Sinusoidal | |
| acc. to IEC/EN 60068-2-6 | | 5 g / 3 ... 150 Hz | |
| acc. to IEC/EN 60947-1 Annex. Q | | Category E | |

(1) 2 mm clearance distance between contactor side wall and grounded metal parts of cabinet required
(2) Valid for 3-pole mini contactors only. Other ratings on request.

# MC1, MC2 3-pole and 4-pole mini contactors

## Technical data



### Magnet system characteristics for MC1A, MC2A contactors

| Contactor types | AC operated | **MC1A** | **MC2A** |
|---|---|---|---|
| Coil operating limits acc. to IEC/EN 60947-4-1 | AC supply | 0.85 ... 1.1 x Uc | |
| AC control voltage | | | |
| Rated control circuit voltage Uc | | See ordering tables | |
| Coil consumption | Average pull-in value (50 Hz) | 26 VA | |
| | Average pull-in value (60 Hz) | 32 VA | |
| | Average holding value (50 Hz) | 5.3 VA | |
| | Average holding value (60 Hz) | 4.5 VA | |
| Drop-out voltage in % of Uc min | | 20 ... 75% | |

### Magnet system characteristics for MC1C, MC2C contactors

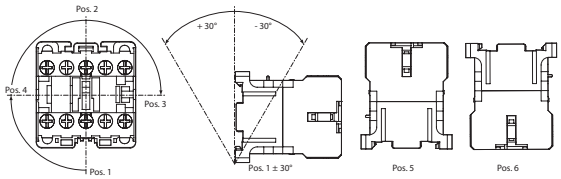
| Contactor types | DC operated | **MC1C** | **MC2C** |
|---|---|---|---|
| Coil operating limits acc. to IEC/EN 60947-4-1 | DC supply | 0.85 ... 1.1 x Uc | |
| DC control voltage | | | |
| Rated control circuit voltage Uc | | See ordering tables | |
| Coil consumption (1) | Average pull-in value | 3 W | |
| | Average holding value | 3 W | |
| Drop-out voltage in % of Uc min | | 10 ... 75% | |

(1) Low consumption mini contactors: see coil consumption on ordering details pages.

### Magnet system characteristics for MC1C, MC2C contactors with extended operating limits coils

| Contactor types | DC operated | **MC1C** | **MC2C** |
|---|---|---|---|
| Coil operating limits acc. to IEC/EN 60947-4-1 | DC supply | 0.85 ... 1.1 x Uc | |
| DC control voltage | | | |
| Rated control circuit voltage Uc | | See ordering tables | |
| Coil consumption | Average pull-in value | 4 W | |
| | Average holding value | 4 W | |
| Drop-out voltage in % of Uc min | | 10 ... 65% | |

### Mounting characteristics and conditions for use

| Contactor types | AC operated | **MC1A** | **MC2A** |
|---|---|---|---|
| | DC operated | **MC1C** | **MC2C** |
| Mounting positions | |  | |
| Mounting distances | | The contactors can be assembled side by side | |
| Fixing | | | |
| On rail acc. to IEC/EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | |
| By screws (not supplied) | | 4 screws at the 4 angles - M4 | |

# MC1, MC2 3-pole and 4-pole mini contactors
## Technical data

### Built-in auxiliary contact according to IEC

| Types | | Built-in auxiliary contacts |
|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-5-1 |
| Rated operational voltage Ue max | | 690 V AC, 440 V DC |
| Rated frequency (without derating) | | DC or 50 / 60 Hz |
| Conventional free-air thermal current Ith θ ≤ 55 °C | | 10 A |
| Ie / Rated operational current AC-15 | 240 V | 6 A |
| | 400 V | 4 A |
| | 500 V | 2.5 A |
| | 690 V | 1.5 A |
| Ie / Rated operational current DC-13 | 24 V | 5 A |
| | 48 V | 2.5 A |
| | 125 V | 0.55 A |
| | 250 V | 0.3 A |
| | 440 V | 0.15 A |
| Short-circuit protection device - fuse type gG | | 10 A |
| Minimum switching capacity | | 17 V / 5 mA |
| Maximum electrical switching frequency | AC-15 | 360 cycles/h |
| | DC-13 | 360 cycles/h |

### Built-in auxiliary contact according to UL/CSA

| Types | Built-in auxiliary contacts |
|---|---|
| Standards | UL/CSA 60947-1, UL/CSA 60947-5-1 |
| Maximum operational voltage | 600 V AC |
| Pilot duty | A600, Q600 |

### Connection

| Contactor types | AC operated | MC1A, MC2A | MC1A..R, MC2A..R |
|---|---|---|---|
| | DC operated | MC1C, MC2C | MC1C..R, MC2C..R |
| Terminals | |  Screw terminals with cable clamp |  Conductors with insulated ring tongue ferrule |
| Connection capacity | | | |
| Main conductors (poles + built-in auxiliary terminals) | | | |
| Rigid: solid | 1 x | 0.75 ... 4 mm² | – |
| | 2 x | 0.75 ... 2.5 mm² | – |
| Flexible without ferrule | 1 or 2 x | 0.75 ... 2.5 mm² | – |
| Flexible with ferrule | 1 x | 0.75 ... 2.5 mm² | – |
| (insulated or not) | 2 x | 0.75 ... 1.5 mm² | – |
| Lugs | Ø mm > | – | 3.6 mm |
| | L mm < | – | 6.6 mm |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 12 ... 18 | – |
| Stripping length | | 9 mm | – |
| Tightening torques | | 0.8 ... 1.0 Nm / 7 lb.in | 0.8 ... 1.0 Nm / 7 lb.in |
| Coil terminals | | | |
| Rigid: solid | 1 or 2 x | 0.75 ... 2.5 mm² | – |
| Flexible without ferrule | 1 or 2 x | 0.75 ... 2.5 mm² | – |
| Flexible with ferrule | 1 x | 0.75 ... 2.5 mm² | – |
| (insulated or not) | 2 x | 0.75 ... 1.5 mm² | – |
| Lugs | Ø mm > | – | 3.6 mm |
| | L mm < | – | 6.6 mm |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 12 ... 18 | – |
| Stripping length | | 9 mm | – |
| Tightening torques | | 0.8 ... 1.0 Nm / 7 lb.in | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | |
| All terminals | | IP20 | |
| Screw terminals | | (screws of unused terminals must be tightened) | |
| All terminals | | M3 | M3.5 |
| Screwdriver type | | Flat Ø 5.5 mm / Pozidriv 2 | |

# MCR 4-pole mini contactor relays
## Technical data



### Main pole – Utilization characteristics according to IEC

| | | |
|---|---|---|
| Contactor types | AC operated | **MCRA** |
| | DC operated | **MCRC** |
| Standards | | IEC/EN 60947-1, EN 60947-5-1 |
| Rated operational voltage Ue max | | 690 V AC, 440 V DC |
| Rated frequency (without derating) | | DC or 50 / 60 Hz |
| Conventional free-air thermal current Ith θ ≤ 55 °C | | 10 A |
| Ie / Rated operational current AC-15 | 240 V | 6 A |
| | 400 V | 4 A |
| | 500 V | 2.5 A |
| | 690 V | 1.5 A |
| Ie / Rated operational current DC-13 | 24 V | 5 A |
| | 48 V | 2.5 A |
| | 125 V | 0.55 A |
| | 250 V | 0.3 A |
| | 440 V | 0.15 A |
| Short-circuit protection device for contactors - fuse type gG | | 10 A |
| Minimum switching capacity | | 17 V / 5 mA |
| Maximum electrical switching frequency | AC-15 | 600 cycles/h |
| | DC-13 | 600 cycles/h |

### Main pole – Utilization characteristics according to UL/NEMA/CSA

| | | |
|---|---|---|
| Contactor types | AC operated | **MCRA** |
| | DC operated | **MCRC** |
| Standards | | UL/CSA 60947-1, UL/CSA 60947-5-1 |
| Maximum operational voltage | | 600 V AC |
| Pilot duty | | A600, Q600 |

# MCR 4-pole mini contactor relays
## Technical data



### General technical data

| | | |
|---|---|---|
| Contactor relay types | AC operated | **MCRA** |
| | DC operated | **MCRC** |
| Rated insulation voltage Ui | | |
| acc. to IEC/EN 60947-5-1 | | 750 V |
| acc. to UL/CSA 60947-5-1 | | 600 V |
| Rated impulse withstand voltage Uimp | | 6 kV |
| Electromagnetic compatibility | | |
| Ambient air temperature close to contactor relay | Operation in free air | -40 ... +55 °C |
| | Storage | -55 ... +80 °C |
| Climatic withstand | | Acc. to IEC / EN 60947-1 Annex. Q |
| Maximum operating altitude (without derating) | | 3000 m |
| Mechanical durability | | $10^7$ operating cycles |
| Resistance to shock | | Half-sine |
| acc. to IEC/EN 60068-2-27 | | 25 g / 11ms |
| acc. to IEC/EN 60947-1 Annex. Q | | Category E |
| Resistance to vibrations | | Sinusoidal |
| acc. to IEC/EN 60068-2-6 | | 5 g / 3 ... 150 Hz |
| acc. to IEC/EN 60947-1 Annex. Q | | Category E |

### Magnet system characteristics for MCRA contactor relays

| | | |
|---|---|---|
| Contactor relay types | AC operated | **MCRA** |
| Coil operating limits acc. to IEC/EN 60947-5-1 | AC supply | 0.85 ... 1.1 x Uc |
| AC control voltage | | |
| Rated control circuit voltage Uc | | See ordering tables |
| Coil consumption | Average pull-in value (50 Hz) | 26 VA |
| | Average pull-in value (60 Hz) | 32 VA |
| | Average holding value (50 Hz) | 5.3 VA |
| | Average holding value (60 Hz) | 4.5 VA |
| Drop-out voltage in % of Uc min | | 20 ... 75 % |

### Magnet system characteristics for MCRC contactor relays

| | | |
|---|---|---|
| Contactor relay types | DC operated | **MCRC** |
| Coil operating limits acc. to IEC/EN 60947-5-1 | DC supply | 0.85 ... 1.1 x Uc |
| DC control voltage | | |
| Rated control circuit voltage Uc | | See ordering tables |
| Coil consumption (1) | Average pull-in value | 3 W |
| | Average holding value | 3 W |
| Drop-out voltage in % of Uc min | | 10 ... 75 % |

(1) Low consumption mini contactor relays: see coil consumption on ordering details pages.

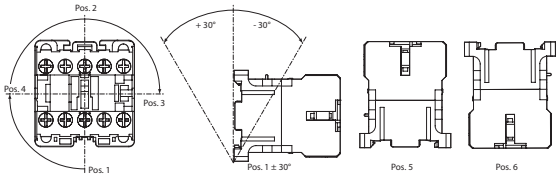
### Magnet system characteristics for MCRC contactor relays with extended operating limits coils

| | | |
|---|---|---|
| Contactor types | DC operated | **MCRC** |
| Coil operating limits acc. to IEC/EN 60947-5-1 | DC supply | 0.85 ... 1.1 x Uc |
| DC control voltage | | |
| Rated control circuit voltage Uc | | See ordering tables |
| Coil consumption | Average pull-in value | 4 W |
| | Average holding value | 4 W |
| Drop-out voltage in % of Uc min | | 10 ... 65 % |

# MCR 4-pole mini contactor relays
Technical data



## Mounting characteristics and conditions for use

| | | |
|---|---|---|
| Contactor types | AC operated | **MCRA** |
| | DC operated | **MCRC** |
| Mounting positions | |   |
| Mounting distances | | The contactors can be assembled side by side. |
| Fixing | | |
| On rail acc. to IEC/EN 60715 | | 35 x 7.5 mm or 35 x 15 mm |
| By screws (not supplied) | | 4 screws at the 4 angles - M4 |

## Connection characteristics

| | | | | |
|---|---|---|---|---|
| Contactor types | AC operated | **MCRA** | **MCRA..R** |
| | DC operated | **MCRC** | **MCRC..R** |
| Terminals | |  Screw terminals with cable clamp |  Conductors with insulated ring tongue ferrule |
| Connection capacity | | | |
| Auxiliary terminals | | | |
| Rigid: solid | 1 x | 0.75 ... 4 mm² | – |
| | 2 x | 0.75 ... 2.5 mm² | – |
| Flexible without ferrule | 1 or 2 x | 0.75 ... 2.5 mm² | – |
| Flexible with ferrule | 1 x | 0.75 ... 2.5 mm² | – |
| (insulated or not) | 2 x | 0.75 ... 1.5 mm² | – |
| Lugs | Ø mm > | – | 3.6 mm |
| | L mm < | – | 6.6 mm |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 12 ... 18 | – |
| Stripping length | | 9 mm | – |
| Tightening torques | | 0.8 ... 1.0 Nm / 7 lb.in | 0.8 ... 1.0 Nm / 7 lb.in |
| Coil terminals | | | |
| Rigid: solid | 1 or 2 x | 0.75 ... 2.5 mm² | – |
| Flexible without ferrule | 1 or 2 x | 0.75 ... 2.5 mm² | – |
| Flexible with ferrule | 1 x | 0.75 ... 2.5 mm² | – |
| (insulated or not) | 2 x | 0.75 ... 1.5 mm² | – |
| Lugs | Ø mm > | – | 3.6 mm |
| | L mm < | – | 6.6 mm |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 12 ... 18 | – |
| Stripping length | | 9 mm | – |
| Tightening torques | | 0.8 ... 1.0 Nm / 7 lb.in | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | |
| All terminals | | IP20 | |
| Screw terminals | | (screws of unused terminals must be tightened) | |
| All terminals | | M3 | M3.5 |
| Screwdriver type | | Flat Ø 5.5 mm / Pozidriv 2 | |

# Accessories
## Technical data



### Auxiliary contacts for front mounting and side mounting according to IEC

| Types | | MACN, MARN, MACL, MARL |
|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-5-1 |
| Rated operational voltage Ue max | | 690 V AC |
| Rated frequency (without derating) | | DC or 50 / 60 Hz |
| Conventional free-air thermal current Ith θ ≤ 55 °C | | 10 A |
| Ie / Rated operational current AC-15 | 240 V | 6 A |
| | 400 V | 4 A |
| | 500 V | 2.5 A |
| | 690 V | 1.5 A |
| Short-circuit protection device - fuse type gG | | 10 A |
| Minimum switching capacity | | 17 V / 5 mA |
| Maximum electrical switching frequency | AC-15 | 360 cycles/h |
| | DC-13 | 360 cycles/h |

### Auxiliary contacts for front mounting and side mounting according to UL/CSA

| Types | MACN, MARN, MACL, MARL |
|---|---|
| Standards | UL/CSA 60947-1, UL/CSA 60947-5-1 |
| Max. operational voltage | 600 V AC |
| Pilot duty | A600, Q600 |

### Connection characteristics

| Terminals | |  Screw terminals with cable clamp |  Conductors with insulated ring tongue ferrule |
|---|---|---|---|
| Connection capacity | | | |
| Auxiliary terminals | | | |
| Rigid: solid | 1 or 2 x | 0.75 ... 2.5 mm² | – |
| Flexible without ferrule | 1 or 2 x | 0.75 ... 2.5 mm² | – |
| Flexible with ferrule | 1 x | 0.75 ... 2.5 mm² | – |
| (insulated or not) | 2 x | 0.75 ... 1.5 mm² | – |
| Lugs | Ø mm > | – | 3.6 mm |
| | L mm < | – | 6.6 mm |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 12 ... 18 | – |
| Stripping length | | 9 mm | – |
| Tightening torques | | 0.8 Nm / 7 lb.in | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | |
| Auxiliary terminals | | IP20 | |
| Screw terminals | | (screws of unused terminals must be tightened) | |
| All terminals | | M3.5 | |
| Screwdriver type | | Flat Ø 5.5 mm / Pozidriv 2 | |

# Accessories
## Technical data



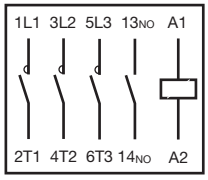
### Electronic timers

| | | |
|---|---|---|
| Insulation Voltage | | 750 V |
| Impulse withstand voltage Uimp | | 4 kV |
| Control voltage, Uc | 50 Hz, 60 Hz, DC | 24-250 V |
| Tolerance of control voltage | | 0.85 ... 1.1 x Uc |
| Timing range | MREBC10AC2 | 0.5 s - 60 s (+/- 6 s) |
| | MREBC20AC2 | 0.2 s - 24 s (+/- 6 s) |
| Ambient air temperature close to the timer | Operation in free air | -25 °C ... +55 °C |
| | Storage | -55 °C ... +80 °C |
| Recovery time | | 100 ms |
| Repeatability | | +/-1 % |
| Temperature variation of delay | % / ° C | 0.075 |
| Degree of protection | | IP20 |
| Mounting position | | Any |

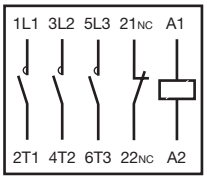
# MC.. 3-pole and 4-pole mini contactors, MCR.. 4-pole mini contactor relays

## Terminal marking and positioning

### MC.. 3-pole mini contactors

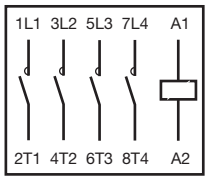



MC..310A

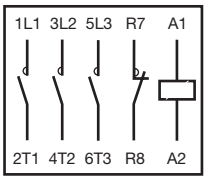



MC..301A

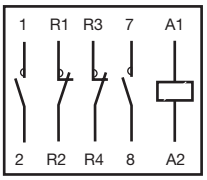
### MC.. 4-pole mini contactors



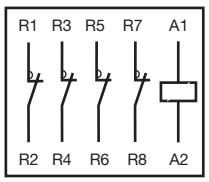

MC..400A




MC..C00A

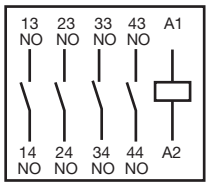



MC..B00A

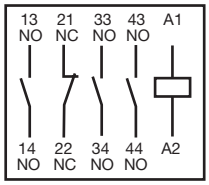



MC..A00A

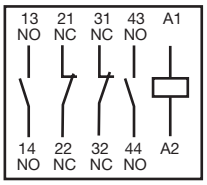
### MC.. 4-pole mini contactor relays



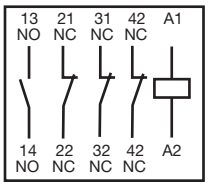

MCR..040A



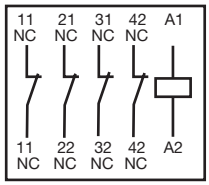

MCR..031A




MCR..022A




MCR..013A

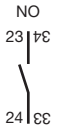



MCR..004A

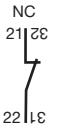
# Auxiliary contact blocks for MC1 and MC2 mini contactors

Terminal marking and positioning

### MACL.., MARL.. side mounted (left or right) 1-pole auxiliary contact block



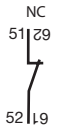

MACL110A




MACL101A



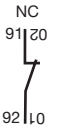

MARL110A




MARL101A




MARL110A..S




MARL101A..S

### MACN.., MARN.. front mounted 2-pole auxiliary contact block




MACN211A




MACN202A




MARN220A

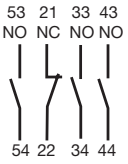



MARN211A

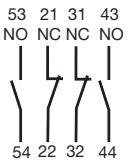



MARN202A

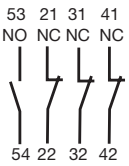
### MACN.., MARN.. front mounted 4-pole auxiliary contact block



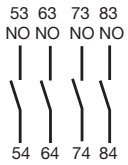

MACN431A



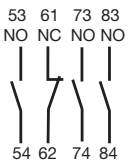

MACN422A




MACN413A



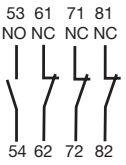

MARN440A



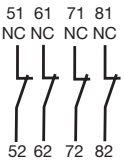

MARN431A




MARN422A

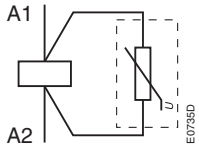



MARN413A

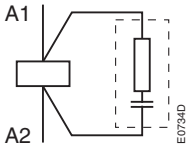



MARN404A

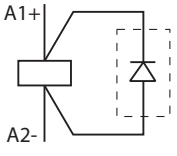
### Surge suppressors




Varistor



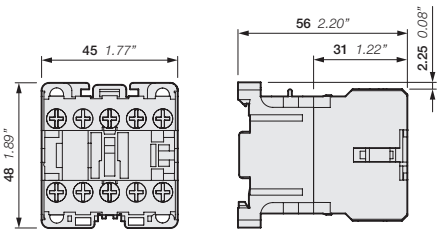

RC



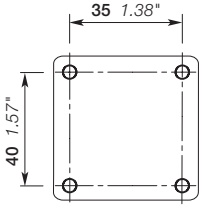

Diode

# MC.. mini contactors and MCR.. mini contactor relays - AC operated with screw terminals and specific screw terminals for ring tongue ferrules

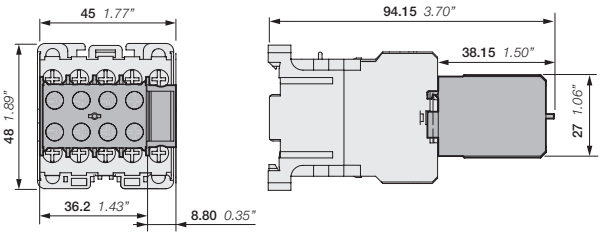
## Dimensions



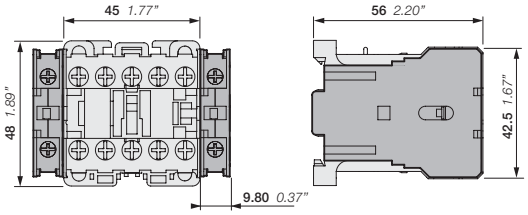

MC1A, MC2A, MCRA, MC1A..R, MC2A..R, MCRA..R



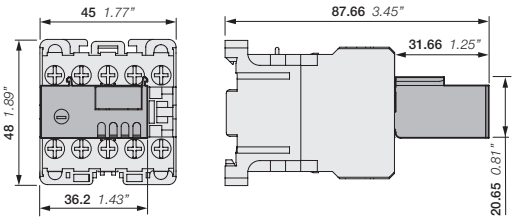

Drilling plan



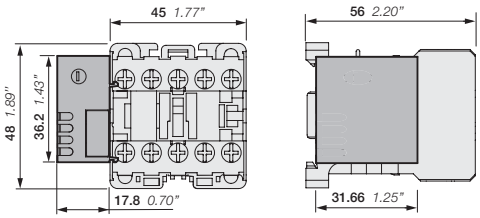

MC1A, MC2A, MCRA, MC1A..R, MC2A..R, MCRA..R
+ MACN2.., MARN2.. 2-pole auxiliary contact block
MACN4.., MARN4.. 4-pole auxiliary contact block



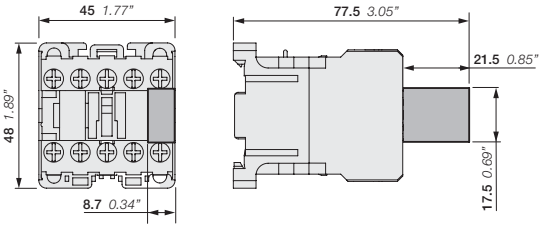

MC1A, MC2A, MCRA, MC1A..R, MC2A..R, MCRA..R
+ MACL.., MARL.. 1-pole auxiliary contact block




MC1A, MC2A, MCRA, MC1A..R, MC2A..R, MCRA..R
+MREBC front mounted electronic timer




MC1A, MC2A, MCRA, MC1A..R, MC2A..R, MCRA..R
+MREBC side mounted electronic timer

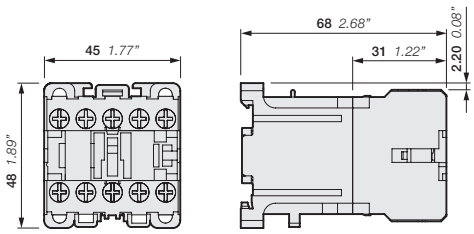



MC1A, MC2A, MCRA, MC1A..R, MC2A..R, MCRA..R
+MP0A surge suppressor

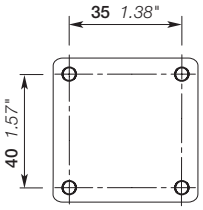
Main dimensions mm, inches

# MC.. mini contactors and MCR.. mini contactor relays - DC operated with screw terminals and specific screw terminals for ring tongue ferrules

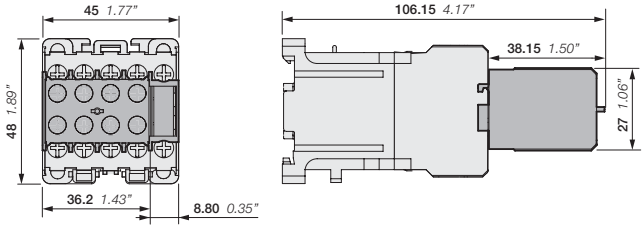
## Dimensions



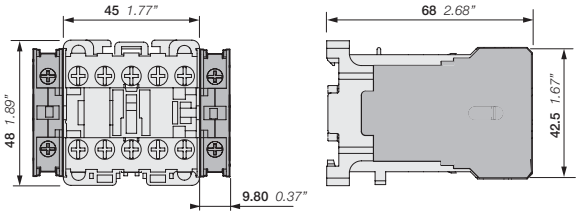

MC1C, MC2C, MCRC, MC1C..R, MC2C..R, MCRC..R



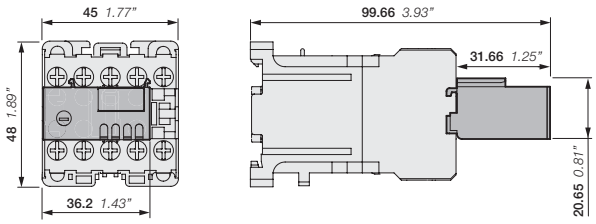

Drilling plan



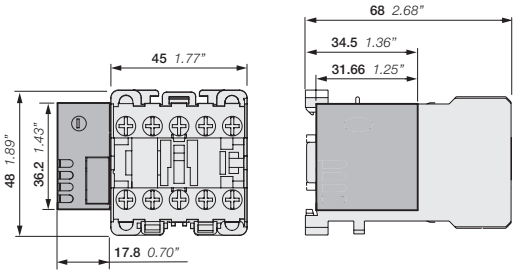

MC1C, MC2C, MCRC, MC1C..R, MC2C..R, MCRC..R
+ MACN2.., MARN2.. 2-pole auxiliary contact block
MACN4.., MARN4.. 4-pole auxiliary contact block



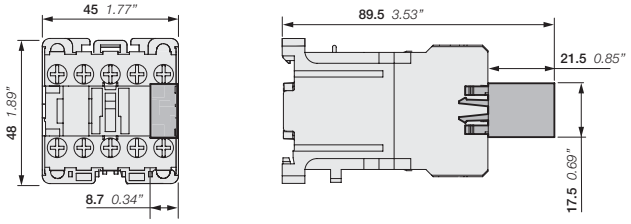

MC1C, MC2C, MCRC, MC1C..R, MC2C..R, MCRC..R
+ MACL.., MARL.. 1-pole auxiliary contact block




MC1C, MC2C, MCRC, MC1C..R, MC2C..R, MCRC..R
+MREBC front mounted electronic timer



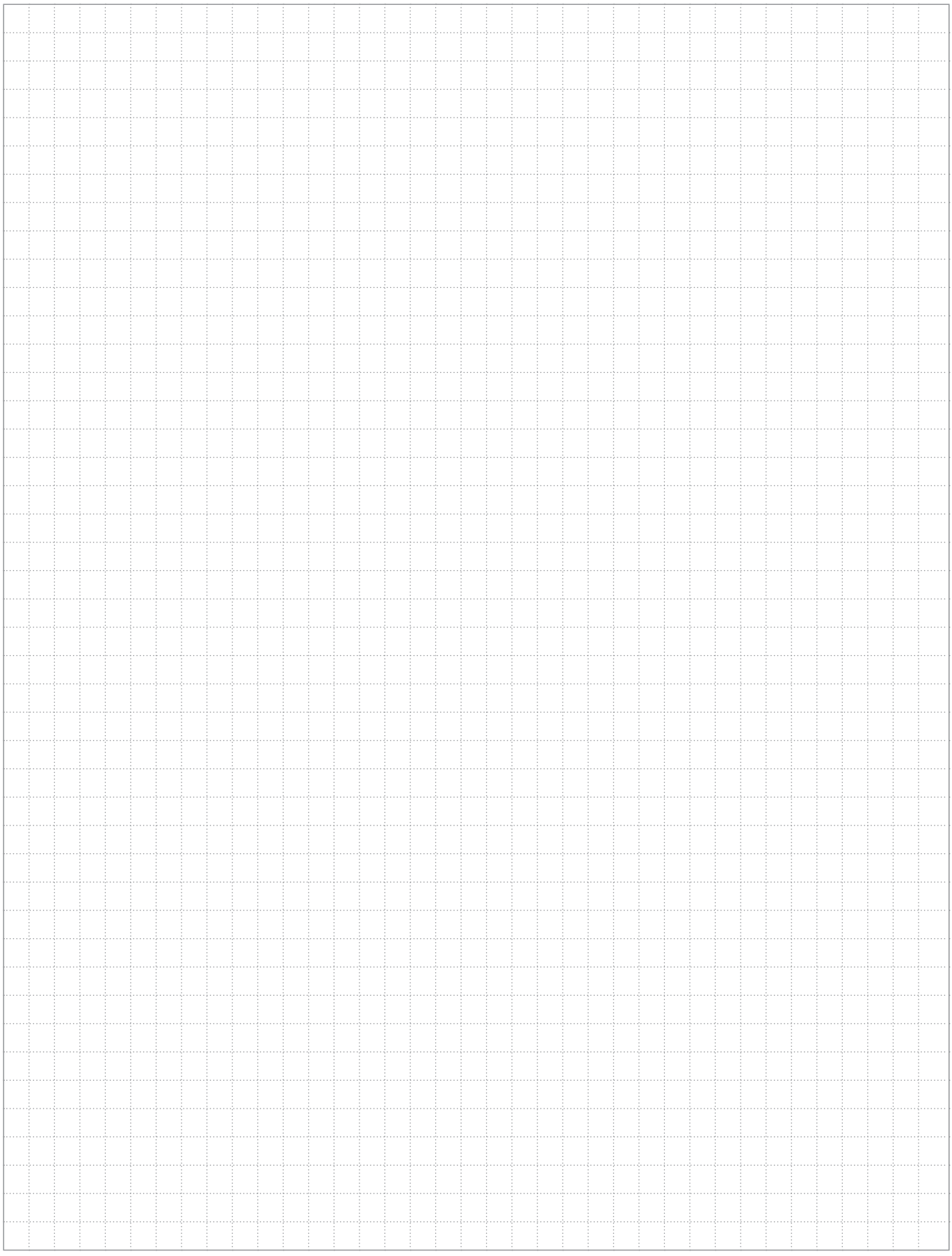

MC1C, MC2C, MCRC, MC1C..R, MC2C..R, MCRC..R
+MREBC side mounted electronic timer




MC1C, MC2C, MCRC, MC1C..R, MC2C..R, MCRC..R
+MP0A surge suppressor

Main dimensions mm, inches

# Notes



**For direct product details information, use product type or order code, ex:**

new.abb.com/products/1SBL101001R2010

# AS 3-pole contactors and NS 3-pole contactor relays
with screw terminals


**3-pole contactors**

**5/**3 Overview
**5/**8 AS09 ... AS16 AC operated
**5/**9 ASL09 ... ASL16 DC operated
**5/**10 AS09 ... AS16 AC operated - 2-stack
**5/**11 ASL09 ... ASL16 DC operated - 2-stack
**5/**12 Main accessories
**5/**14 Technical data
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**5/**22 Terminal marking and positioning
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**Contactor relays**

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**5/**30 NS AC operated
**5/**31 NSL DC operated
**5/**32 Main accessories
**5/**34 Technical data
**5/**38 Terminal marking and positioning
**5/**40 Dimensions

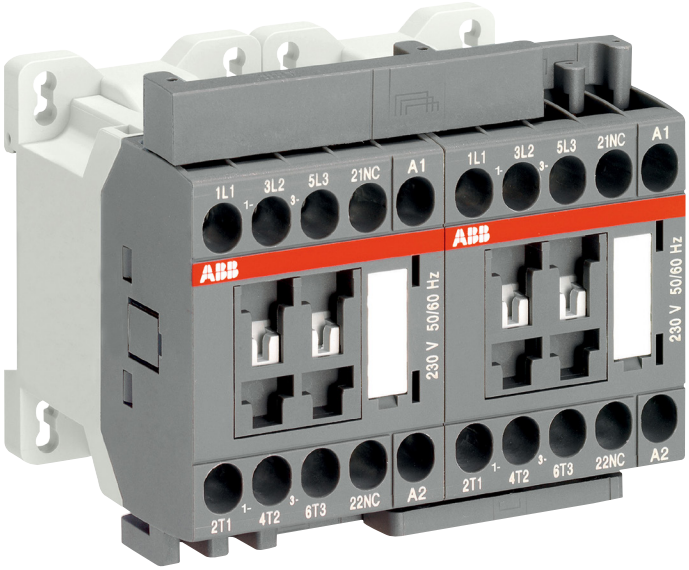
**Accessories**

**5/**42 Auxiliary contact blocks
**5/**45 Surge suppressors
**5/**47 Mechanical interlock unit and other accessories
**5/**48 Connection accessories for starting solutions

**5/**49 **Voltage code table**

# AS contactors
## Efficient and space saving





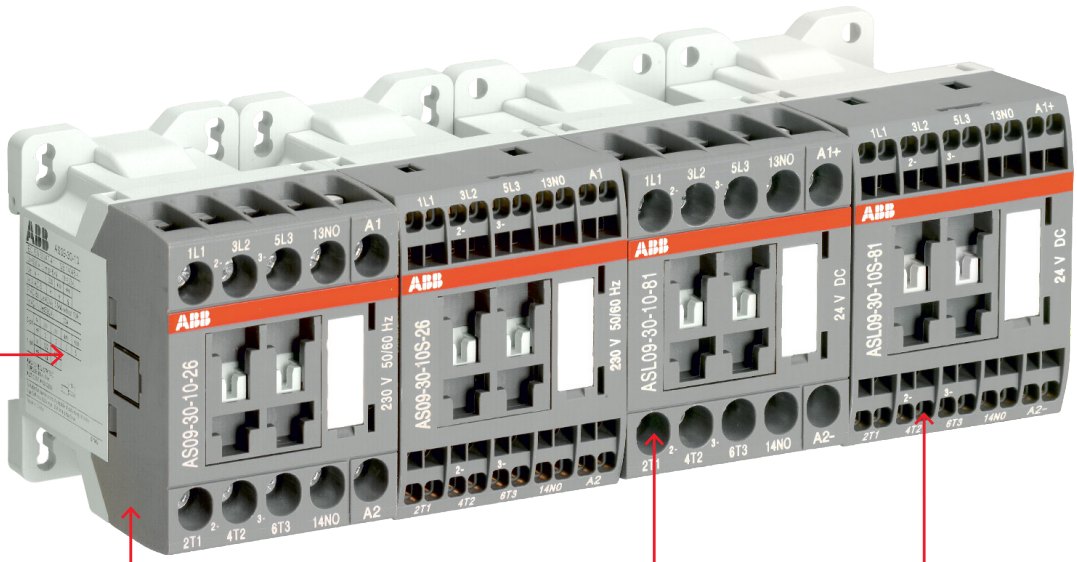

The compact AS contactor range allows you to optimize equipment design and is a reliable, time and cost saving solution.

### Speed up your projects
**Simpler by design**
AS contactors come in one single size and are designed to make life easy for engineering, handling and wiring purposes. These products follow a simple marking pattern, which enables a quick identification of their individual features.

### Easy to install
**Easy to use**
Make engineering a simple process with AS contactors. Every product is delivered with opened terminals, located directly on the front for easy access. Every terminal is screwdriver guided. Spring terminal versions are also available for a time-saving and reliable connection alternative.

### Space saving
**Space optimization**
The addition of accessories keeps the panel smart and compact, while providing additional features. Interlocking kits and surge suppression are clipped into the housing without adding width to the small frame of the contactor.

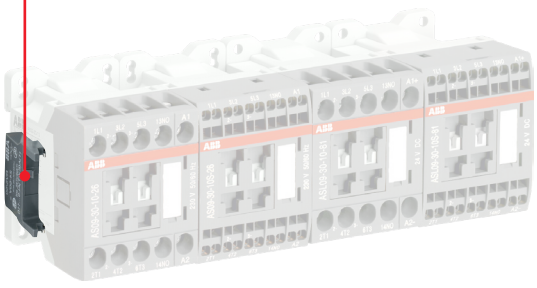
# Compact and efficient
## Optimize your equipment dimensions!



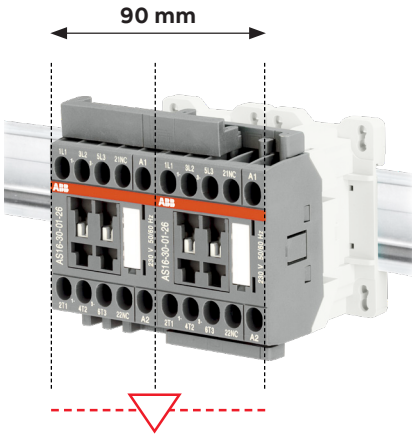

### W 45 x H 68 x D 72.5 mm
**Easy to engineer with just one size**
For motor starting solutions up to 7.5 kW at 400 V and 3 hp at 440 V, contactors are in one frame size for both AC and DC coils.

### Screw
**Screw terminal**
On top of that, they are available with screw or spring terminals.

### Spring
**Spring terminal**



**Side clip-on surge suppressors**
This add-on snaps and connects to the side of the housing and does not add width to the frame. The coil terminals remain accessible this way.




**Compact reversing contactors**
With their low consumption coil of only 3 W, AS contactors can be controlled directly by most PLC's. For 24 V control circuits, this is only 125 mA.

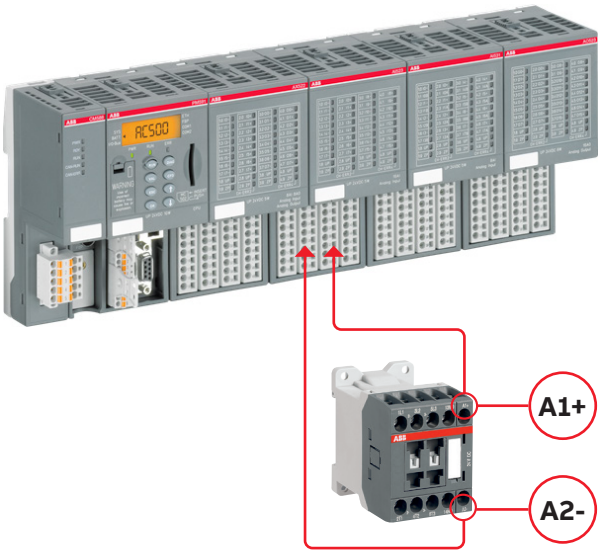
# Easy to use
## Space-saving and intuitive





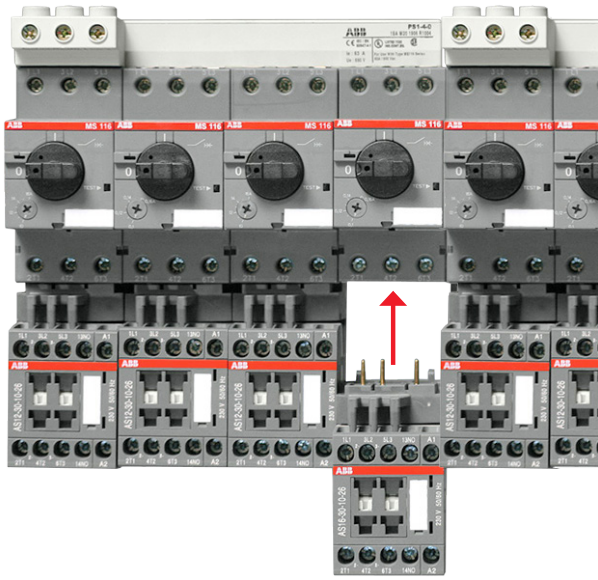
**Make your control circuits reliable**
Built-in and add-on auxiliary contacts offer high reliability for low signals and meet the requirements for mechanically linked and mirror contacts according to IEC standards.

**Two types of terminals, for even more choices**
As an alternative to the conventional screw terminals, spring terminals are often used in applications with vibrations. Both types are able to accommodate two cables. This way, AS offers the right type of terminal depending on the installation.




**Direct control by PLC**
With their low consumption coil of only 3 W, AS contactors can be controlled directly by most PLC's. For 24 V control circuits, this is only 125 mA.





**Choose reliable and time-saving solutions**
AS contactors can easily be connected to manual motor starters or overload relays. The connecting accessories prevent mistakes and save time when assembling starter combinations.

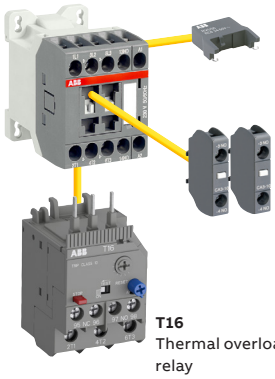
# 3-pole contactors
## Main accessories



**AS09 ... AS16**
3-pole contactors



## Main accessories for contactors



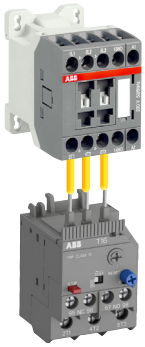
**RV5, RT5 or RC5-1**
Surge suppressor

**CA-3**
1-pole auxiliary contact block

**T16**
Thermal overload relay

## Main accessories for starting solutions

**Direct-on-line starter**

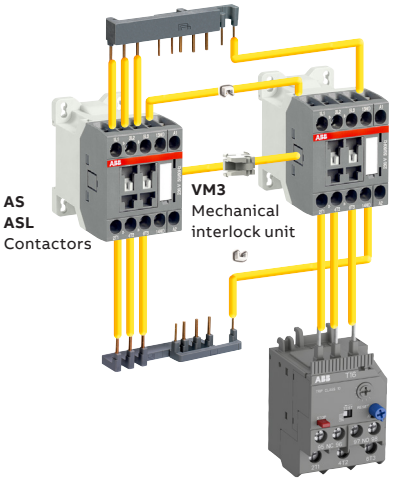


**AS**
**ASL**
Contactors

**T16**
Thermal overload relay

**Reversing starter**

**BER16C-3**
Connection set



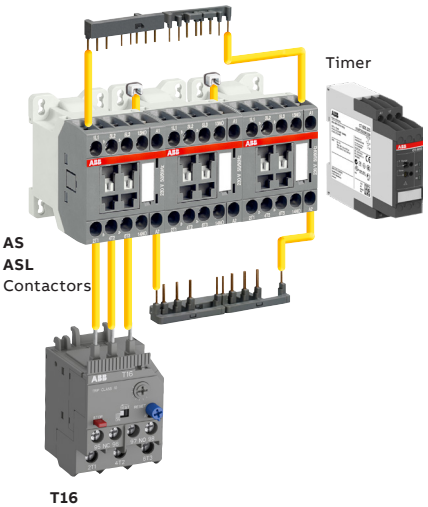
**AS**
**ASL**
Contactors

**VM3**
Mechanical interlock unit

**T16**
Thermal overload relay

**Star-delta starter**

**BEY16C-3**
Connection set



Timer

**AS**
**ASL**
Contactors

**T16**
Thermal overload relay

# 3-pole contactors





## Screw terminals

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | AC control voltage | | | | | **AS09** | **AS12** | **AS16** |
| | DC control voltage | | | | | **ASL09** | **ASL12** | **ASL16** |

## Switching of 3-phase cage motors

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | IEC | **AC-3** | Rated operational power | | **400 V** | **4 kW** | **5.5 kW** | **7.5 kW** |
| | | | Rated operational current | θ ≤ 60 °C | **400 V** | 9 A | 12 A | 15.5 A |
| | | | | θ ≤ 60 °C | **415 V** | 9 A | 12 A | 15.5 A |
| | | | | θ ≤ 60 °C | **690 V** | 5 A | 7 A | 9 A |
| | **UL / CSA** | **3-phase motor rating** | | | **440-480 V** | **5 hp** | **7.5 hp** | **10 hp** |
| | NEMA size | | | | | 00 | 00 | 0 |

## Protection of 3-phase motors

| | | | | | | |
|---|---|---|---|---|---|---|
| **Thermal overload relays** |  | **T16...** | | | | |
| | | 0.10...**0.13** | 0.23...**0.31** | 0.55...**0.74** | 1.30...**1.70** | 3.10...**4.20** | 7.60...**10.0** |
| | | 0.13...**0.17** | 0.31...**0.41** | 0.74...**1.00** | 1.70...**2.30** | 4.20...**5.70** | 10.0...**13.0** |
| | | 0.17...**0.23** | 0.41...**0.55** | 1.00...**1.30** | 2.30...**3.10** | 5.70...**7.60** | 13.0...**16.0** |

## Switching of resistive circuits

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | IEC | **AC-1** | Rated operational current | θ ≤ 40 °C | **690 V** | **22 A** | **24 A** | **24 A** |
| | | | | θ ≤ 60 °C | **690 V** | 18 A | 20 A | 20 A |
| | | | | θ ≤ 70 °C | **690 V** | 15 A | 16 A | 16 A |
| | | With conductor cross-sectional area | | | | 2.5 mm² | 2.5 mm² | 2.5 mm² |
| | **UL / CSA** | **General use rating** | | 600 V AC | | **20 A** | **20 A** | **20 A** |
| | | With conductor cross-sectional area | | | | AWG 12 | AWG 12 | AWG 12 |

## Main accessories

| | | | |
|---|---|---|---|
| **Auxiliary contact blocks** | Front mounting |  | 1-pole **CA3-10** or **CA3-01** |
| **Interlocks** | Mechanical |  | **VM3** |
| **Surge suppressors** | Side-mounted (without additional width) |  | **RV5** (Varistor) AC / DC<br>**RC5-1** (Capacitor) AC<br>**RT5** (Transil diode) DC |
| **Connection sets** | Reversing starters<br>Star-delta starters |  | **BER16C-3**<br>**BEY16C-3** |
| **Connecting link** | With manual motor starter |  | **BEA16-3** |

# AS09 ... AS16 3-pole contactors

## 4 to 7.5 kW
## AC operated




AS09-30-10

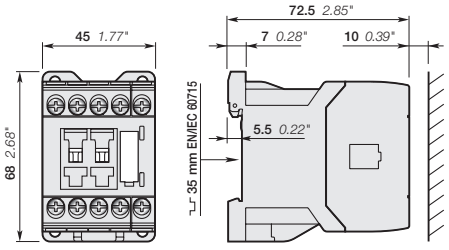
AS09 ... AS16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

- 3 main poles and 1 built-in auxiliary contact
- control circuit: AC operated
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc (1) | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50 Hz | V 60 Hz | | | | kg |
| 4 | 22 | 5 | 20 | 24 | 24 | 1 0 | AS09-30-10-20 | 1SBL101001R2010 | 0.220 |
| | | | | | | 0 1 | AS09-30-01-20 | 1SBL101001R2001 | 0.220 |
| | | | | 220 | 220 | 1 0 | AS09-30-10-25 | 1SBL101001R2510 | 0.220 |
| | | | | | | 0 1 | AS09-30-01-25 | 1SBL101001R2501 | 0.220 |
| | | | | 230 | 230 | 1 0 | AS09-30-10-26 | 1SBL101001R2610 | 0.220 |
| | | | | | | 0 1 | AS09-30-01-26 | 1SBL101001R2601 | 0.220 |
| 5.5 | 24 | 7.5 | 20 | 24 | 24 | 1 0 | AS12-30-10-20 | 1SBL111001R2010 | 0.220 |
| | | | | | | 0 1 | AS12-30-01-20 | 1SBL111001R2001 | 0.220 |
| | | | | 220 | 220 | 1 0 | AS12-30-10-25 | 1SBL111001R2510 | 0.220 |
| | | | | | | 0 1 | AS12-3001-25 | 1SBL111001R2501 | 0.220 |
| | | | | 230 | 230 | 1 0 | AS12-30-10-26 | 1SBL111001R2610 | 0.220 |
| | | | | | | 0 1 | AS12-30-01-26 | 1SBL111001R2601 | 0.220 |
| 7.5 | 24 | 10 | 20 | 24 | 24 | 1 0 | AS16-30-10-20 | 1SBL121001R2010 | 0.220 |
| | | | | | | 0 1 | AS16-30-01-20 | 1SBL121001R2001 | 0.220 |
| | | | | 220 | 220 | 1 0 | AS16-30-10-25 | 1SBL121001R2510 | 0.220 |
| | | | | | | 0 1 | AS16-30-01-25 | 1SBL121001R2501 | 0.220 |
| | | | | 230 | 230 | 1 0 | AS16-30-10-26 | 1SBL121001R2610 | 0.220 |
| | | | | | | 0 1 | AS16-30-01-26 | 1SBL121001R2601 | 0.220 |

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.




AS09, AS12, AS16

Main dimensions mm, inches

# ASL09 ... ASL16 3-pole contactors

## 4 to 7.5 kW
## DC operated




ASL09-30-10

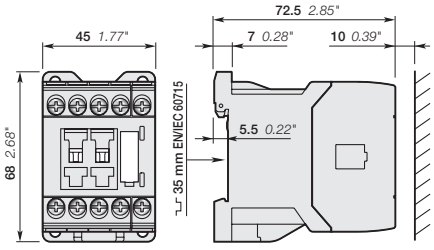
ASL09 ... ASL16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

- 3 main poles and 1 built-in auxiliary contact
- control circuit: low consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc (1) | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | Pkg (1 pce) |
| kW | A | hp | A | V DC | | | | kg |
| 4 | 22 | 5 | 20 | 24 | 1 0 | ASL09-30-10-81 | 1SBL103001R8110 | 0.280 |
| | | | | | 0 1 | ASL09-30-01-81 | 1SBL103001R8101 | 0.280 |
| 5.5 | 24 | 7.5 | 20 | 24 | 1 0 | ASL12-30-10-81 | 1SBL113001R8110 | 0.280 |
| | | | | | 0 1 | ASL12-30-01-81 | 1SBL113001R8101 | 0.280 |
| 7.5 | 24 | 10 | 20 | 24 | 1 0 | ASL16-30-10-81 | 1SBL123001R8110 | 0.280 |
| | | | | | 0 1 | ASL16-30-01-81 | 1SBL123001R8101 | 0.280 |

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.




ASL09, ASL12, ASL16

Main dimensions mm, inches

# AS09 ... AS16 2-stack 3-pole contactors

## 4 to 7.5 kW
## AC operated




AS09-30-32

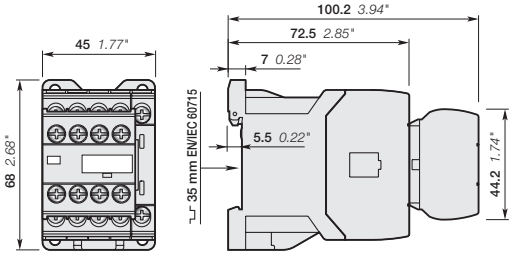
AS09 ... AS16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

- 1st stack with 3 main poles and 1 N.O. built-in auxiliary contact
- 2nd stack with permanently fixed 2 N.O. + 2 N.C. auxiliary contact block. The auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC operated
- a comprehensive range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc (1) | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50 Hz | V 60 Hz | 3 2 | | | kg |
| 4 | 22 | 5 | 20 | 24 | 24 | 3 2 | AS09-30-32-20 | 1SBL101001R2032 | 0.260 |
| | | | | 220 | 220 | 3 2 | AS09-30-32-25 | 1SBL101001R2532 | |
| | | | | 230 | 230 | 3 2 | AS09-30-32-26 | 1SBL101001R2632 | 0.260 |
| 5.5 | 24 | 7.5 | 20 | 24 | 24 | 3 2 | AS12-30-32-20 | 1SBL111001R2032 | 0.260 |
| | | | | 220 | 220 | 3 2 | AS12-30-32-25 | 1SBL111001R2532 | |
| | | | | 230 | 230 | 3 2 | AS12-30-32-26 | 1SBL111001R2632 | 0.260 |
| 7.5 | 24 | 10 | 20 | 24 | 24 | 3 2 | AS16-30-32-20 | 1SBL121001R2032 | 0.260 |
| | | | | 220 | 220 | 3 2 | AS16-30-32-25 | 1SBL121001R2532 | |
| | | | | 230 | 230 | 3 2 | AS16-30-32-26 | 1SBL121001R2632 | 0.260 |

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.




AS09, AS12, AS16

Main dimensions mm, inches

# ASL09 ... ASL16 2-stack 3-pole contactors

4 to 7.5 kW

DC operated




ASL09-30-32

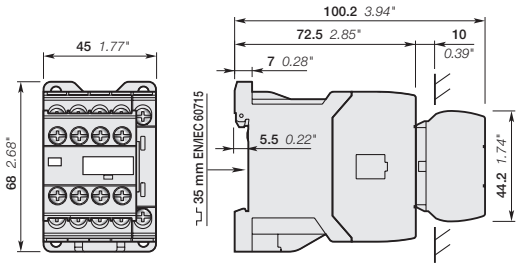
ASL09 ... ASL16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

- 1st stack with 3 main poles and 1 N.O. built-in auxiliary contact
- 2nd stack with permanently fixed 2 N.O. + 2 N.C. auxiliary contact block. The auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: low consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
- a comprehensive range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc (1) | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | Pkg (1 pce) |
| kW | A | hp | A | V DC | | | | kg |
| 4 | 22 | 5 | 20 | 24 | 3 2 | ASL09-30-32-81 | 1SBL103001R8132 | 0.320 |
| 5.5 | 24 | 7.5 | 20 | 24 | 3 2 | ASL12-30-32-81 | 1SBL113001R8132 | 0.320 |
| 7.5 | 24 | 10 | 20 | 24 | 3 2 | ASL16-30-32-81 | 1SBL123001R8132 | 0.320 |

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.



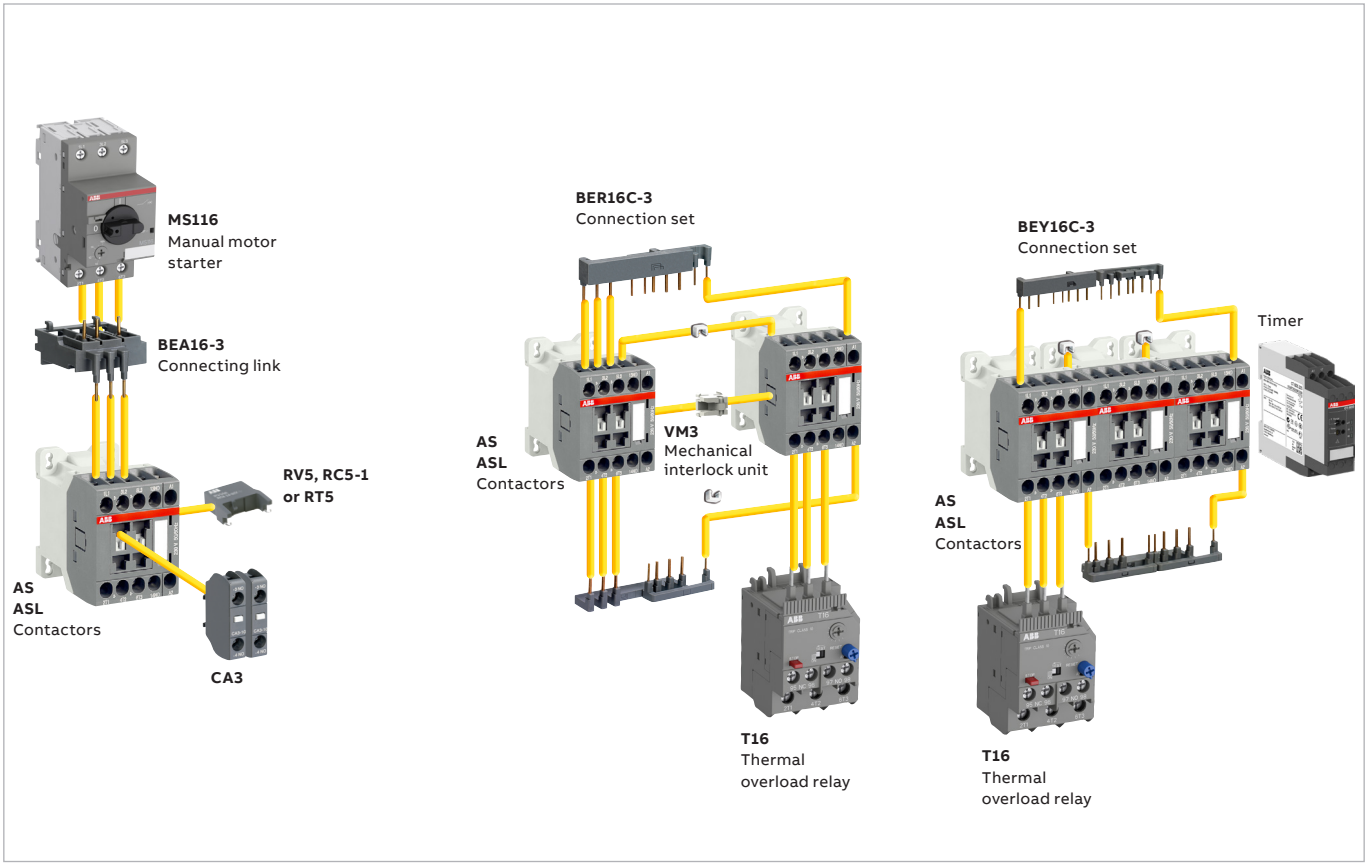

ASL09, ASL12, ASL16

Main dimensions mm, inches

# AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors

## Main accessories

### Contactor and main accessories (other accessories available)




### Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories | | | | Side-mounted accessories | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Auxiliary contact blocks | | Mechanical interlock unit (between 2 contactors) | | | | |
| | | | 1-pole CA3 | | VM3 | | Surge suppressors | | |
| AS09 ... AS16 | 3 0<br>3 0 | 1 0<br>0 1 | 2 max. | + | 1 | + | RV5 | or | RC5-1 |
| AS09 ... AS16 | 3 0 | 3 2 | – | | 1 | + | RV5 | or | RC5-1 |
| ASL09 ... ASL16 | 3 0<br>3 0 | 1 0<br>0 1 | 2 max. | + | 1 | + | RV5 | or | RT5 |
| ASL09 ... ASL16 | 3 0 | 3 2 | – | | 1 | + | RV5 | or | RT5 |

### Overload relays fitting details (1)

| Contactor types | Thermal overload relays |
|---|---|
| AS09 ... AS16<br>ASL09 ... ASL16 | T16 (0.10...16 A) |

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.
(1) Direct mounting - No kit required.

# AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors

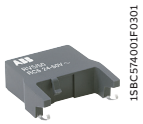
## Main accessories



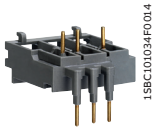

CA3-10



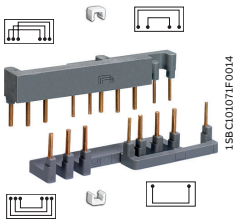

VM3



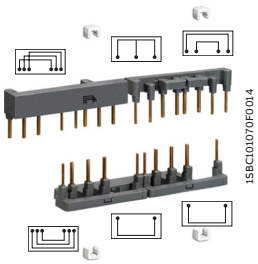

RV5




BEA16-3




BER16C-3




BEY16C-3

### Front-mounted instantaneous auxiliary contact blocks

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| AS09 ... AS16 | 1 0 | CA3-10 | 1SBN011010T1010 | 10 | 0.011 |
| ASL09 ... ASL16 | 0 1 | CA3-01 | 1SBN011010T1001 | 10 | 0.011 |

### Mechanical interlock unit

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| AS09 ... AS16, ASL09 ... ASL16 | VM3 | 1SBN031005T1000 | 10 | 0.002 |

### Surge suppressors

| For contactors | Rated control circuit voltage - Uc V | AC | DC | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|---|---|
| AS09 ... AS16, ASL09 ... ASL16 | 24...50 | ● | ● | RV5/50 | 1SBN050010R1000 | 2 | 0.015 |
| | 50...133 | ● | ● | RV5/133 | 1SBN050010R1001 | 2 | 0.015 |
| | 110...250 | ● | ● | RV5/250 | 1SBN050010R1002 | 2 | 0.015 |
| | 250...440 | ● | ● | RV5/440 | 1SBN050010R1003 | 2 | 0.015 |
| AS09 ... AS16 | 24...50 | ● | – | RC5-1/50 | 1SBN050100R1000 | 2 | 0.012 |
| | 50...133 | ● | – | RC5-1/133 | 1SBN050100R1001 | 2 | 0.012 |
| | 110...250 | ● | – | RC5-1/250 | 1SBN050100R1002 | 2 | 0.012 |
| | 250...440 | ● | – | RC5-1/440 | 1SBN050100R1003 | 2 | 0.012 |
| ASL09 ... ASL16 | 12...32 | – | ● | RT5/32 | 1SBN050020R1000 | 2 | 0.015 |
| | 25...65 | – | ● | RT5/65 | 1SBN050020R1001 | 2 | 0.015 |
| | 50...90 | – | ● | RT5/90 | 1SBN050020R1002 | 2 | 0.015 |
| | 77...150 | – | ● | RT5/150 | 1SBN050020R1003 | 2 | 0.015 |
| | 150...264 | – | ● | RT5/264 | 1SBN050020R1004 | 2 | 0.015 |

### Connecting links with manual motor starters

| For contactors | Manual motor starter | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| AS09 ... AS16<br>ASL09 ... ASL16 | MS116-0.16 ... MS116-16<br>MS132-0.16 ... MS132-16 | BEA16-3 | 1SBN081006T1000 | 10 | 0.019 |

### Connection sets for reversing contactors

| For contactors | Mechanical interlock unit | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| AS09 ... AS16, ASL09 ... ASL16 | with or without VM3 | BER16C-3 | 1SBN081012R1000 | 1 | 0.035 |

Note: BER16C-3 connection set includes two BB3 fixing clips, and an electrical interlocking when fitted on contactors with built-in N.C. auxiliary contacts. BER16C-3 can be used with or without VM3 mechanical interlock unit.

### Connection sets for star-delta starting

| For contactors | Mech. interlock unit between Star & Delta contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| AS09 ... AS12, ASL09 ... ASL12 | with or without VM3 | BEY16C-3 | 1SBN081018R2000 | 1 | 0.041 |

Note: BEY16C-3 connection set includes two BB3 fixing clips, and an electrical interlocking when fitted on Star and Delta contactors with built-in N.C. auxiliary contacts. BEY16C-3 can be used with or without VM3 mechanical interlock unit.

# AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors

## Technical data



### Main pole - Utilization characteristics according to IEC

| Contactor types | AC operated | **AS09** | **AS12** | **AS16** |
|---|---|---|---|---|
| | DC operated | **ASL09** | **ASL12** | **ASL16** |
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1 | | |
| Rated operational voltage Ue max. | | 690 V | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | |
| Conventional free-air thermal current Ith | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 22 A | 25 A | 25 A |
| With conductor cross-sectional area | | 2.5 mm² | 4 mm² | 4 mm² |
| AC-1 Utilization category | | | | |
| For air temperature close to contactor | | | | |
| Ie / Rated operational current AC-1 | θ ≤ 40 °C | 22 A | 24 A | 24 A |
| Ue max. ≤ 690 V, 50/60 Hz | θ ≤ 60 °C | 18 A | 20 A | 20 A |
| | θ ≤ 70 °C | 15 A | 16 A | 16 A |
| With conductor cross-sectional area | | 2.5 mm² | | |
| AC-3 Utilization category | | | | |
| For air temperature close to contactor θ ≤ 60 °C | | | | |
| Ie / Max. rated operational current AC-3 (1) | | | | |
| | 220-230-240 V | 9 A | 12 A | 15.7 A |
| M 3~ 3-phase motors | 400 V | 9 A | 12 A | 15.5 A |
| | 415 V | 9 A | 12 A | 15.5 A |
| | 440 V | 8 A | 11 A | 13.6 A |
| | 500 V | 8 A | 11 A | 12.5 A |
| | 690 V | 5 A | 7 A | 9 A |
| Rated operational power AC-3 (1) | | | | |
| | 220-230-240 V | 2.2 kW | 3 kW | 4 kW |
| M 3~ 1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors | 400 V | 4 kW | 5.5 kW | 7.5 kW |
| | 415 V | 4 kW | 5.5 kW | 7.5 kW |
| | 440 V | 4 kW | 5.5 kW | 7.5 kW |
| | 500 V | 4 kW | 5.5 kW | 7.5 kW |
| | 690 V | 4 kW | 5.5 kW | 7.5 kW |
| Rated making capacity AC-3 | | 10 x Ie AC-3 acc. to IEC 60947-4-1 | | |
| Rated breaking capacity AC-3 | | 8 x Ie AC-3 acc. to IEC 60947-4-1 | | |
| AC-8a Utilization category | | | | |
| (without thermal overload relay - Ue 400 V 50/60 Hz - θ ≤ 40 °C) | | | | |
| Ie / Rated operational current AC-8a | | 12 A | 16 A | 22 A |
| Rated operational power AC-8a | | 5.5 kW | 7.5 kW | 11 kW |
| Short-circuit protection device for contactors | | | | |
| without thermal overload relay - Motor protection excluded (2) | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 25 A | | |
| Rated short-time withstand current Icw | 1 s | 230 A | 250 A | 250 A |
| at 40 °C ambient temperature, | 10 s | 100 A | 124 A | 124 A |
| in free air from a cold state | 30 s | 65 A | 75 A | 75 A |
| | 1 min | 50 A | 55 A | 55 A |
| | 15 min | 22 A | 24 A | 24 A |
| Maximum breaking capacity | | | | |
| cos φ = 0.45 | at 440 V | 155 A | | |
| | at 690 V | 90 A | | |
| Power dissipation per pole | Ie / AC-1 | 1 W | 1.2 W | 1.2 W |
| | Ie / AC-3 | 0.16 W | 0.3 W | 0.5 W |
| Max. electrical switching frequency | AC-1 | 600 cycles/h | | |
| | AC-3 | 1200 cycles/h | | |
| | AC-4 | 300 cycles/h | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

# AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors

Technical data



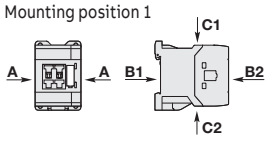
## Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC operated | AS09 | AS12 | AS16 |
|---|---|---|---|---|
| | DC operated | ASL09 | ASL12 | ASL16 |
| Standards | | UL 508, CSA C22.2 No. 14 | | |
| Max. operational voltage | | 690 V | | |
| NEMA size | | 00 | 00 | 0 |
| NEMA continuous amp rating | Thermal current | 9 A | 9 A | 18 A |
| NEMA maximum horse power ratings 1-phase, 60 Hz | 115 V AC | 1/3 hp | 1/3 hp | 1 hp |
| | 230 V AC | 1 hp | 1 hp | 2 hp |
| NEMA maximum horse power ratings 3-phase, 60 Hz | 200 V AC | 1 1/2 hp | 1 1/2 hp | 3 hp |
| | 230 V AC | 1 1/2 hp | 1 1/2 hp | 3 hp |
| | 460 V AC | 2 hp | 2 hp | 5 hp |
| | 575 V AC | 2 hp | 2 hp | 5 hp |
| UL / CSA general use rating | | | | |
| 600 V AC | | 20 A | 20 A | 20 A |
| With conductor cross-sectional area | | AWG 12 | AWG 12 | AWG 12 |
| UL / CSA maximum 1-phase motor rating | | | | |
| Full load current | 120 V AC | 7.2 A | 9.8 A | 13.8 A |
| | 240 V AC | 8 A | 10 A | 12 A |
| Horse power rating | 120 V AC | 1/3 hp | 1/2 hp | 3/4 hp |
| | 240 V AC | 1 hp | 1-1/2 hp | 2 hp |
| UL / CSA maximum 3-phase motor rating | | | | |
| Full load current (1) | 200-208 V AC | 7.8 A | 7.8 A | 11 A |
| | 220-240 V AC | 6.8 A | 9.6 A | 15.2 A |
| | 440-480 V AC | 7.6 A | 11 A | 14 A |
| | 550-600 V AC | 9 A | 11 A | 11 A |
| Horse power rating (1) | 200-208 V AC | 2 hp | 2 hp | 3 hp |
| | 220-240 V AC | 2 hp | 3 hp | 5 hp |
| | 440-480 V AC | 5 hp | 7-1/2 hp | 10 hp |
| | 550-600 V AC | 7-1/2 hp | 10 hp | 10 hp |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded | | | | |
| Fuse rating | | 40 A | 50 A | 60 A |
| Fuse type, 600 V | | J | | |
| Max. electrical switching frequency | | | | |
| For general use | | 600 cycles/h | | |
| For motor use | | 1200 cycles/h | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

## General technical data

| Contactor types | | AC operated | AS09 | AS12 | AS16 |
|---|---|---|---|---|---|
| | | DC operated | ASL09 | ASL12 | ASL16 |
| Rated insulation voltage Ui | | | | | |
| acc. to IEC 60947-4-1 | | | 690 V | | |
| acc. to UL / CSA | | | 600 V | | |
| Rated impulse withstand voltage Uimp. | | | 6 kV | | |
| Pollution degree | | | 3 | | |
| Ambient air temperature close to contactor | | | | | |
| Operation | Fitted with thermal overload relay | | -25...+60 °C | | |
| | Without thermal overload relay | | -40...+70 °C | | |
| Storage | | | -60...+80 °C | | |
| Climatic withstand | | | Category B according to IEC 60947-1 Annex Q | | |
| Maximum operating altitude (without derating) | | | 3000 m | | |
| Mechanical durability | | | | | |
| Number of operating cycles | | | 10 millions operating cycles | | |
| Max. switching frequency | | | 3600 cycles/h | | |
| Shock withstand | | | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | |
| acc. to IEC/EN 60068-2-27 | | Shock direction | AS contactors - AC operated | ASL contactors - DC operated | |
| Mounting position 1 | | A | 20 g | 20 g closed position / 10 g open position | |
| | | B1 | 10 g closed position / 5 g open position | 15 g closed position / 5 g open position | |
| | | B2 | 15 g | 10 g | |
| | | C1 | 20 g closed position / 9 g open position | 15 g closed position / 8 g open position | |
| | | C2 | 20 g closed position / 14 g open position | 14 g closed position / 8 g open position | |
| Vibration withstand acc. to IEC 60068-2-6 | | | 5...300 Hz / 3 g closed position / 2 g open position | | |



# AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors

## Technical data



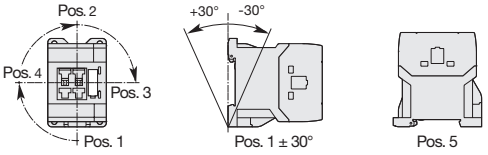
### Magnet system characteristics for AS09 ... AS16 contactors

| Contactor types | | | AC operated | AS09 | AS12 | AS16 |
|---|---|---|---|---|---|---|
| Coil operating limits | | | AC supply | | | |
| acc. to IEC 60947-4-1 | | | | 0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C) | | |
| AC control voltage | Rated control circuit voltage Uc | | at 50 Hz | 24...415 V | | |
| | | | at 60 Hz | 24...415 V | | |
| | Coil consumption | Average pull-in value | 50 Hz | 33 VA | | |
| | | | 60 Hz | 33 VA | | |
| | | | 50/60 Hz | 33 VA | | |
| | | Average holding value | 50 Hz | 6.5 VA / 1.5 W | | |
| | | | 60 Hz | 5 VA / 1.2 W | | |
| | | | 50/60 Hz | 6.5 VA / 1.5 W | | |
| Drop-out voltage | | | | Approx. 30...50 % of Uc | | |
| Operating time | | | | | | |
| Between coil energization and: | | N.O. contact closing | | 9...24 ms | | |
| | | N.C. contact opening | | 6...18 ms | | |
| Between coil de-energization and: | | N.O. contact opening (1) | | 5...19 ms | | |
| | | N.C. contact closing (1) | | 7...22 ms | | |
| | | | | (1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3 | | |

### Magnet system characteristics for ASL09 ... ASL16 contactors

| Contactor types | | | DC operated | ASL09 | ASL12 | ASL16 |
|---|---|---|---|---|---|---|
| Coil operating limits | | | DC supply | | | |
| acc. to IEC 60947-4-1 | | | | 0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C) | | |
| DC control voltage | Rated control circuit voltage Uc | | | 12...240 V DC | | |
| | Coil consumption | Average pull-in value | | 3 W | | |
| | | Average holding value | | 3 W | | |
| Drop-out voltage | | | | Approx. 10...40 % of Uc | | |
| Coil time constant | Open | L/R | | 12 ms | | |
| | Closed | L/R | | 40 ms | | |
| Operating time | | | | | | |
| Between coil energization and: | | N.O. contact closing | | 36...59 ms | | |
| | | N.C. contact opening | | 31...53 ms | | |
| Between coil de-energization and: | | N.O. contact opening (1) | | 13...17 ms | | |
| | | N.C. contact closing (1) | | 15...20 ms | | |
| | | | | (1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2 | | |

### Mounting characteristics and conditions for use

| Contactor types | | AC operated | AS09 | AS12 | AS16 |
|---|---|---|---|---|---|
| | | DC operated | ASL09 | ASL12 | ASL16 |
| Mounting positions | | |  | | |
| Mounting distances | | | The contactors can be assembled side by side. | | |
| Fixing | On rail according to IEC/EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | | |
| | By screws (not supplied) | | 2 x M4 screws placed diagonally | | |

# AS09 ... AS16 and
# ASL09 ... ASL16 3-pole contactors
## Technical data

### Connecting characteristics

| Contactor types | AC operated | AS09 | AS12 | AS16 |
|---|---|---|---|---|
| | DC operated | ASL09 | ASL12 | ASL16 |
| Main terminals | |  Screw terminals with cable clamp | | |
| Connection capacity (min. ... max.) | | | | |
| Main conductors (poles) | | | | |
| Rigid Solid/Stranded | 1 x | 0.75...4 mm² | | |
| | 2 x | 0.75...4 mm² | | |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² | | |
| | 2 x | 0.75...2.5 mm² | | |
| Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² | | |
| | 2 x | 0.75...1.5 mm² | | |
| Bars or lugs | L ≤ | 7.7 mm | | |
| | I > | 3.2 mm | | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...12 | | |
| Stripping length | | 9 mm | | |
| Tightening torque Recommended | | 1.00 Nm / 9 lb.in | | |
| Max. | | 1.20 Nm | | |
| Auxiliary conductors (built-in auxiliary terminals + coil terminals) | | | | |
| Rigid Solid/Stranded | 1 x | 0.75...2.5 mm² | | |
| | 2 x | 0.75...2.5 mm² | | |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² | | |
| | 2 x | 0.75...2.5 mm² | | |
| Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² | | |
| | 2 x | 0.75...1.5 mm² | | |
| Lugs | L ≤ | 7.7 mm | | |
| | I > | 3.2 mm | | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 | | |
| Stripping length | | | | |
| Tightening torque | | | | |
| Coil terminals Recommended | | 1.00 Nm / 9 lb.in | | |
| Max. | | 1.20 Nm | | |
| Built-in auxiliary terminals Recommended | | 1.00 Nm / 9 lb.in | | |
| Max. | | 1.20 Nm | | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | |
| All terminals | | IP20 | | |
| Screw terminals | | Delivered in open position, screws of unused terminals must be tightened | | |
| All terminals | | M3 | | |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 | | |

# AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors

## Technical data



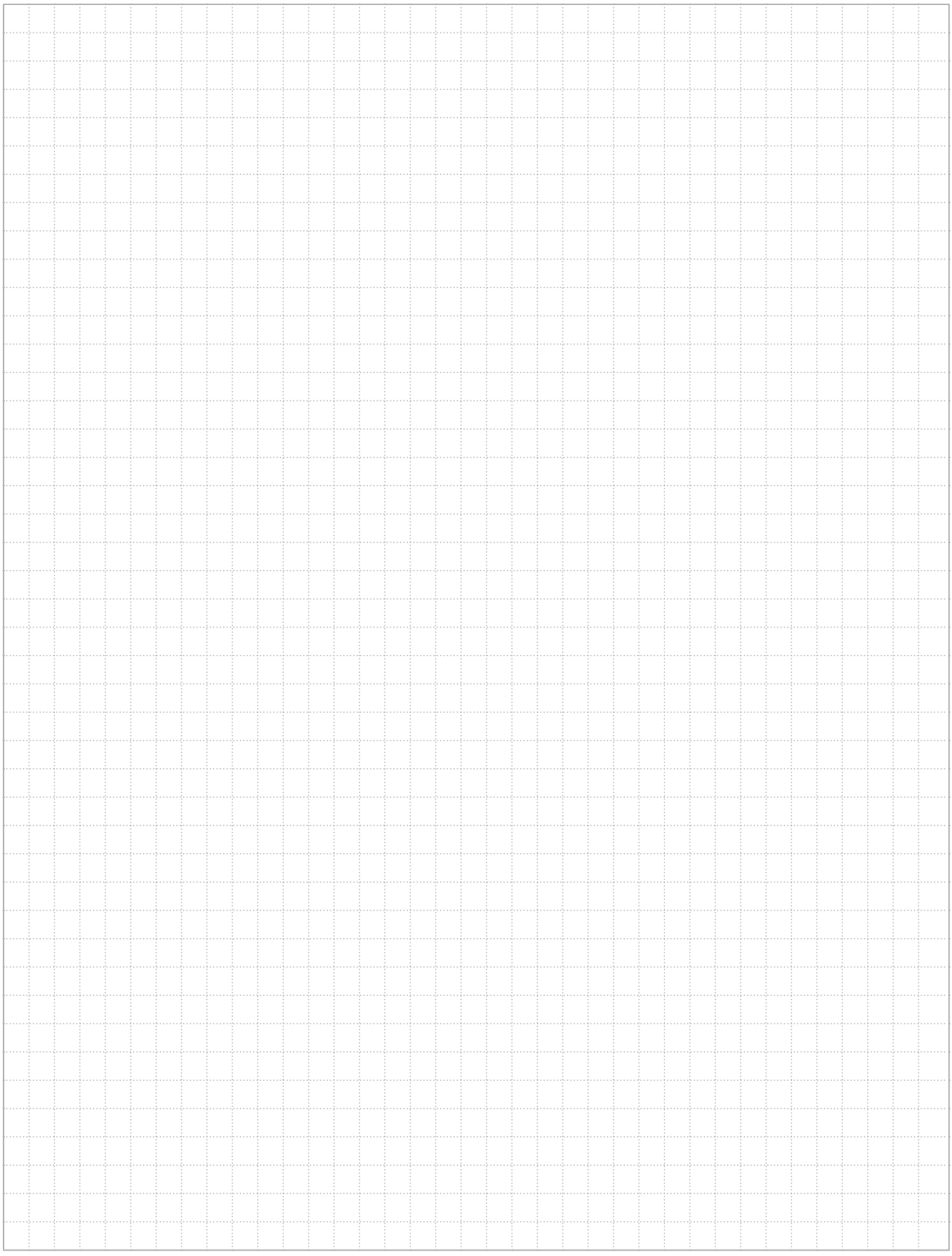
### Built-in auxiliary contacts according to IEC

| Contactor types | AC operated | **AS09** | **AS12** | **AS16** |
|---|---|---|---|---|
| | DC operated | **ASL09** | **ASL12** | **ASL16** |
| Rated operational voltage Ue max. | | 690 V | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | |
| Conventional free-air thermal current Ith - θ ≤ 40 °C | | 10 A | | |
| Ie / Rated operational current AC-15 | | | | |
| acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A | | |
| | 220-240 V 50/60 Hz | 4 A | | |
| | 400-440 V 50/60 Hz | 3 A | | |
| | 500 V 50/60 Hz | 2 A | | |
| | 690 V 50/60 Hz | 2 A | | |
| Making capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | | |
| Breaking capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | | |
| Ie / Rated operational current DC-13 | | | | |
| acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W | | |
| | 48 V DC | 2.8 A / 134 W | | |
| | 72 V DC | 1 A / 72 W | | |
| | 110 V DC | 0.55 A / 60 W | | |
| | 125 V DC | 0.55 A / 69 W | | |
| | 220 V DC | 0.27 A / 60 W | | |
| | 250 V DC | 0.27 A / 68 W | | |
| Short-circuit protection device gG type fuse | | 10 A | | |
| Rated short-time withstand current Icw | for 1.0 s | 100 A | | |
| | for 0.1 s | 140 A | | |
| Minimum switching capacity | | 12 V / 3 mA | | |
| with failure rate acc. to IEC 60947-5-4 | | $10^{-7}$ | | |
| Non-overlapping time between N.O. and N.C. contacts | | 1.5 ms | | |
| Power dissipation per pole at 6 A | | 0.1 W | | |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h | | |
| | DC-13 | 900 cycles/h | | |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA3 aux. contact blocks) are mechanically linked contacts. | | |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA3 aux. contact blocks) are mirror contacts. | | |

### Built-in auxiliary contacts according to UL / CSA

| Contactor types | AC operated | **AS09** | **AS12** | **AS16** |
|---|---|---|---|---|
| | DC operated | **ASL09** | **ASL12** | **ASL16** |
| Max. operational voltage | | 600 V AC, 250 V DC | | |
| Pilot duty | | A600, Q300 | | |
| AC thermal rated current | | 10 A | | |
| AC maximum volt-ampere making | | 7200 VA | | |
| AC maximum volt-ampere breaking | | 720 VA | | |
| DC thermal rated current | | 2.5 A | | |
| DC maximum volt-ampere making-breaking | | 69 VA | | |

# Notes

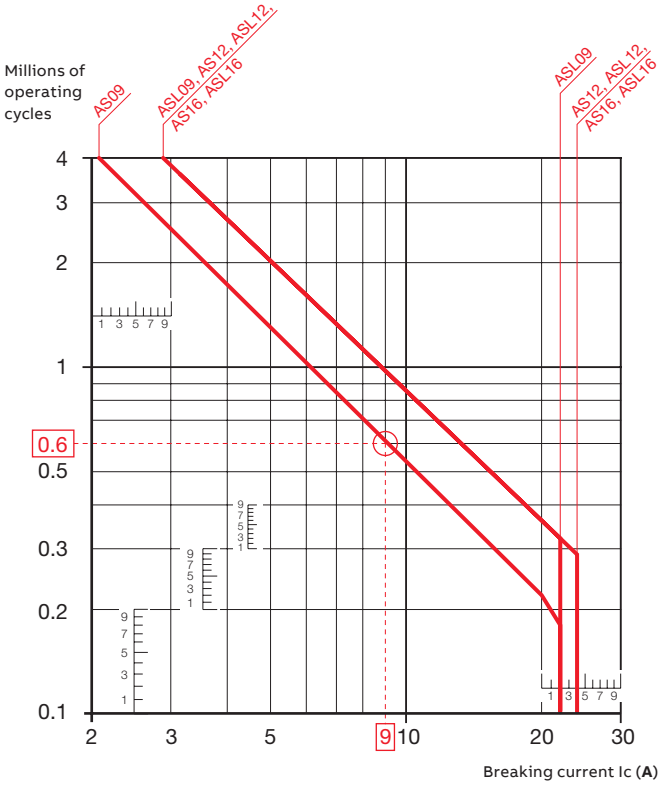


# AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors

## Electrical durability

**Electrical durability for AC-1 utilization category - Ue ≤ 690 V**
**Note: AC-1 maximum current is selected according to ambient temperature. Please see technical data.**

Switching non-inductive or slightly inductive loads. The breaking current Ic for AC-1 is equal to the rated operational current of the load. Maximum electrical switching frequency: 600 cycles / hour.



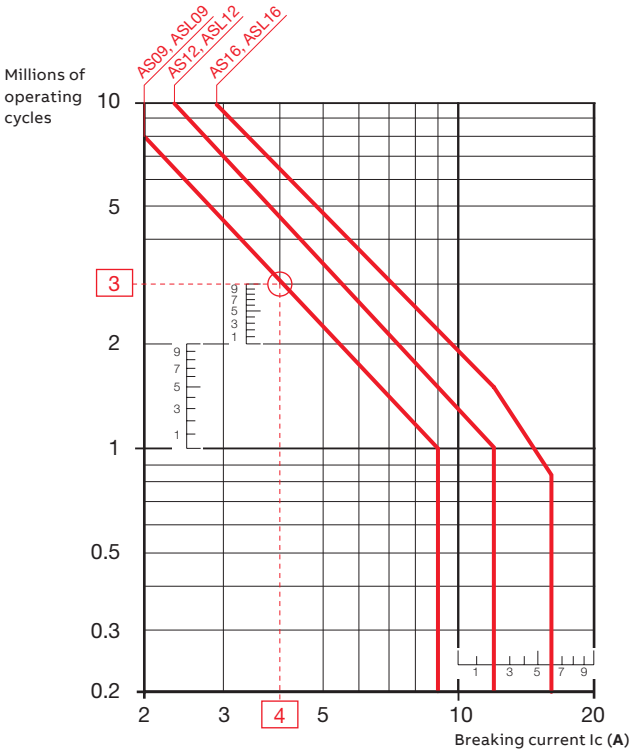

Example:
Breaking current = 9 A.
On the opposite curve at intersection "○" 9 A the corresponding value for the electrical durability is approximately 0.6 millions operating cycles.

# AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors

## Electrical durability

**Electrical durability for AC-3 utilization category - Ue ≤ 440 V - Ambient temperature ≤ 60 °C**

Switching cage motors: starting and switching off running motors. The breaking current Ic for AC-3 is equal to the rated operational current Ie (Ie = motor full load current). Maximum electrical switching frequency: 1200 cycles / hour.



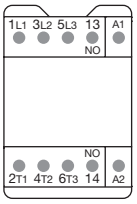

Example:
Breaking current = 4 A.
On the opposite curve at intersection "○" 4 A the corresponding value for the electrical durability is approximately 3 millions operating cycles.

# AS09 ... AS16 3-pole contactors
## Terminal marking and positioning

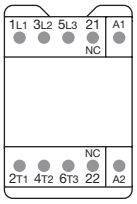


### AS contactors - AC operated

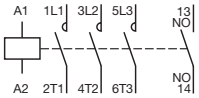
Standard devices without addition of auxiliary contacts



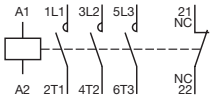

AS09 ... AS16-30-10



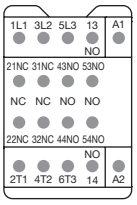

AS09 ... AS16-30-01



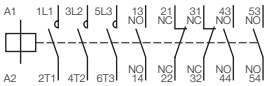

AS09 ... AS16-30-10




AS09 ... AS16-30-01

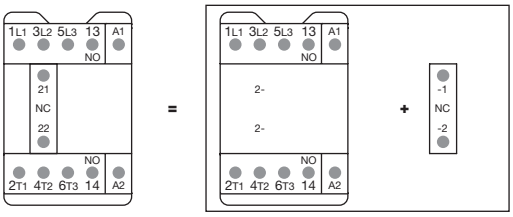



AS09 ... AS16-30-32

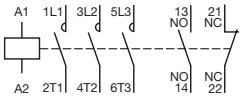



AS09 ... AS16-30-32

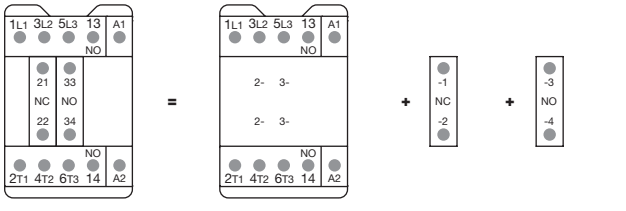
Other possible contact combinations with auxiliary contact blocks added by the user



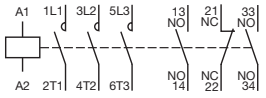

Combination 11 = AS09 ... AS16-30-10 + CA3-01




Combination 11

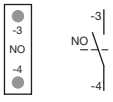



Combination 21 = AS09 ... AS16-30-10 + CA3-01 + CA3-10

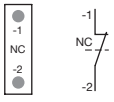



Combination 21

CA3 1-pole auxiliary contact blocks




CA3-10



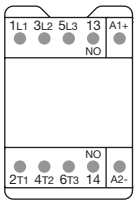

CA3-01

# ASL09 ... ASL16 3-pole contactors

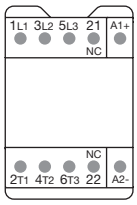
## Terminal marking and positioning

### ASL contactors - DC operated (the polarity A1+, A2- must be respected)

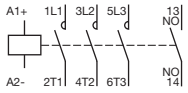
Standard devices without addition of auxiliary contacts



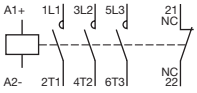

ASL09 ... ASL16-30-10



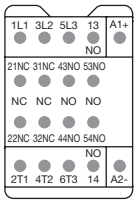

ASL09 ... ASL16-30-01



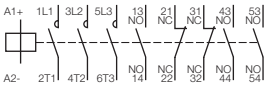

ASL09 ... ASL16-30-10




ASL09 ... ASL16-30-01

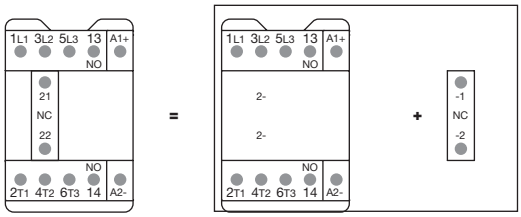



ASL09 ... ASL16-30-32

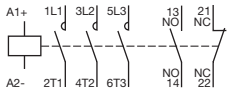



ASL09 ... ASL16-30-32

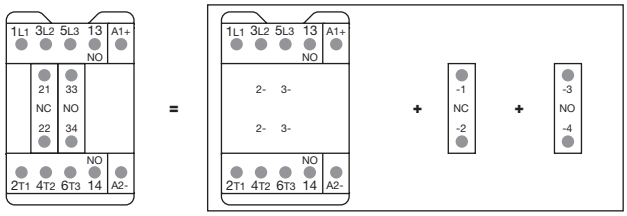
Other possible contact combinations with auxiliary contact blocks added by the user



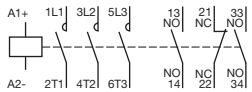

Combination 11 = ASL09 ... ASL16-30-10 + CA3-01




Combination 11

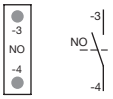



Combination 21 = ASL09 ... ASL16-30-10 + CA3-01 + CA3-10

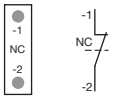



Combination 21

CA3 1-pole auxiliary contact blocks

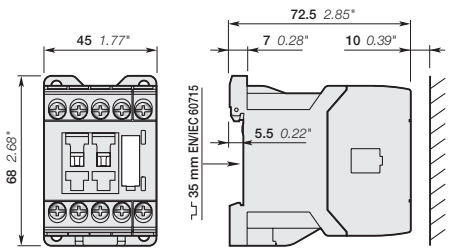



CA3-10

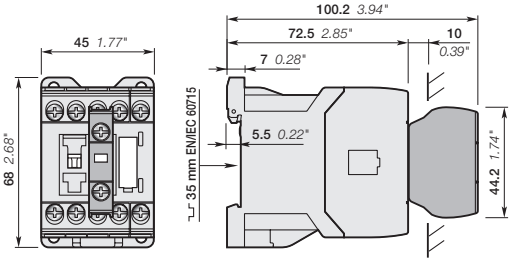



CA3-01

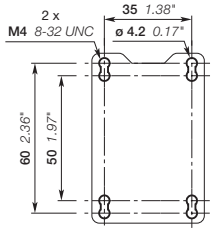
# AS09 ... AS16 3-pole contactors
## Dimensions

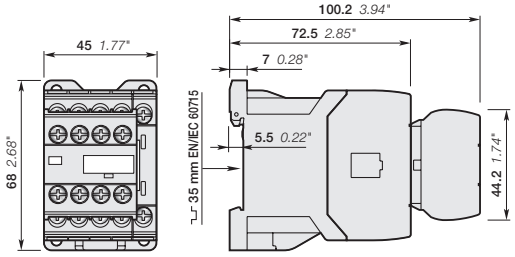



AS09, AS12, AS16




AS09, AS12, AS16
+ CA3 front-mounted 1-pole auxiliary contact block

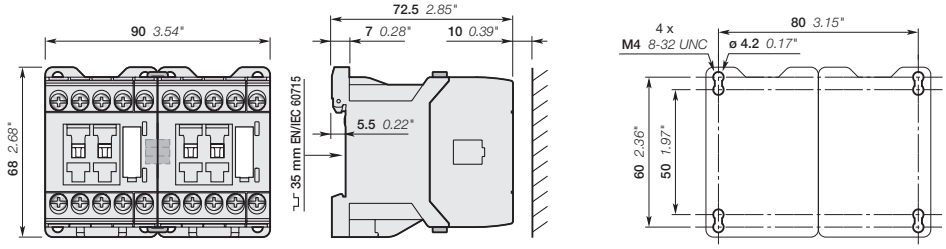


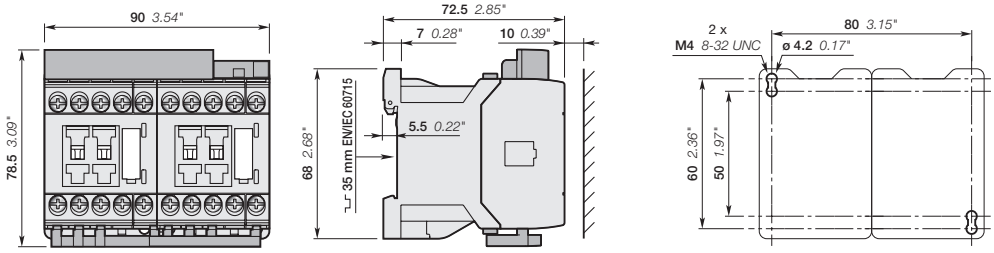

AS09 ... 16-30-32

Main dimensions mm, inches

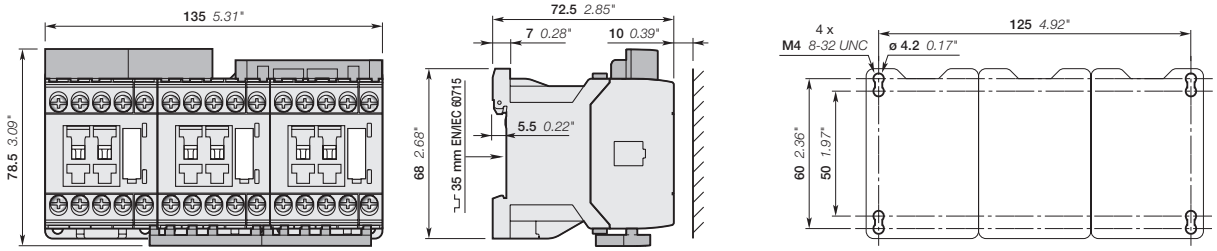
# AS09 ... AS16 3-pole contactors
## Dimensions




AS09, AS12, AS16
+ VM3 mechanical interlock unit including two BB3 fixing clips



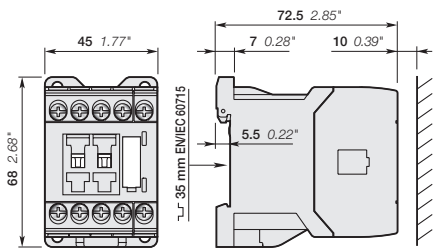

AS09, AS12, AS16
+ BER16C-3 connection set for reversing starter including two BB3 fixing clips



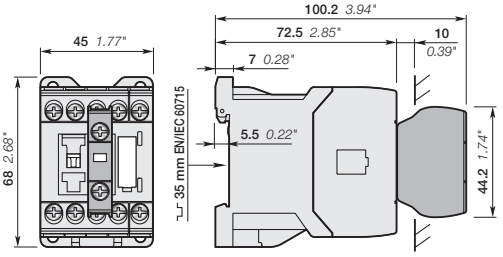

AS09, AS12, AS16
+ BEY16C-3 connection set for star-delta starter including four BB3 fixing clips

Main dimensions mm, inches

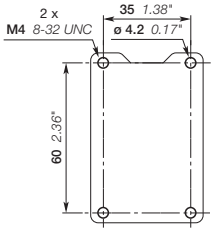
# ASL09 ... ASL16 3-pole contactors
## Dimensions

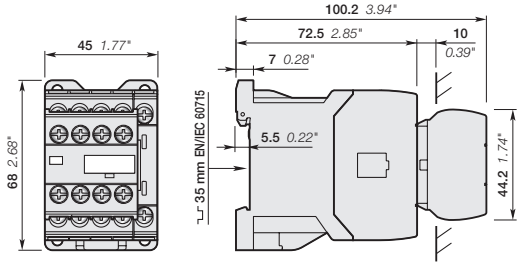



ASL09, ASL12, ASL16




ASL09, ASL12, ASL16
+ CA3 front-mounted 1-pole auxiliary contact block

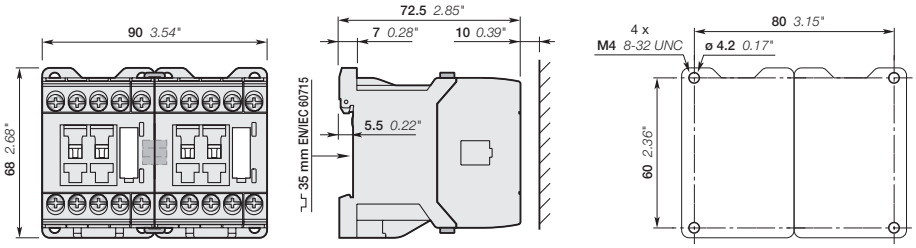


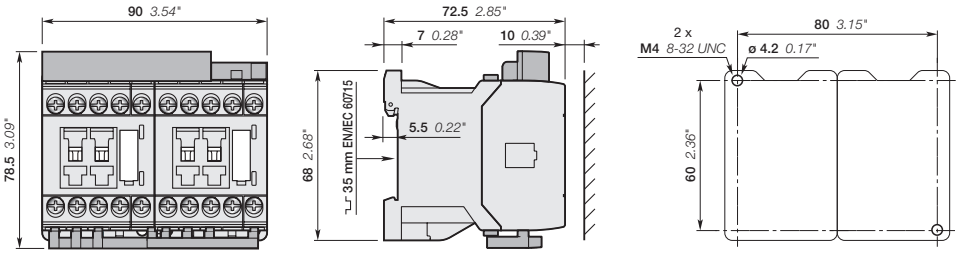

ASL09 ... 16-30-32

Main dimensions mm, inches

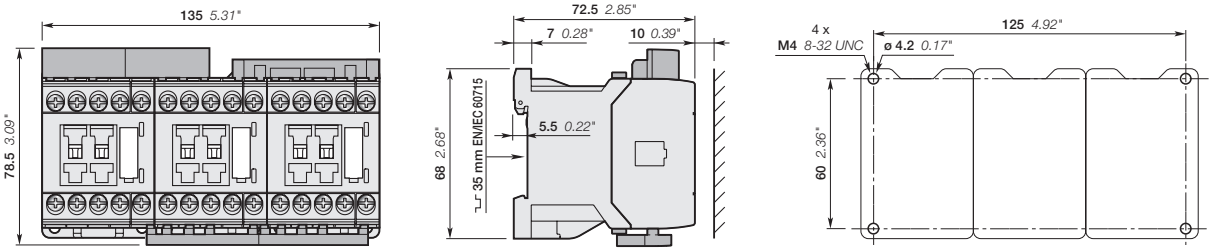
# ASL09 ... ASL16 3-pole contactors
## Dimensions




ASL09, ASL12, ASL16
+ VM3 mechanical interlock unit including two BB3 fixing clips




ASL09, ASL12, ASL16
+ BER16C-3 connection set for reversing starter including two BB3 fixing clips



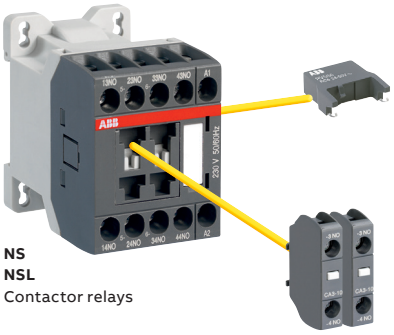

ASL09, ASL12, ASL16
+ BEY16C-3 connection set for star-delta starter including four BB3 fixing clips

# Contactor relays
## Main accessories



**NS, NSL**
Contactor relays

## 4-pole contactor relays



**RV5, RT5 or RC5-1**
Surge suppressor

**CA-3**
1-pole auxiliary contact block

**NS**
**NSL**
Contactor relays

## 8-pole contactor relays



**RV5, RT5 or RC5-1**
Surge suppressor

**NS**
**NSL**
Contactor relays

# Contactor relays


NS


NSL

## Screw terminals

| | | | | |
|---|---|---|---|---|
| AC control voltage | **NS22E** | **NS31E** | **NS40E** |
| DC control voltage | **NSL22E** | **NSL31E** | **NSL40E** |
| | 2 N.O. + 2 N.C. | 3 N.O. + 1 N.C. | 4 N.O. |


NS


NSL

| | | | | | | |
|---|---|---|---|---|---|---|
| AC control voltage | **NS44E** | **NS53E** | **NS62E** | **NS71E** | **NS80E** |
| DC control voltage | **NSL44E** | **NSL53E** | **NSL62E** | **NSL71E** | **NSL80E** |
| | 4 N.O. + 4 N.C. | 5 N.O. + 3 N.C. | 6 N.O. + 2 N.C. | 7 N.O. + 1 N.C. | 8 N.O. |

## Control circuit switching

| | | | |
|---|---|---|---|
| IEC | Rated operational current AC-15 | 240 V | 4 A |
| | | 400 V | 3 A |
| | | 690 V | 2 A |
| | DC-13 | 24 V | 6 A / 144 W |
| | | 250 V | 0.27 A / 68 W |
| UL / CSA | Pilot Duty | | A600, Q300 |

## Main accessories

| | | | |
|---|---|---|---|
| Auxiliary contact blocks | Front mounting  | 1-pole CA3-10 or CA3-01 | |
| Surge suppressors | Side-mounted (without additional width)  | RV5 | (Varistor) AC / DC |
| | | RC5-1 | (Capacitor) AC |
| | | RT5 | (Transil diode) DC |

# NS contactor relays
## AC operated

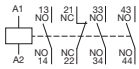
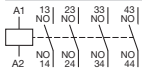
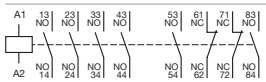
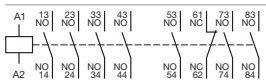
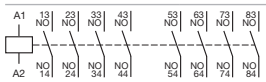



NS22E

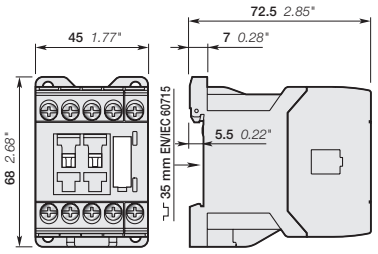
NS contactor relays are used for switching auxiliary and control circuits.

These contactor relays are designed with:

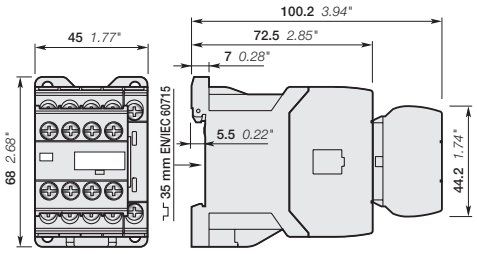
- 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC operated
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

| Number of contacts | | Rated control circuit voltage Uc (1) | | Type | Order code | Weight Pkg (1 pce) |
|---|---|---|---|---|---|---|
| 1st stack | 2nd stack | V 50 Hz | V 60 Hz | | | kg |
|  | | 24 | 24 | NS22E-20 | 1SBH101001R2022 | 0.220 |
| | | 220 | 220 | NS22E-25 Relay | 1SBH101001R2522 | 0.220 |
| | | 230 | 230 | NS22E-26 | 1SBH101001R2622 | 0.220 |
|  | | 24 | 24 | NS31E-20 | 1SBH101001R2031 | 0.220 |
| | | 220 | 220 | NS31E-25 Relay | 1SBH101001R2531 | 0.220 |
| | | 230 | 230 | NS31E-26 | 1SBH101001R2631 | 0.220 |
|  | | 24 | 24 | NS40E-20 | 1SBH101001R2040 | 0.220 |
| | | 220 | 220 | NS40E-25 Relay | 1SBH101001R2540 | 0.220 |
| | | 230 | 230 | NS40E-26 | 1SBH101001R2640 | 0.220 |
|  | | 24 | 24 | NS44E-20 | 1SBH101001R2044 | 0.260 |
| | | 220 | 220 | NS44E-25 Relay | 1SBH101001R2544 | 0.260 |
| | | 230 | 230 | NS44E-26 | 1SBH101001R2644 | 0.260 |
|  | | 24 | 24 | NS53E-20 | 1SBH101001R2053 | 0.260 |
| | | 220 | 220 | NS53E-25 Relay | 1SBH101001R2553 | 0.260 |
| | | 230 | 230 | NS53E-26 | 1SBH101001R2653 | 0.260 |
|  | | 24 | 24 | NS62E-20 | 1SBH101001R2062 | 0.260 |
| | | 220 | 220 | NS62E-25 Relay | 1SBH101001R2562 | 0.260 |
| | | 230 | 230 | NS62E-26 | 1SBH101001R2662 | 0.260 |
|  | | 24 | 24 | NS71E-20 | 1SBH101001R2071 | 0.260 |
| | | 220 | 220 | NS71E-25 Relay | 1SBH101001R2571 | 0.260 |
| | | 230 | 230 | NS71E-26 | 1SBH101001R2671 | 0.260 |
|  | | 24 | 24 | NS80E-20 | 1SBH101001R2080 | 0.260 |
| | | 220 | 220 | NS80E-25 Relay | 1SBH101001R2580 | 0.260 |
| | | 230 | 230 | NS80E-26 | 1SBH101001R2680 | 0.260 |

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.




NS22E, NS31E, NS40E




NS44E, NS53E, NS62E, NS71E, NS80E

Main dimensions mm, inches

# NSL contactor relays

## DC operated

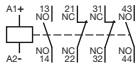
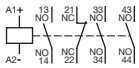



NSL22E

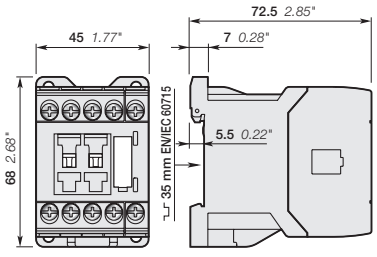
NSL contactor relays are used for switching auxiliary and control circuits.

These contactor relays are designed with:

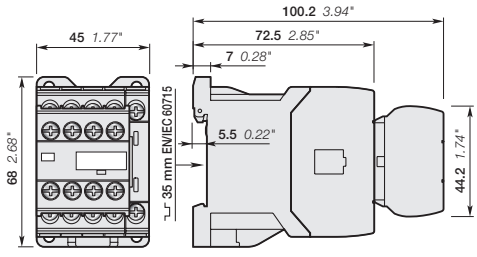
- 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: low coil consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

| Number of contacts | | Rated control circuit voltage Uc (1) V DC | Type | Order code | Weight Pkg (1 pce) kg |
|---|---|---|---|---|---|
| 1st stack | 2nd stack | | | | |
|  | | 24 | NSL22E-81 | 1SBH103001R8122 | 0.280 |
|  | | 24 | NSL31E-81 | 1SBH103001R8131 | 0.280 |
|  | | 24 | NSL40E-81 | 1SBH103001R8140 | 0.280 |
|  | | 24 | NSL44E-81 | 1SBH103001R8144 | 0.320 |
|  | | 24 | NSL53E-81 | 1SBH103001R8153 | 0.320 |
|  | | 24 | NSL62E-81 | 1SBH103001R8162 | 0.320 |
|  | | 24 | NSL71E-81 | 1SBH103001R8171 | 0.320 |
|  | | 24 | NSL80E-81 | 1SBH103001R8180 | 0.320 |

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.




NSL22E, NSL31E, NSL40E




NSL44E, NSL53E, NSL62E, NSL71E, NSL80E

Main dimensions mm, inches

# NS and NSL contactor relays
## Main accessories

### Contactor relays and main accessories (other accessories available)

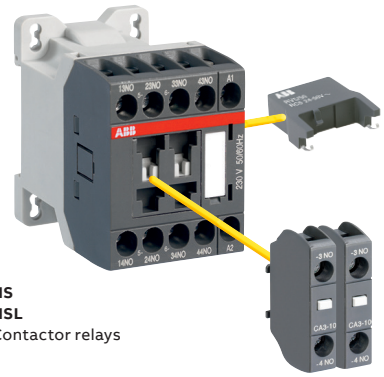
**8-pole contactor relay**



**RV5, RT5 or RC5-1**
Surge suppressor

**NS**
**NSL**
Contactor relays

**4-pole contactor relay**



**RV5, RT5 or RC5-1**
Surge suppressor

**NS**
**NSL**
Contactor relays

**CA-3**
1-pole auxiliary contact block

**CA3**

### Main accessory fitting details

| Contactor types | Main poles | | Front-mounted accessories Auxiliary contact blocks 1-pole CA3 | | Side-mounted accessories Surge suppressors | |
|---|---|---|---|---|---|---|
| NS.. | 2 2 | E | 2 max. | + | RV5 | or RC5-1 |
| NS.. | 3 1 | E | | | | |
| NS.. | 4 0 | E | | | | |
| NS.. | 4 4 | E | – | | RV5 | or RC5-1 |
| NS.. | 5 3 | E | | | | |
| NS.. | 6 2 | E | | | | |
| NS.. | 7 1 | E | | | | |
| NS.. | 8 0 | E | | | | |
| NSL.. | 2 2 | E | 2 max. | + | RV5 | or RT5 |
| NSL.. | 3 1 | E | | | | |
| NSL.. | 4 0 | E | | | | |
| NSL.. | 4 4 | E | – | | RV5 | or RT5 |
| NSL.. | 5 3 | E | | | | |
| NSL.. | 6 2 | E | | | | |
| NSL.. | 7 1 | E | | | | |
| NSL.. | 8 0 | E | | | | |

# NS and NSL contactor relays
## Main accessories



CA3-10

### Front-mounted instantaneous auxiliary contact blocks

| For contactor relays | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|
| | | | | | kg |
| NS, NSL | 1 0 | CA3-10 | 1SBN011010T1010 | 10 | 0.011 |
| | 0 1 | CA3-01 | 1SBN011010T1001 | 10 | 0.011 |



RV5

### Surge suppressors

| For contactor relays | Rated control circuit voltage - Uc | | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|
| | V | AC | DC | | | | kg |
| NS, NSL | 24...50 | ● | ● | RV5/50 | 1SBN050010R1000 | 2 | 0.015 |
| | 50...133 | ● | ● | RV5/133 | 1SBN050010R1001 | 2 | 0.015 |
| | 110...250 | ● | ● | RV5/250 | 1SBN050010R1002 | 2 | 0.015 |
| | 250...440 | ● | ● | RV5/440 | 1SBN050010R1003 | 2 | 0.015 |
| NS | 24...50 | ● | – | RC5-1/50 | 1SBN050100R1000 | 2 | 0.012 |
| | 50...133 | ● | – | RC5-1/133 | 1SBN050100R1001 | 2 | 0.012 |
| | 110...250 | ● | – | RC5-1/250 | 1SBN050100R1002 | 2 | 0.012 |
| | 250...440 | ● | – | RC5-1/440 | 1SBN050100R1003 | 2 | 0.012 |
| NSL | 12...32 | – | ● | RT5/32 | 1SBN050020R1000 | 2 | 0.015 |
| | 25...65 | – | ● | RT5/65 | 1SBN050020R1001 | 2 | 0.015 |
| | 50...90 | – | ● | RT5/90 | 1SBN050020R1002 | 2 | 0.015 |
| | 77...150 | – | ● | RT5/150 | 1SBN050020R1003 | 2 | 0.015 |
| | 150...264 | – | ● | RT5/264 | 1SBN050020R1004 | 2 | 0.015 |

# NS and NSL contactor relays
## Technical data



### Contact utilization characteristics according to IEC

| Contactor relay types | AC operated | **NS** |
|---|---|---|
| | DC operated | **NSL** |
| Standards | | IEC/EN 60947-5-1 |
| Rated operational voltage Ue max. | | 690 V |
| Rated frequency (without derating) | | 50 / 60 Hz |
| Conventional free-air thermal current Ith - θ ≤ 40 °C | | 10 A |
| Ie / Rated operational current AC-15 | | |
| acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A |
| | 220-240 V 50/60 Hz | 4 A |
| | 400-440 V 50/60 Hz | 3 A |
| | 500 V 50/60 Hz | 2 A |
| | 690 V 50/60 Hz | 2 A |
| Making capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 |
| Breaking capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 |
| Ie / Rated operational current DC-13 | | |
| acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W |
| | 48 V DC | 2.8 A / 134 W |
| | 72 V DC | 1 A / 72 W |
| | 110 V DC | 0.55 A / 60 W |
| | 125 V DC | 0.55 A / 69 W |
| | 220 V DC | 0.27 A / 60 W |
| | 250 V DC | 0.27 A / 68 W |
| Short-circuit protection device for contactors | | |
| Ue ≤ 500 V AC - gG type fuse | | 10 A |
| Rated short-time withstand current Icw | for 1.0 s | 100 A |
| | for 0.1 s | 140 A |
| Minimum switching capacity | | 12 V / 3 mA |
| with failure rate acc. to IEC 60947-5-4 | | $10^{-7}$ |
| Non-overlapping time between N.O. and N.C. contacts | | 1.5 ms |
| Power dissipation per pole at 6 A | | 0.1 W |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h |
| | DC-13 | 900 cycles/h |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA3 aux. contact blocks) are mechanically linked contacts. |

### Contact utilization characteristics according to UL / CSA

| Contactor relay types | AC operated | **NS** |
|---|---|---|
| | DC operated | **NSL** |
| Standards | | UL 508, CSA C22.2 No. 14 |
| Max. operational voltage | | 600 V AC, 250 V DC |
| Pilot duty | | A600, Q300 |
| AC thermal rated current | | 10 A |
| AC maximum volt-ampere making | | 7200 VA |
| AC maximum volt-ampere breaking | | 720 VA |
| DC thermal rated current | | 2.5 A |
| DC maximum volt-ampere making-breaking | | 69 VA |

# NS and NSL contactor relays
## Technical data



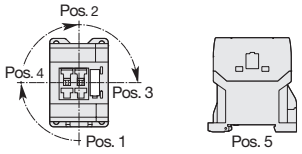
### Magnet system characteristics for NS contactor relays

| Contactor relay types | | | AC operated | **NS** |
|---|---|---|---|---|
| Coil operating limits | | | AC supply | |
| acc. to IEC 60947-5-1 | | | | 0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C) |
| AC control voltage | Rated control circuit voltage Uc | | at 50 Hz | 24...415 V |
| | | | at 60 Hz | 24...415 V |
| | Coil consumption | Average pull-in value | 50 Hz | 33 VA |
| | | | 60 Hz | 33 VA |
| | | | 50/60 Hz | 33 VA |
| | | Average holding value | 50 Hz | 6.5 VA / 1.5 W |
| | | | 60 Hz | 5 VA / 1.2 W |
| | | | 50/60 Hz | 6.5 VA / 1.5 W |
| Drop-out voltage | | | | Approx. 30...50 % of Uc |
| Operating time | | | | |
| | Between coil energization and: | | N.O. contact closing | 9...24 ms |
| | | | N.C. contact opening | 6...18 ms |
| | Between coil de-energization and: | | N.O. contact opening (1) | 5...19 ms |
| | | | N.C. contact closing (1) | 7...22 ms |
| | | | | (1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3. |

### Magnet system characteristics for NSL contactor relays

| Contactor relay types | | | DC operated | **NSL** |
|---|---|---|---|---|
| Coil operating limits | | | DC supply | |
| acc. to IEC 60947-5-1 | | | | 0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C) |
| DC control voltage | Rated control circuit voltage Uc | | | 12...240 V DC |
| | Coil consumption | | Average pull-in value | 3 W |
| | | | Average holding value | 3 W |
| Drop-out voltage | | | | Approx. 10...40 % of Uc |
| Coil time constant | Open | | L/R | 12 ms |
| | Closed | | L/R | 40 ms |
| Operating time | | | | |
| | Between coil energization and: | | N.O. contact closing | 36...59 ms |
| | | | N.C. contact opening | 31...53 ms |
| | Between coil de-energization and: | | N.O. contact opening (1) | 13...17 ms |
| | | | N.C. contact closing (1) | 15...20 ms |
| | | | | (1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2. |

### Mounting characteristics and conditions for use

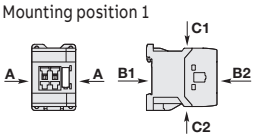
| Contactor relay types | | AC operated | **NS** |
|---|---|---|---|
| | | DC operated | **NSL** |
| Mounting positions | | |  |
| Mounting distances | | | The contactor relays can be assembled side by side. |
| Fixing | On rail according to IEC/EN 60715 | | 35 x 7.5 mm or 35 x 15 mm |
| | By screws (not supplied) | | 2 x M4 screws placed diagonally |

# NS and NSL contactor relays

## Technical data



### General technical data

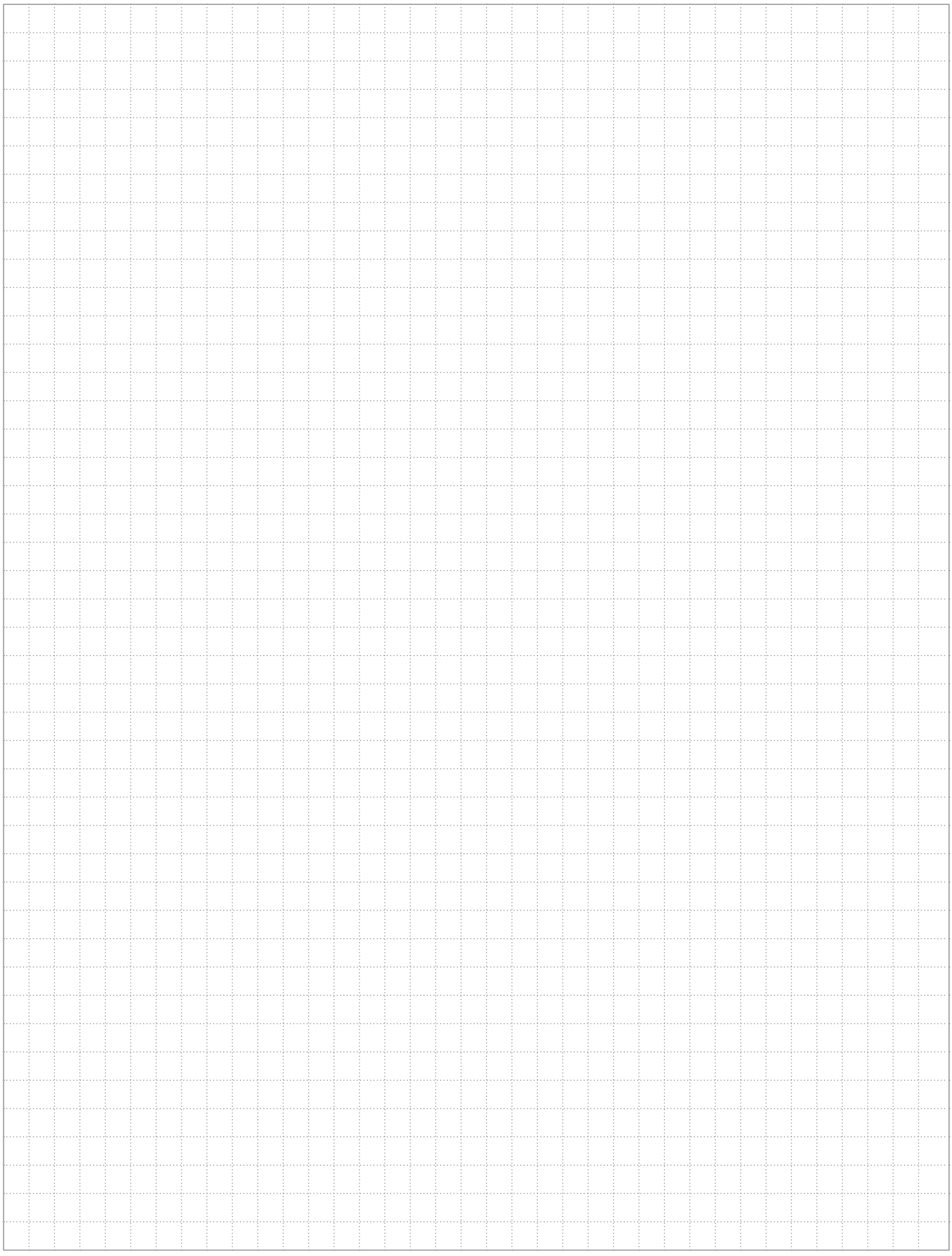
| | | | |
|---|---|---|---|
| Contactor relay types | AC operated | **NS** | |
| | DC operated | **NSL** | |
| Rated insulation voltage Ui | | | |
| acc. to IEC 60947-5-1 | | 690 V | |
| acc. to UL / CSA | | 600 V | |
| Rated impulse withstand voltage Uimp. | | 6 kV | |
| Pollution degree | | 3 | |
| Ambient air temperature close to contactor relay | | | |
| Operation in free air | | -40...+70 °C | |
| Storage | | -60...+80 °C | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | |
| Maximum operating altitude (without derating) | | 3000 m | |
| Mechanical durability | | | |
| Number of operating cycles | | 20 millions operating cycles | |
| Max. switching frequency | | 3600 cycles/h | |
| Shock withstand | | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | |
| acc. to IEC/EN 60068-2-27 | Shock direction | NS contactor relays - AC operated | NSL contactor relays - DC operated |
| Mounting position 1 | A | 20 g | 20 g closed position / 10 g open position |
|  | B1 | 5 g | 15 g closed position / 5 g open position |
| | B2 | 15 g | 10 g |
| | C1 | 19 g closed position / 8 g open position | 19 g closed position / 8 g open position |
| | C2 | 16 g closed position / 13 g open position | 14 g closed position / 8 g open position |
| Vibration withstand acc. to IEC 60068-2-6 | | 5...300 Hz / 3 g closed position / 2 g open position | |



### Connecting characteristics

| | | | |
|---|---|---|---|
| Contactor relay types | AC operated | **NS** | |
| | DC operated | **NSL** | |
| Main terminals | |  Screw terminals with cable clamp | |
| Connection capacity (min. ... max.) | | | |
| Pole and coil terminals | | | |
| Rigid Solid/Stranded | 1 x | 0.75...2.5 mm² | |
| | 2 x | 0.75...2.5 mm² | |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² | |
| | 2 x | 0.75...2.5 mm² | |
| Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² | |
| | 2 x | 0.75...1.5 mm² | |
|  Lugs | L ≤ | 7.7 mm | |
| | l > | 3.2 mm | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 | |
| Stripping length | | 9 mm | |
| Tightening torque Recommended | | 1.00 Nm / 9 lb.in | |
| Max. | | 1.20 Nm | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | |
| All terminals | | IP20 | |
| Screw terminals | | Delivered in open position, screws of unused terminals must be tightened | |
| All terminals | | M3 | |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 | |

# Notes



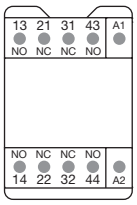
# NS contactor relays

## Terminal marking and positioning

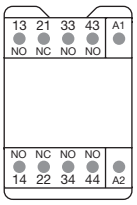


### NS contactor relays - AC operated

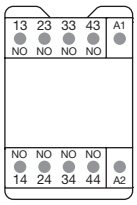
Standard devices without addition of auxiliary contact blocks



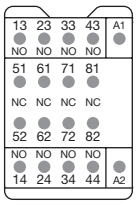

NS22E



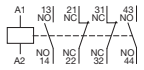

NS31E



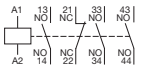

NS40E




NS44E



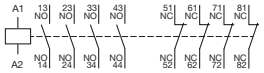

NS22E



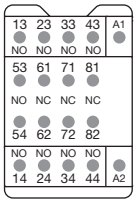

NS31E



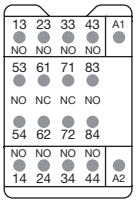

NS40E



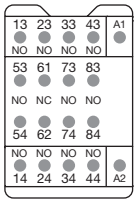

NS44E



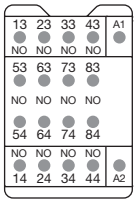

NS53E




NS62E



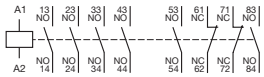

NS71E




NS80E




NS53E




NS62E

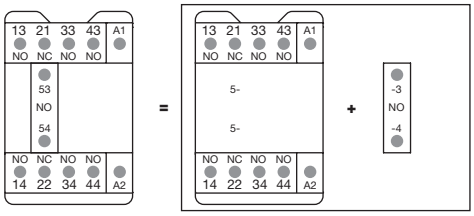



NS71E

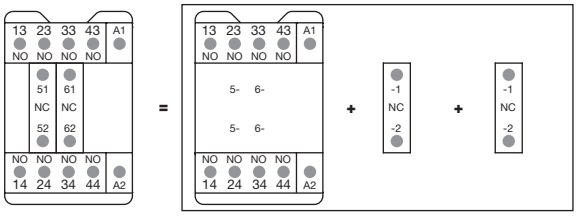



NS80E

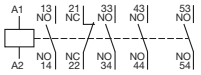
Other possible contact combinations with auxiliary contact blocks added by the user




Combination 41E = NS31E + CA3-10



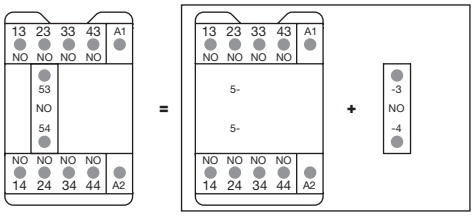

Combination 42E = NS40E + CA3-01 + CA3-01



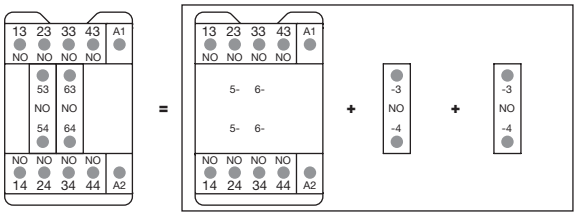

Combination 41E



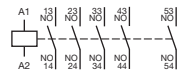

Combination 42E



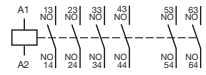

Combination 50E = NS40E + CA3-10




Combination 60E = NS40E + CA3-10 + CA3-10

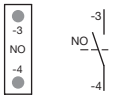



Combination 50E

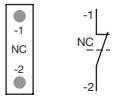



Combination 60E

CA3 1-pole auxiliary contact blocks




CA3-10



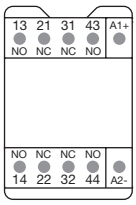

CA3-01

# NSL contactor relays

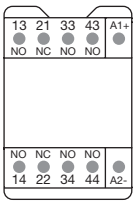
## Terminal marking and positioning

### NSL contactor relays - DC operated (the polarity A1+, A2- must be respected)

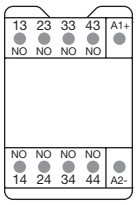
Standard devices without addition of auxiliary contact blocks



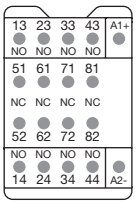

NSL22E



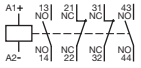

NSL31E



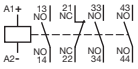

NSL40E



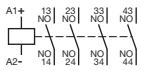

NSL44E




NSL22E



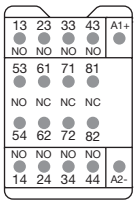

NSL31E



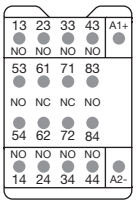

NSL40E



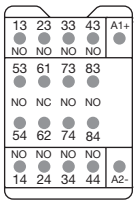

NSL44E



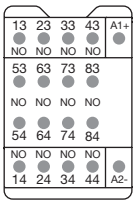

NSL53E




NSL62E




NSL71E




NSL80E




NSL53E




NSL62E

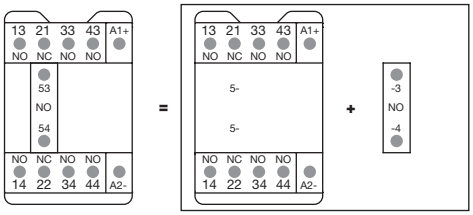



NSL71E

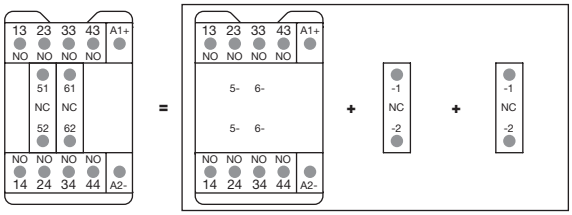



NSL80E

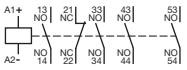
Other possible contact combinations with auxiliary contact blocks added by the user



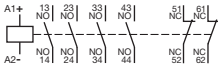

Combination 41E = NSL31E + CA3-10



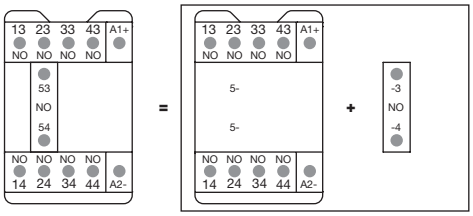

Combination 42E = NSL40E + CA3-01 + CA3-01



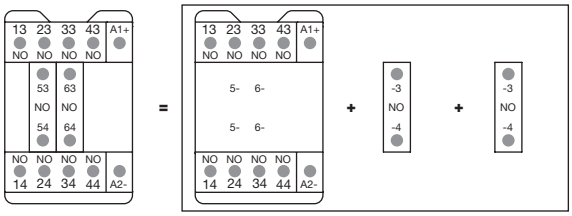

Combination 41E



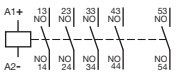

Combination 42E




Combination 50E = NSL40E + CA3-10




Combination 60E = NSL40E + CA3-10 + CA3-10

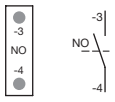



Combination 50E

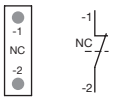



Combination 60E

CA3 1-pole auxiliary contact blocks




CA3-10

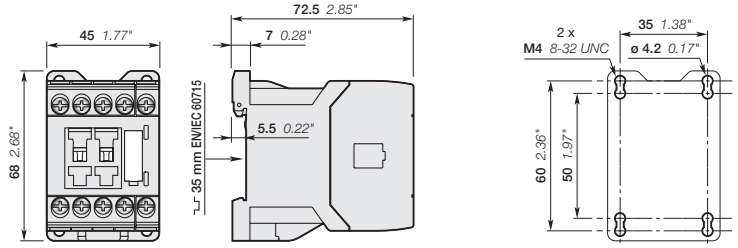



CA3-01

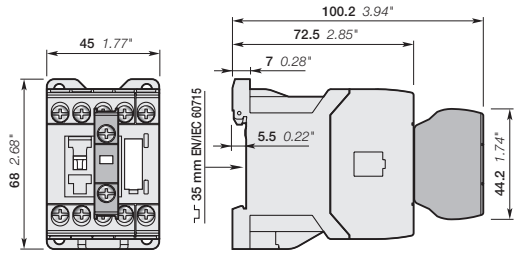
# NS contactor relays
## Dimensions



### 4-pole contactor relays

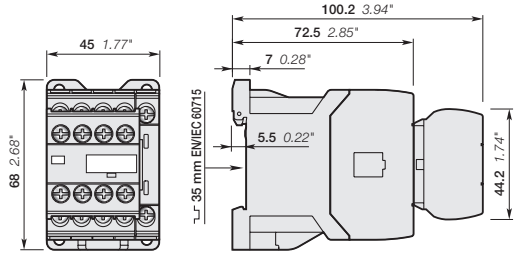



NS22E, NS31E, NS40E




NS22E, NS31E, NS40E
+ CA3 front-mounted 1-pole auxiliary contact block

### 8-pole contactor relays

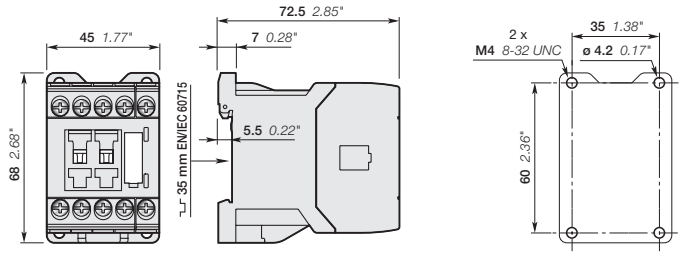



NS44E, NS53E, NS62E, NS71E, NS80E

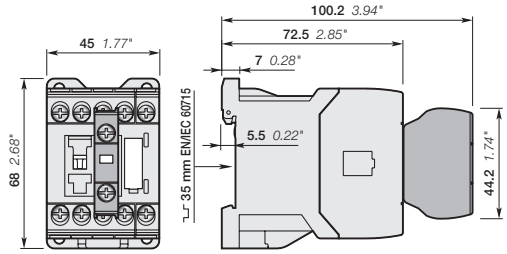
Main dimensions mm, inches

# NSL contactor relays
## Dimensions

### 4-pole contactor relays

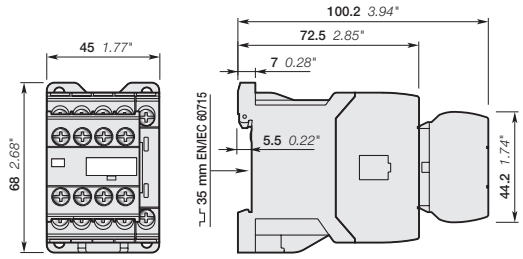



NSL22E, NSL31E, NSL40E




NSL22E, NSL31E, NSL40E
+ CA3 front-mounted 1-pole auxiliary contact block

### 8-pole contactor relays




NSL44E, NSL53E, NSL62E, NSL71E, NSL80E

Main dimensions mm, inches

# Auxiliary contact blocks
## Accessories



CA3-10

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits.

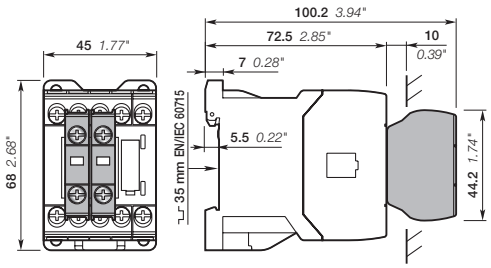
CA3 1-pole auxiliary contact blocks, designed for standard industrial environments, are equipped with:

- N.O. or N.C. contacts.
- Screw-type connecting terminals with cage clamp delivered open.

All 1-pole auxiliary contact blocks are protected against accidental direct contact and bear the corresponding function marking.

A maximum of two 1-pole auxiliary contact blocks can be front-mounted on 1-stack contactors or 1-stack contactor relays.

| For contactors | For contactor relays | Contact blocks | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|
| | |  | | | | kg |
| **1-pole auxiliary contact blocks with screw terminals** | | | | | | |
| AS09 ... AS16 | NS, NSL | 1 – | CA3-10 | 1SBN011010T1010 | 10 | 0.011 |
| ASL09 ... ASL16 | | – 1 | CA3-01 | 1SBN011010T1001 | 10 | 0.011 |




Main dimensions mm, inches

# Auxiliary contact blocks
## Technical data



### Contact utilization characteristics according to IEC

| | | |
|---|---|---|
| Types | | **1-pole CA3** |
| Standards | | IEC/EN 60947-5-1 |
| Rated insulation voltage Ui acc. to IEC 60947-5-1 | | 690 V |
| Rated impulse withstand voltage Uimp | | 6 kV |
| Pollution degree | | 3 |
| Rated operational voltage Ue max. | | 690 V |
| Conventional thermal current Ith - θ ≤ 40 °C | | 10 A |
| Ie / Rated operational current AC-15 | | |
| acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A |
| | 220-240 V 50/60 Hz | 4 A |
| | 400-440 V 50/60 Hz | 3 A |
| | 500 V 50/60 Hz | 2 A |
| | 690 V 50/60 Hz | 2 A |
| Making capacity | | 10 x Ie AC-15 acc. to IEC 60947-5-1 |
| Breaking capacity | | 10 x Ie AC-15 acc. to IEC 60947-5-1 |
| Ie / Rated operational current DC-13 | 24 V DC | 6 A / 144 W |
| acc. to IEC 60947-5-1 | 48 V DC | 2.8 A / 134 W |
| | 72 V DC | 1 A / 72 W |
| | 110 V DC | 0.55 A / 60 W |
| | 125 V DC | 0.55 A / 69 W |
| | 220 V DC | 0.27 A / 60 W |
| | 250 V DC | 0.27 A / 68 W |
| Short-circuit protection device gG type fuse | | 10 A |
| Rated short-time withstand current Icw | for 1.0 s | 100 A |
| θ = 40 °C | for 0.1 s | 140 A |
| Minimum switching capacity | | 12 V / 3 mA |
| with failure rate acc. to IEC 60947-5-4 | | 10-7 |
| Power dissipation per pole at 6 A | | 0.1 W |
| Mechanical durability | | |
| Number of operating cycles | | 10 millions operating cycles |
| Max. switching frequency | | 3600 cycles/h |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h |
| | DC-13 | 900 cycles/h |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Additional N.O. or N.C. auxiliary contacts (CA3) are mechanically linked contacts |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | Additional N.C. auxiliary contacts (CA3) are mirror contacts |

### Contact utilization characteristics according to UL / CSA

| | |
|---|---|
| Standards | UL 508, CSA C22.2 No. 14 |
| Max. operational voltage | 690 V AC, 250 V DC |
| Pilot duty | A600, Q300 |
| AC thermal rated current | 10 A |
| AC maximum volt-ampere making | 7200 VA |
| AC maximum volt-ampere breaking | 720 VA |
| DC thermal rated current | 2.5 A |
| DC maximum volt-ampere making-breaking | 69 VA |

### Connecting characteristics

| | | | |
|---|---|---|---|
| Connection capacity (min. ... max.) | | | |
|  | Rigid Solid/Stranded | 1 x | 0.75...2.5 mm² |
|  | | 2 x | 0.75...2.5 mm² |
|  | Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² |
|  | | 2 x | 0.75...2.5 mm² |
|  | Flexible with insulated ferrule | 1 x | 0.75...2.5 mm² |
|  | | 2 x | 0.75...1.5 mm² |
|  | Lugs | L ≤ | 7.7 mm |
| | | l > | 3.2 mm |
| Connection capacity acc. to UL / CSA | | 1 or 2 x | AWG 18...14 |
| Stripping length | | | 9 mm |
| Tightening torque | Recommended | | 1 Nm / 9 lb.in |
| | Max. | | 1.20 Nm |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | IP20 |
| Screw terminals | | | Delivered in open position, screws of unused terminals must be tightened |
| All terminals | | | M3 |
| Screwdriver type | | | Flat Ø 5.5 / Pozidriv 2 |

# Auxiliary contact blocks for AS09 ... AS16, ASL09 ... ASL16 contactors and NS, NSL contactor relays

## Electrical durability

**Electrical durability for AC-15 utilization category - Ue ≤ 400 V**

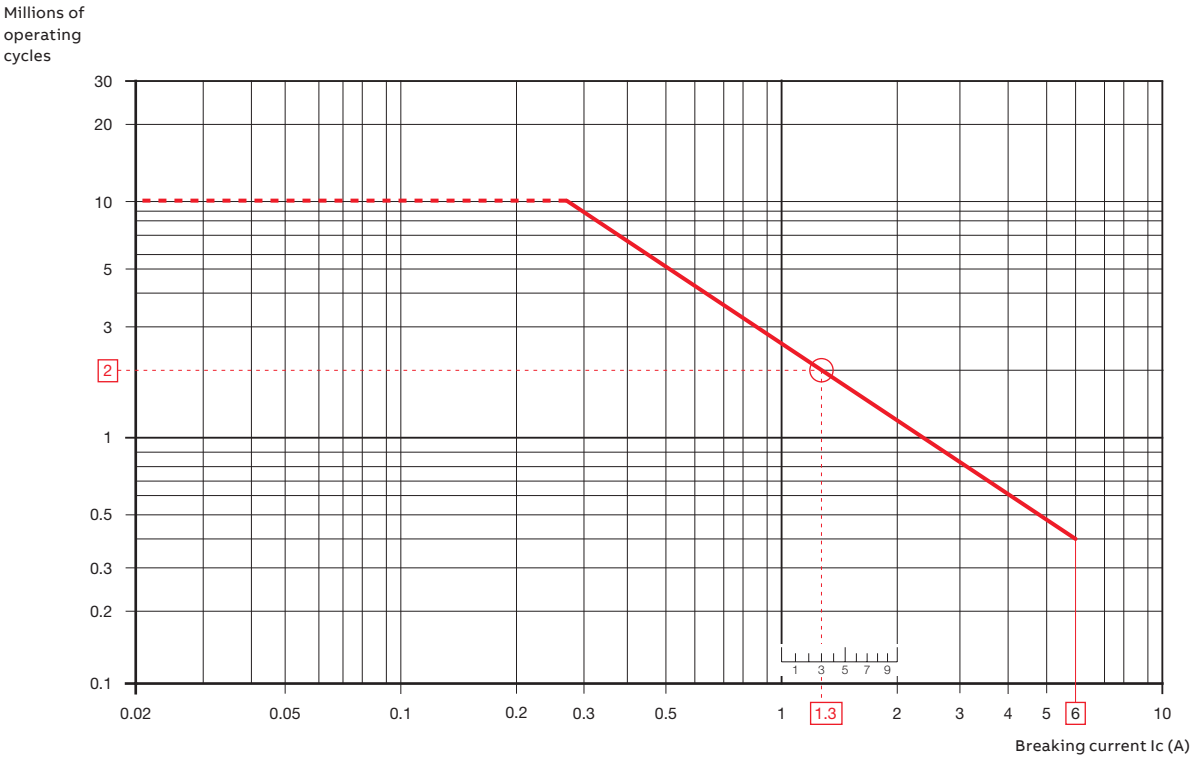
AC-15 utilization category according to IEC/EN 60947-5-1:

- making current: 10 x Ie with cos ϕ = 0.7 and Ue
- breaking current: Ie with cos ϕ = 0.4 and Ue.

This curve represents the electrical durability of the built-in or add-on auxiliary contacts in relation to the breaking current.

The curve has been drawn for resistive and inductive loads up to 400 V:

- AS09 ... AS16 and ASL09 ... ASL16 contactor built-in auxiliary contacts
- 1-pole CA3
- NS and NSL contactor relays.

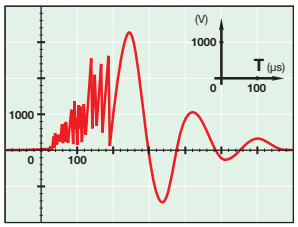



**Example:**

Breaking current = 1.3 A

On the opposite curve at intersection "○" 1.3 A the corresponding value for the electrical durability is approximately 2 millions operating cycles.

# Surge suppressors for contactor coils




The operation of inductive circuits causes overvoltages, in particular on opening the contactor coil.

The electromagnetic energy stored in the coil during contactor closing is restored on opening in the form of surges, the slope and amplitude of which may rise to several kilovolts. A number of drawbacks are observed ranging from interference on the electronic devices to the breakdown of insulators and even the destruction of certain sensitive components.

The graph opposite reproduces the oscillogram showing voltage discharges at the terminals of a 42 V / 50 Hz coil without peak clipping. The coil was switched by 8 series-connected poles of a contactor relay.

Following a burst of discharges with a very steep slope, a damped oscillation emerges with a peak value of 3500 V.

**Overvoltage Factor**

The overvoltage factor k is defined as the ratio of the maximum overvoltage peak value Ûs to the peak value Ûc of the coil rated control voltage Uc:

$$k = \frac{\hat{U}s\ max.}{\hat{U}c} \qquad \text{in DC} \quad k = \frac{\hat{U}s\ max.}{Uc} \qquad \text{in AC} \quad k = \frac{\hat{U}s\ max.}{Uc\ \sqrt{2}}$$

For example the following is obtained for the above graph: $k = \frac{3500}{42\ \sqrt{2}} \approx 60$

To reduce the harmful effects of these overvoltages, ABB has developed a range of surge suppressors designed to reduce the k factor defined above and to limit or even completely eliminate the high pre-damping voltage frequencies.

Each case is different, but the technical data tolerances and generous sizing of parts have enabled us to reduce the number of variants.

We have chosen the following solutions: transil diodes, varistors and RC blocks.

Note: A varistor is a resistor whose value decreases to a very large extent when a certain voltage is applied at its terminals.



RV5

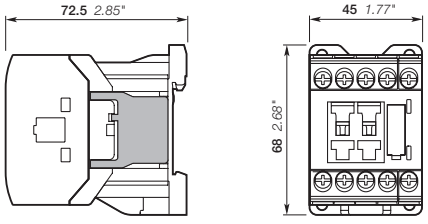


RC5-1



RT5

| For contactors | For contactor relays | Rated control circuit voltage - Uc | | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|
| | | V | AC | DC | | | | kg |
| AS, ASL | NS, NSL | 24...50 | ● | ● | RV5/50 | 1SBN050010R1000 | 2 | 0.015 |
| | | 50...133 | ● | ● | RV5/133 | 1SBN050010R1001 | 2 | 0.015 |
| | | 110...250 | ● | ● | RV5/250 | 1SBN050010R1002 | 2 | 0.015 |
| | | 250...440 | ● | ● | RV5/440 | 1SBN050010R1003 | 2 | 0.015 |
| AS | NS | 24...50 | ● | – | RC5-1/50 | 1SBN050100R1000 | 2 | 0.012 |
| | | 50...133 | ● | – | RC5-1/133 | 1SBN050100R1001 | 2 | 0.012 |
| | | 110...250 | ● | – | RC5-1/250 | 1SBN050100R1002 | 2 | 0.012 |
| | | 250...440 | ● | – | RC5-1/440 | 1SBN050100R1003 | 2 | 0.012 |
| ASL | NSL | 12...32 | – | ● | RT5/32 | 1SBN050020R1000 | 2 | 0.015 |
| | | 25...65 | – | ● | RT5/65 | 1SBN050020R1001 | 2 | 0.015 |
| | | 50...90 | – | ● | RT5/90 | 1SBN050020R1002 | 2 | 0.015 |
| | | 77...150 | – | ● | RT5/150 | 1SBN050020R1003 | 2 | 0.015 |
| | | 150...264 | – | ● | RT5/264 | 1SBN050020R1004 | 2 | 0.015 |



Main dimensions mm, inches

**Easy connection to the coil terminals**
(parallel mounting)
Clip-on for both fixing and connection.

**No additional space**
Clipped onto the right side part of the contactor base without changing contactor overall dimensions and keeping a free access to coil terminals.

# Surge suppressors for contactor coils
## Technical data

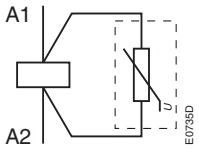


| **Varistor** | **RV5/50** | **RV5/133** | **RV5/250** | **RV5/440** |
|---|---|---|---|---|
| Rated control circuit voltage Uc | 24...50 V AC | 50...133 V AC | 110...250 V AC | 250...440 V AC |
| | 24...50 V DC | 50...133 V DC | 110...250 V DC | 250...440 V DC |
| Residual overvoltage (clipping voltage) | 132 V AC | 270 V AC | 480 V AC | 825 V AC |
| | 132 V DC | 270 V DC | 480 V DC | 825 V DC |
| Opening time growth factor | none | | | |
| Operating temperature | -20...+70 °C | | | |
| Advantages | High energy absorption: good damping - Unpolarized system. | | | |
| Drawback | Clipping as from Uvdr*, thus voltage front up to this point. | | | |
| | *Uvdr = Varistor operating voltage (voltage dependent resistor), tolerance ± 10 %. | | | |

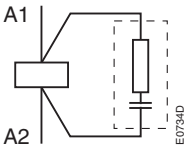
| **RC type** | **RC5-1/50** | **RC5-1/133** | **RC5-1/250** | **RC5-1/440** |
|---|---|---|---|---|
| Rated control circuit voltage Uc | 24...50 V AC | 50...133 V AC | 110...250 V AC | 250...440 V AC |
| Residual overvoltage (clipping voltage) | 2 to 3 x Uc max. | | | |
| Opening time growth factor | 2...3 | | | |
| Operating temperature | -20...+70 °C | | | |
| Advantages | Very fast clipping - Attenuation of steep fronts and thus of high frequencies. | | | |

| **Transil diode** | **RT5/32** | **RT5/65** | **RT5/90** | **RT5/150** | **RT5/264** |
|---|---|---|---|---|---|
| Rated control circuit voltage Uc | 12...32 V DC | 25...65 V DC | 50...90 V DC | 77...150 V DC | 150...264 V DC |
| Residual overvoltage (clipping voltage) | 50 V DC | 100 V DC | 150 V DC | 210 V DC | 390 V DC |
| Opening time growth factor | 1.1...1.2 | | | | |
| Operating temperature | -20...+70 °C | | | | |
| Advantages | Good energy absorption - Unpolarized system - Simple, reliable system. | | | | |
| Drawback | Delay on drop out which does not however reduce contactor breaking capacity. | | | | |

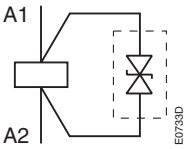
### Wiring diagrams



Varistor



RC type



Transil diode

# Mechanical interlock unit and other accessories



VM3



## Mechanical interlock unit

When mounted between two contactors without additional width, the VM3 mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed.

The mechanical interlock unit includes 2 fixing clips.

| For contactors | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| Left | Right | | | | |
| AS | AS | VM3 | 1SBN031005T1000 | 10 | 0.002 |
| ASL | ASL | | | | |

Note : VM3 mechanical durability, 5 millions of operating cycles on both reversing contactors.



BB3

## Fixing clips

BB3 is a set of 50 fixing clips.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| AS, ASL | BB3 | 1SBN111020R1000 | 1 | 0.009 |

## Test block

BDT4 test block is suitable for switching on contactor off-load.

Marking on the block indicates the contactor type to fit with.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| AS, ASL, NS, NSL | BDT4 | 1SBN110122T1000 | 10 | 0.007 |



BDT4

## Function markers

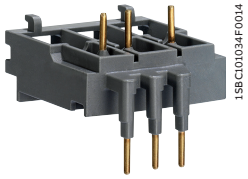
Box of 16 blank cards (16 markers by card) designed to be clipped onto the front face of contactors or contactor relays.
Marker dimensions: 7 x 20 mm (.276" x .787").

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| AS, ASL, NS, NSL | BA4 | 1SNA235156R2700 | 16 | 0.011 |



BA4

# Connection accessories for starting solutions



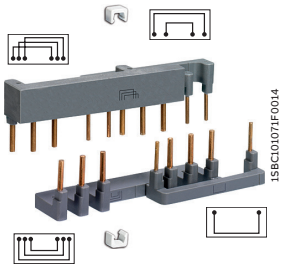

BEA16-3

## Connecting links

The BEA16-3 insulated 3-pole connecting links are used to connect an AC or DC operated contactors with manual motor starters.

The connecting links ensure the electrical and mechanical connection between the contactor and the manual motor starter.

| For contactors | Manual motor starter | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| AS09 ... AS16<br>ASL09 ... ASL16 | MS116-0.16 ... MS116-16<br>MS132-0.16 ... MS132-16 | BEA16-3 | 1SBN081006T1000 | 10 | 0.019 |




BER16C-3

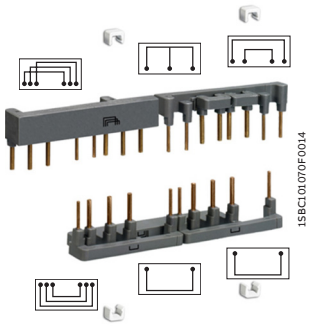
## Connection sets for reversing contactors

The BER16C-3 connection sets are used for the connections between the main poles of two 3-pole contactors mounted side by side as reversing contactors, including electrical interlocking between built-in N.C. auxiliary contact and coil terminals.

The connection sets are made up of:

- 1 upstream and 1 downstream connections: insulated, solid copper bars,
- 2 connections to realize electrical interlocking between contactors equipped with built-in N.C. auxiliary contacts,
- 2 fixing clips.

| For contactors | Mechanical interlock unit | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| 2 x AS09 ... AS16<br>2 x ASL09 ... ASL16 | with or without VM3 | BER16C-3 | 1SBN081012R1000 | 1 | 0.035 |




BEY16C-3

## Connection sets for star-delta starting

BEY16C-3 connection sets are designed for star-delta starters whose contactors are assembled according to line delta star mounting.

The connection sets are made up of:

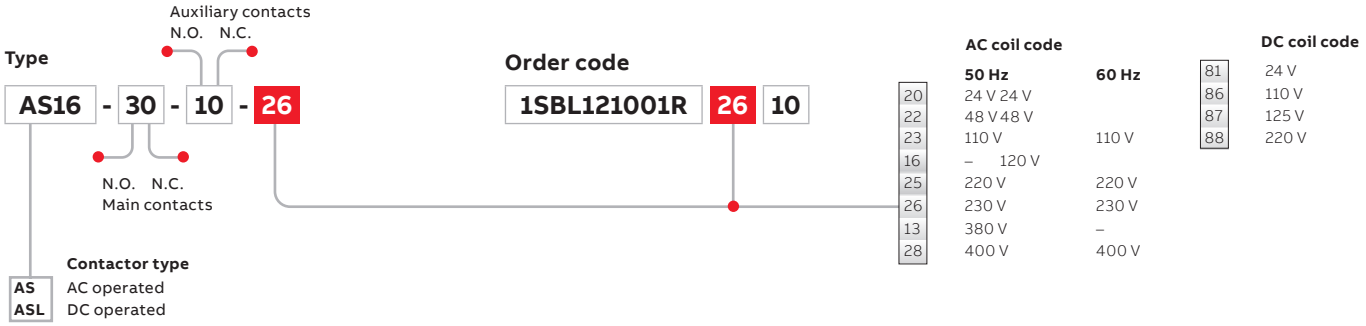
- Line contactor / delta contactor: upstream phase-to-phase connection,
- Delta contactor / star contactor: downstream connection in parallel,
- Star contactor: star point upstream,
- An electrical interlocking between delta and star contactors equipped with built-in N.C. auxiliary contacts,
- 4 fixing clips.

| For contactors | | | Mech. interlock unit between star & delta contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|---|---|
| Line | Delta | Star | | | | | |
| AS09 | AS09 | AS09 | with or without VM3 | BEY16C-3 | 1SBN081018R2000 | 1 | 0.041 |
| AS12 | AS12 | AS09 | | | | | |

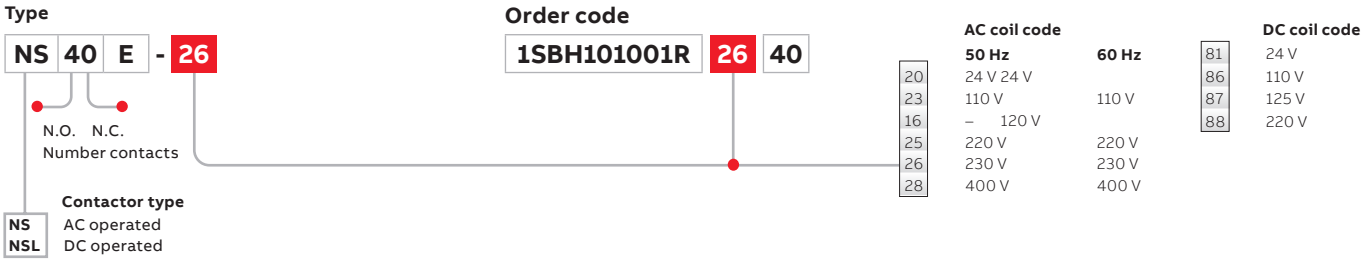
# Voltage code table

The below tables indicate the available coil voltages and corresponding digits for order codes. When placing an order, please give either type or order code. Select a standard contactor from ordering detail pages. Change the coil voltage code in the type or in the order code according to the table below. For detail code information, please contact your ABB local sales organization.

## 3-pole contactors




## Contactor relays





**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**1SBL101004R2010**

# AS..S 3-pole contactors and NS..S contactor relays with spring terminals




**AS..S 3-pole contactors - with spring terminals**

**5/**52 AS09..S ... AS16..S AC operated
**5/**53 ASL09..S ... ASL16..S DC operated
**5/**54 AS09..S ... AS16..S AC operated - 2-stack
**5/**55 ASL09..S ... ASL16..S DC operated - 2-stack
**5/**56 Main accessories
**5/**58 Technical data
**5/**64 Electrical durability
**5/**65 Terminal marking and positioning
**5/**67 Dimensions

**NS..S contactors relays - with spring terminals**

**5/**69 NS..S AC operated
**5/**70 NSL..S DC operated
**5/**71 Main accessories
**5/**73 Technical data
**5/**76 Terminal marking and positioning
**5/**78 Dimensions

**Accessories**

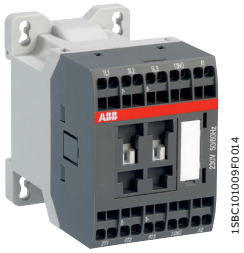
**5/**80 Auxiliary contact blocks - with spring terminals
**5/**83 Surge suppressors for contactor coils
**5/**85 Connecting links for starting solution and other accessories

**5/**86 **Voltage code table**

# AS09..S ... AS16..S 3-pole contactors

## 4 to 7.5 kW

## AC operated - with spring terminals




AS09-30-10S

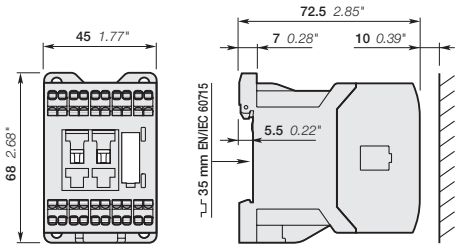
AS09 ... AS16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

- spring terminals
- 3 main poles and 1 built-in auxiliary contact
- control circuit: AC operated
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc (1) | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50 Hz | V 60 Hz | | | | kg |
| 4 | 20 | 5 | 12 | 24 | 24 | 1 0 | AS09-30-10S-20 | 1SBL101004R2010 | 0.220 |
| | | | | | | 0 1 | AS09-30-01S-20 | 1SBL101004R2001 | 0.220 |
| | | | | 220 | 220 | 1 0 | AS09-30-10S-25 | 1SBL101004R2510 | 0.220 |
| | | | | | | 0 1 | AS09-30-01S-25 | 1SBL101004R2501 | 0.220 |
| | | | | 230 | 230 | 1 0 | AS09-30-10S-26 | 1SBL101004R2610 | 0.220 |
| | | | | | | 0 1 | AS09-30-01S-26 | 1SBL101004R2601 | 0.220 |
| 5.5 | 22 | 7.5 | 12 | 24 | 24 | 1 0 | AS12-30-10S-20 | 1SBL111004R2010 | 0.220 |
| | | | | | | 0 1 | AS12-30-01S-20 | 1SBL111004R2001 | 0.220 |
| | | | | 220 | 220 | 1 0 | AS12-30-10S-25 | 1SBL111004R2510 | 0.220 |
| | | | | | | 0 1 | AS12-30-01S-25 | 1SBL111004R2501 | 0.220 |
| | | | | 230 | 230 | 1 0 | AS12-30-10S-26 | 1SBL111004R2610 | 0.220 |
| | | | | | | 0 1 | AS12-30-01S-26 | 1SBL111004R2601 | 0.220 |
| 7.5 | 22 | 10 | 15.2 | 24 | 24 | 1 0 | AS16-30-10S-20 | 1SBL121004R2010 | 0.220 |
| | | | | | | 0 1 | AS16-30-01S-20 | 1SBL121004R2001 | 0.220 |
| | | | | 220 | 220 | 1 0 | AS16-30-10S-25 | 1SBL121004R2510 | 0.220 |
| | | | | | | 0 1 | AS16-30-01S-25 | 1SBL121004R2501 | 0.220 |
| | | | | 230 | 230 | 1 0 | AS16-30-10S-26 | 1SBL121004R2610 | 0.220 |
| | | | | | | 0 1 | AS16-30-01S-26 | 1SBL121004R2601 | 0.220 |

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.




AS09..S, AS12..S, AS16..S

Main dimensions mm, inches

# ASL09..S ... ASL16..S 3-pole contactors

## 4 to 7.5 kW

## DC operated - with spring terminals




ASL09-30-10S

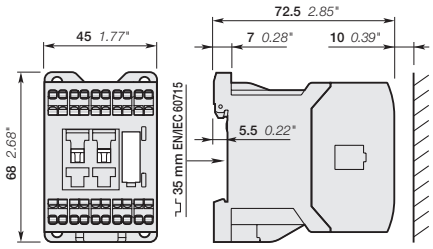
ASL09..S ... ASL16..S contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

- spring terminals
- 3 main poles and 1 built-in auxiliary contact
- control circuit: low consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
- add-on auxiliary contact blocks for front mounting and comprehensive range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc (1) | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | Pkg (1 pce) |
| kW | A | hp | A | V DC | | | | kg |
| 4 | 20 | 5 | 12 | 24 | 1 0 | ASL09-30-10S-81 | 1SBL103004R8110 | 0.280 |
| | | | | | 0 1 | ASL09-30-01S-81 | 1SBL103004R8101 | 0.280 |
| 5.5 | 22 | 7.5 | 12 | 24 | 1 0 | ASL12-30-10S-81 | 1SBL113004R8110 | 0.280 |
| | | | | | 0 1 | ASL12-30-01S-81 | 1SBL113004R8101 | 0.280 |
| 7.5 | 22 | 10 | 15.2 | 24 | 1 0 | ASL16-30-10S-81 | 1SBL123004R8110 | 0.280 |
| | | | | | 0 1 | ASL16-30-01S-81 | 1SBL123004R8101 | 0.280 |

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.



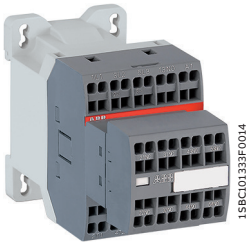

ASL09..S, ASL12..S, ASL16..S

Main dimensions mm, inches

# AS09..S ... AS16..S 2-stack 3-pole contactors

## 4 to 7.5 kW

## AC operated - with spring terminals




AS09-30-32S

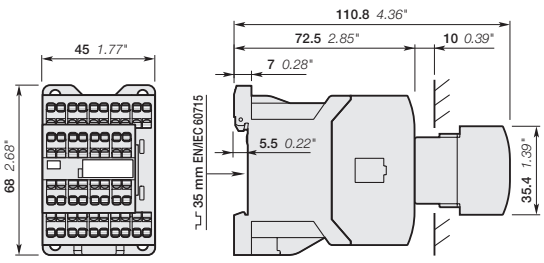
AS09..S ... AS16..S contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

- spring terminals
- 1st stack with 3 main poles and 1 N.O. built-in auxiliary contact
- 2nd stack with permanently fixed 2 N.O. + 2 N.C. auxiliary contact block
- the auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC operated
- a comprehensive range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc (1) | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| kW | A | hp | A | V 50 Hz | V 60 Hz | | | | kg |
| 4 | 20 | 5 | 12 | 24 | 24 | 3 2 | AS09-30-32S-20 | 1SBL101004R2032 | 0.260 |
| | | | | 220 | 220 | 3 2 | AS09-30-32S-25 | 1SBL101004R2532 | 0.260 |
| | | | | 230 | 230 | 3 2 | AS09-30-32S-26 | 1SBL101004R2632 | 0.260 |
| 5.5 | 22 | 7.5 | 12 | 24 | 24 | 3 2 | AS12-30-32S-20 | 1SBL111004R2032 | 0.260 |
| | | | | 220 | 220 | 3 2 | AS12-30-32S-25 | 1SBL111004R2532 | 0.260 |
| | | | | 230 | 230 | 3 2 | AS12-30-32S-26 | 1SBL111004R2632 | 0.260 |
| 7.5 | 22 | 10 | 15.2 | 24 | 24 | 3 2 | AS16-30-32S-20 | 1SBL121004R2032 | 0.260 |
| | | | | 220 | 220 | 3 2 | AS16-30-32S-25 | 1SBL121004R2532 | 0.260 |
| | | | | 230 | 230 | 3 2 | AS16-30-32S-26 | 1SBL121004R2632 | 0.260 |

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.



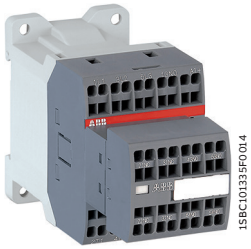

AS09..S, AS12..S, AS16..S

Main dimensions mm, inches

# ASL09..S ... ASL16..S 2-stack 3-pole contactors

## 4 to 7.5 kW

## DC operated - with spring terminals




ASL09-30-32S

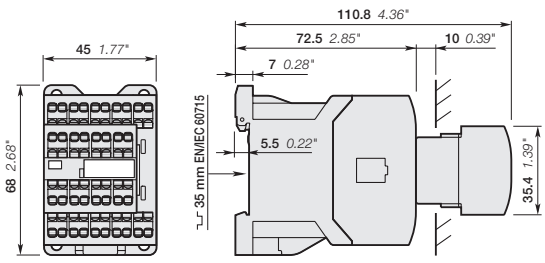
ASL09..S ... ASL16..S contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

- spring terminals
- 1st stack with 3 main poles and 1 N.O. built-in auxiliary contact
- 2nd stack with permanently fixed 2 N.O. + 2 N.C. auxiliary contact block
- the auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: low consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
- a comprehensive range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc (1) | Auxiliary contacts fitted | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|
| Rated operational power 400 V AC-3 | current θ ≤ 40 °C AC-1 | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | Pkg (1 pce) |
| kW | A | hp | A | V DC | | | | kg |
| 4 | 20 | 5 | 12 | 24 | 3 2 | ASL09-30-32S-81 | 1SBL103004R8132 | 0.320 |
| 5.5 | 22 | 7.5 | 12 | 24 | 3 2 | ASL12-30-32S-81 | 1SBL113004R8132 | 0.320 |
| 7.5 | 22 | 10 | 15.2 | 24 | 3 2 | ASL16-30-32S-81 | 1SBL123004R8132 | 0.320 |

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.




ASL09..S, ASL12..S, ASL16..S

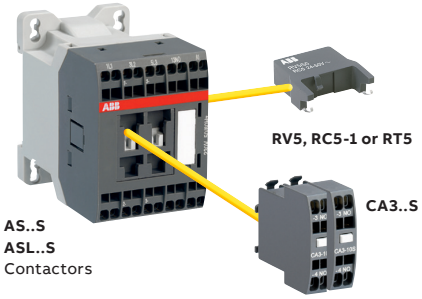
Main dimensions mm, inches

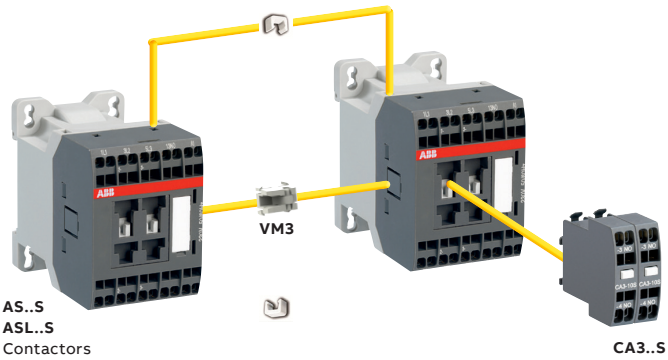
05

# AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

## Main accessories

### Contactor and main accessories (other accessories available)




### Main accessory fitting details

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories | | | Side-mounted accessories | |
|---|---|---|---|---|---|---|---|
| | | | Auxiliary contact blocks | Mechanical interlock unit (between 2 contactors) | | | |
| | | | 1-pole CA3..S | VM3 | | Surge suppressors | |
| AS09..S ... AS16..S | 3 0 | 1 0 | 2 max. | + 1 | + | RV5 | or RC5-1 |
| AS09..S ... AS16..S | 3 0 | 0 1 | | | | | |
| AS09..S ... AS16..S | 3 0 | 3 2 | – | 1 | + | RV5 | or RC5-1 |
| ASL09..S ... ASL16..S | 3 0 | 1 0 | 2 max. | + 1 | + | RV5 | or RT5 |
| ASL09..S ... ASL16..S | 3 0 | 0 1 | | | | | |
| ASL09..S ... ASL16..S | 3 0 | 3 2 | – | 1 | + | RV5 | or RT5 |

# AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

## Main accessories




CA3-10S

### Front-mounted instantaneous auxiliary contact blocks

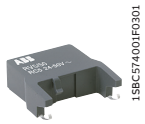
| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| AS09..S ... AS16..S | 1 0 | CA3-10S | 1SBN011019T1010 | 10 | 0.011 |
| ASL09..S ... ASL16..S | 0 1 | CA3-01S | 1SBN011019T1001 | 10 | 0.011 |




VM3

### Mechanical interlock unit

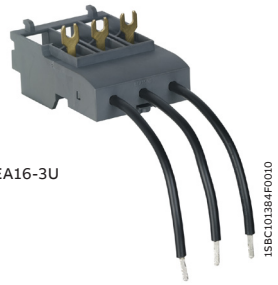
| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| AS09..S ... AS16..S, ASL09..S ... ASL16..S | VM3 | 1SBN031005T1000 | 10 | 0.002 |




RV5

### Surge suppressors

| For contactors | Rated control circuit voltage - Uc V | AC | DC | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|---|---|
| AS09..S ... AS16..S, ASL09..S ... ASL16..S | 24...50 | ● | ● | RV5/50 | 1SBN050010R1000 | 2 | 0.015 |
| | 50...133 | ● | ● | RV5/133 | 1SBN050010R1001 | 2 | 0.015 |
| | 110...250 | ● | ● | RV5/250 | 1SBN050010R1002 | 2 | 0.015 |
| | 250...440 | ● | ● | RV5/440 | 1SBN050010R1003 | 2 | 0.015 |
| AS09..S ... AS16..S | 24...50 | ● | – | RC5-1/50 | 1SBN050100R1000 | 2 | 0.012 |
| | 50...133 | ● | – | RC5-1/133 | 1SBN050100R1001 | 2 | 0.012 |
| | 110...250 | ● | – | RC5-1/250 | 1SBN050100R1002 | 2 | 0.012 |
| | 250...440 | ● | – | RC5-1/440 | 1SBN050100R1003 | 2 | 0.012 |
| ASL09..S ... ASL16..S | 12...32 | – | ● | RT5/32 | 1SBN050020R1000 | 2 | 0.015 |
| | 25...65 | – | ● | RT5/65 | 1SBN050020R1001 | 2 | 0.015 |
| | 50...90 | – | ● | RT5/90 | 1SBN050020R1002 | 2 | 0.015 |
| | 77...150 | – | ● | RT5/150 | 1SBN050020R1003 | 2 | 0.015 |
| | 150...264 | – | ● | RT5/264 | 1SBN050020R1004 | 2 | 0.015 |




BEA16-3U

### Connecting links with manual motor starters

| For contactors | Manual motor starter | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| AS09..S ... AS16..S<br>ASL09..S ... ASL16..S | MS116-0.16 ... MS116-16<br>MS132-0.16 ... MS132-16 | BEA16-3U | 1SBN081020R1000 | 1 | 0.045 |

# AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

## Technical data



### Main pole - Utilization characteristics according to IEC

| Contactor types | AC operated | **AS09..S** | **AS12..S** | **AS16..S** |
|---|---|---|---|---|
| | DC operated | **ASL09..S** | **ASL12..S** | **ASL16..S** |
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1 | | |
| Rated operational voltage Ue max. | | 690 V | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | |
| Conventional free-air thermal current Ith | | | | |
| acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 20 A | 22 A | 22 A |
| With conductor cross-sectional area | | 2.5 mm² | 2.5 mm² | 2.5 mm² |
| AC-1 Utilization category | | | | |
| For air temperature close to contactor | | | | |
| Ie / Rated operational current AC-1 | θ ≤ 40 °C | 20 A | 22 A | 22 A |
| Ue max. ≤ 690 V, 50/60 Hz | θ ≤ 60 °C | 15 A | 17 A | 17 A |
| | θ ≤ 70 °C | 12 A | 14 A | 14 A |
| With conductor cross-sectional area | | 2.5 mm² | | |
| AC-3 Utilization category | | | | |
| For air temperature close to contactor θ ≤ 60 °C | | | | |
| Ie / Max. rated operational current AC-3 (1) | | | | |
| | 220-230-240 V | 9 A | 12 A | 15.7 A |
|  3-phase motors | 400 V | 9 A | 12 A | 15.5 A |
| | 415 V | 9 A | 12 A | 15.5 A |
| | 440 V | 8 A | 11 A | 13.6 A |
| | 500 V | 8 A | 11 A | 12.5 A |
| | 690 V | 5 A | 7 A | 9 A |
| Rated operational power AC-3 (1) | | | | |
| | 220-230-240 V | 2.2 kW | 3 kW | 4 kW |
|  1500 r.p.m. 50 Hz<br>1800 r.p.m. 60 Hz<br>3-phase motors | 400 V | 4 kW | 5.5 kW | 7.5 kW |
| | 415 V | 4 kW | 5.5 kW | 7.5 kW |
| | 440 V | 4 kW | 5.5 kW | 7.5 kW |
| | 500 V | 4 kW | 5.5 kW | 7.5 kW |
| | 690 V | 4 kW | 5.5 kW | 7.5 kW |
| Rated making capacity AC-3 | | 10 x Ie AC-3 acc. to IEC 60947-4-1 | | |
| Rated breaking capacity AC-3 | | 8 x Ie AC-3 acc. to IEC 60947-4-1 | | |
| AC-8a Utilization category | | | | |
| (without thermal overload relay - Ue 400 V 50/60 Hz - θ ≤ 40 °C) | | | | |
| Ie / Rated operational current AC-8a | | 12 A | 16 A | 22 A |
| Rated operational power AC-8a | | 5.5 kW | 7.5 kW | 11 kW |
| Short-circuit protection device for contactors | | | | |
| without thermal overload relay - Motor protection excluded (2) | | | | |
| Ue ≤ 500 V AC - gG type fuse | | 25 A | | |
| Rated short-time withstand current Icw | 1 s | 230 A | 250 A | 250 A |
| at 40 °C ambient temperature, | 10 s | 100 A | 124 A | 124 A |
| in free air from a cold state | 30 s | 65 A | 75 A | 75 A |
| | 1 min | 50 A | 55 A | 55 A |
| | 15 min | 20 A | 22 A | 22 A |
| Maximum breaking capacity | | | | |
| cos ϕ = 0.45 | at 440 V | 155 A | | |
| | at 690 V | 90 A | | |
| Power dissipation per pole | Ie / AC-1 | 0.9 W | 1.1 W | 1.1 W |
| | Ie / AC-3 | 0.18 W | 0.33 W | 0.55 W |
| Max. electrical switching frequency | AC-1 | 600 cycles/h | | |
| | AC-3 | 1200 cycles/h | | |
| | AC-4 | 300 cycles/h | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

# AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

Technical data



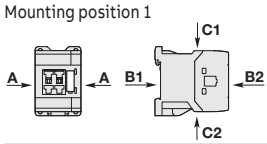
## Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC operated | **AS09..S** | **AS12..S** | **AS16..S** |
|---|---|---|---|---|
| | DC operated | **ASL09..S** | **ASL12..S** | **ASL16..S** |
| Standards | | UL 508, CSA C22.2 No. 14 | | |
| Max. operational voltage | | 690 V | | |
| NEMA size | | 00 | 00 | 00 |
| NEMA continuous amp rating | Thermal current | 9 A | | |
| NEMA maximum horse power ratings 1-phase, 60 Hz | 115 V AC | 1/3 hp | 1/3 hp | 1/3 hp |
| | 230 V AC | 1 hp | 1 hp | 1 hp |
| NEMA maximum horse power ratings 3-phase, 60 Hz | 200 V AC | 1-1/2 hp | 1-1/2 hp | 1-1/2 hp |
| | 230 V AC | 1-1/2 hp | 1-1/2 hp | 1-1/2 hp |
| | 460 V AC | 2 hp | 2 hp | 2 hp |
| | 575 V AC | 2 hp | 2 hp | 2 hp |
| UL / CSA General use rating | | | | |
| 600 V AC | | 12 A | 12 A | 15.2 A |
| With conductor cross-sectional area | | AWG 14 | AWG 14 | AWG 12 |
| UL / CSA maximum 1-phase motor rating | | | | |
| Full load current | 120 V AC | 7.2 A | 9.8 A | 13.8 A |
| | 240 V AC | 8 A | 10 A | 12 A |
| Horse power rating | 120 V AC | 1/3 hp | 1/2 hp | 3/4 hp |
| | 240 V AC | 1 hp | 1-1/2 hp | 2 hp |
| UL / CSA maximum 3-phase motor rating | | | | |
| Full load current (1) | 200-208 V AC | 7.8 A | 7.8 A | 11 A |
| | 220-240 V AC | 6.8 A | 9.6 A | 15.2 A |
| | 440-480 V AC | 7.6 A | 11 A | 14 A |
| | 550-600 V AC | 9 A | 11 A | 11 A |
| Horse power rating (1) | 200-208 V AC | 2 hp | 2 hp | 3 hp |
| | 220-240 V AC | 2 hp | 3 hp | 5 hp |
| | 440-480 V AC | 5 hp | 7-1/2 hp | 10 hp |
| | 550-600 V AC | 7-1/2 hp | 10 hp | 10 hp |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded | | | | |
| Fuse rating | | 40 A | 50 A | 60 A |
| Fuse type, 600 V | | J | | |
| Max. electrical switching frequency | | | | |
| For general use | | 600 cycles/h | | |
| For motor use | | 1200 cycles/h | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

## General technical data

| Contactor types | AC operated | **AS09..S** | **AS12..S** | **AS16..S** |
|---|---|---|---|---|
| | DC operated | **ASL09..S** | **ASL12..S** | **ASL16..S** |
| Rated insulation voltage Ui | | | | |
| acc. to IEC 60947-4-1 | | 690 V | | |
| acc. to UL / CSA | | 600 V | | |
| Rated impulse withstand voltage Uimp. | | 6 kV | | |
| Pollution degree | | 3 | | |
| Ambient air temperature close to contactor | | | | |
| Operation | | -40...+70 °C | | |
| Storage | | -60...+80 °C | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | |
| Maximum operating altitude (without derating) | | 3000 m | | |
| Mechanical durability | | | | |
| Number of operating cycles | | 10 millions operating cycles | | |
| Max. switching frequency | | 3600 cycles/h | | |
| Shock withstand | | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | |
| acc. to IEC/EN 60068-2-27 Mounting position 1 | Shock direction | AS contactors - AC operated | ASL contactors - DC operated | |
| | A | 20 g | 20 g closed position / 10 g open position | |
| | B1 | 10 g closed position / 5 g open position | 15 g closed position / 5 g open position | |
| | B2 | 15 g | 10 g | |
| | C1 | 20 g closed position / 9 g open position | 15 g closed position / 8 g open position | |
| | C2 | 20 g closed position / 14 g open position | 14 g closed position / 8 g open position | |
| Vibration withstand | acc. to IEC 60068-2-6 | 5...300 Hz / 3 g closed position / 2 g open position | | |



# AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

Technical data



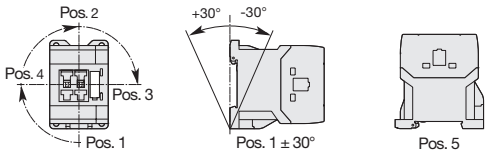
## Magnet system characteristics for AS09..S ... AS16..S contactors

| Contactor types | | | AC operated | **AS09..S** | **AS12..S** | **AS16..S** |
|---|---|---|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | | | AC supply | 0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C) | | |
| AC control voltage | Rated control circuit voltage Uc | | at 50 Hz | 24...415 V | | |
| | | | at 60 Hz | 24...415 V | | |
| | Coil consumption | Average pull-in value | 50 Hz | 33 VA | | |
| | | | 60 Hz | 33 VA | | |
| | | | 50/60 Hz | 33 VA | | |
| | | Average holding value | 50 Hz | 6.5 VA / 1.5 W | | |
| | | | 60 Hz | 5 VA / 1.2 W | | |
| | | | 50/60 Hz | 6.5 VA / 1.5 W | | |
| Drop-out voltage | | | | Approx. 30...50 % of Uc | | |
| Operating time | | | | | | |
| | Between coil energization and: | | N.O. contact closing | 9...24 ms | | |
| | | | N.C. contact opening | 6...18 ms | | |
| | Between coil de-energization and: | | N.O. contact opening (1) | 5...19 ms | | |
| | | | N.C. contact closing (1) | 7...22 ms | | |
| | | | | (1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3. | | |

## Magnet system characteristics for ASL09..S ... ASL16..S contactors

| Contactor types | | | DC operated | **ASL09..S** | **ASL12..S** | **ASL16..S** |
|---|---|---|---|---|---|---|
| Coil operating limits acc. to IEC 60947-4-1 | | | DC supply | 0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C) | | |
| DC control voltage | Rated control circuit voltage Uc | | | 12...240 V DC | | |
| | Coil consumption | Average pull-in value | | 3 W | | |
| | | Average holding value | | 3 W | | |
| Drop-out voltage | | | | Approx. 10...40 % of Uc | | |
| Coil time constant | Open | | L/R | 12 ms | | |
| | Closed | | L/R | 40 ms | | |
| Operating time | | | | | | |
| | Between coil energization and: | | N.O. contact closing | 36...59 ms | | |
| | | | N.C. contact opening | 31...53 ms | | |
| | Between coil de-energization and: | | N.O. contact opening (1) | 13...17 ms | | |
| | | | N.C. contact closing (1) | 15...20 ms | | |
| | | | | (1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2 | | |

## Mounting characteristics and conditions for use

| Contactor types | | AC operated | **AS09..S** | **AS12..S** | **AS16..S** |
|---|---|---|---|---|---|
| | | DC operated | **ASL09..S** | **ASL12..S** | **ASL16..S** |
| Mounting positions | | |  | | |
| Mounting distances | | | The contactors can be assembled side by side. | | |
| Fixing | On rail according to IEC/EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | | |
| | By screws (not supplied) | | 2 x M4 screws placed diagonally | | |

# AS09..S ... AS16..S and
# ASL09..S ... ASL16..S 3-pole contactors - with spring terminals
## Technical data

### Connecting characteristics

| Contactor types | AC operated | AS09..S | AS12..S | AS16..S |
|---|---|---|---|---|
| | DC operated | ASL09..S | ASL12..S | ASL16..S |
| Main terminals | |  Spring terminals | | |
| Connection capacity (min. ... max.) | | | | |
| Main conductors (poles) | | | | |
| Rigid Solid/Stranded | 1 x | 0.75...2.5 mm² | | |
| | 2 x | 0.75...2.5 mm² | | |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² | | |
| | 2 x | 0.75...2.5 mm² | | |
| Flexible with insulated ferrule | 1 x | 0.75...1.5 mm² | | |
| | 2 x | 0.75...1.5 mm² | | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...12 | | |
| Stripping length | | 10 mm | | |
| Auxiliary conductors (built-in auxiliary terminals + coil terminals) | | | | |
| Rigid Solid/Stranded | 1 x | 0.75...2.5 mm² | | |
| | 2 x | 0.75...2.5 mm² | | |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² | | |
| | 2 x | 0.75...2.5 mm² | | |
| Flexible with insulated ferrule | 1 x | 0.75...1.5 mm² | | |
| | 2 x | 0.75...1.5 mm² | | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 | | |
| Stripping length | | 10 mm | | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | | |
| All terminals | | IP20 | | |
| Screwdriver type | | Flat Ø 3.5 | | |

# AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

Technical data



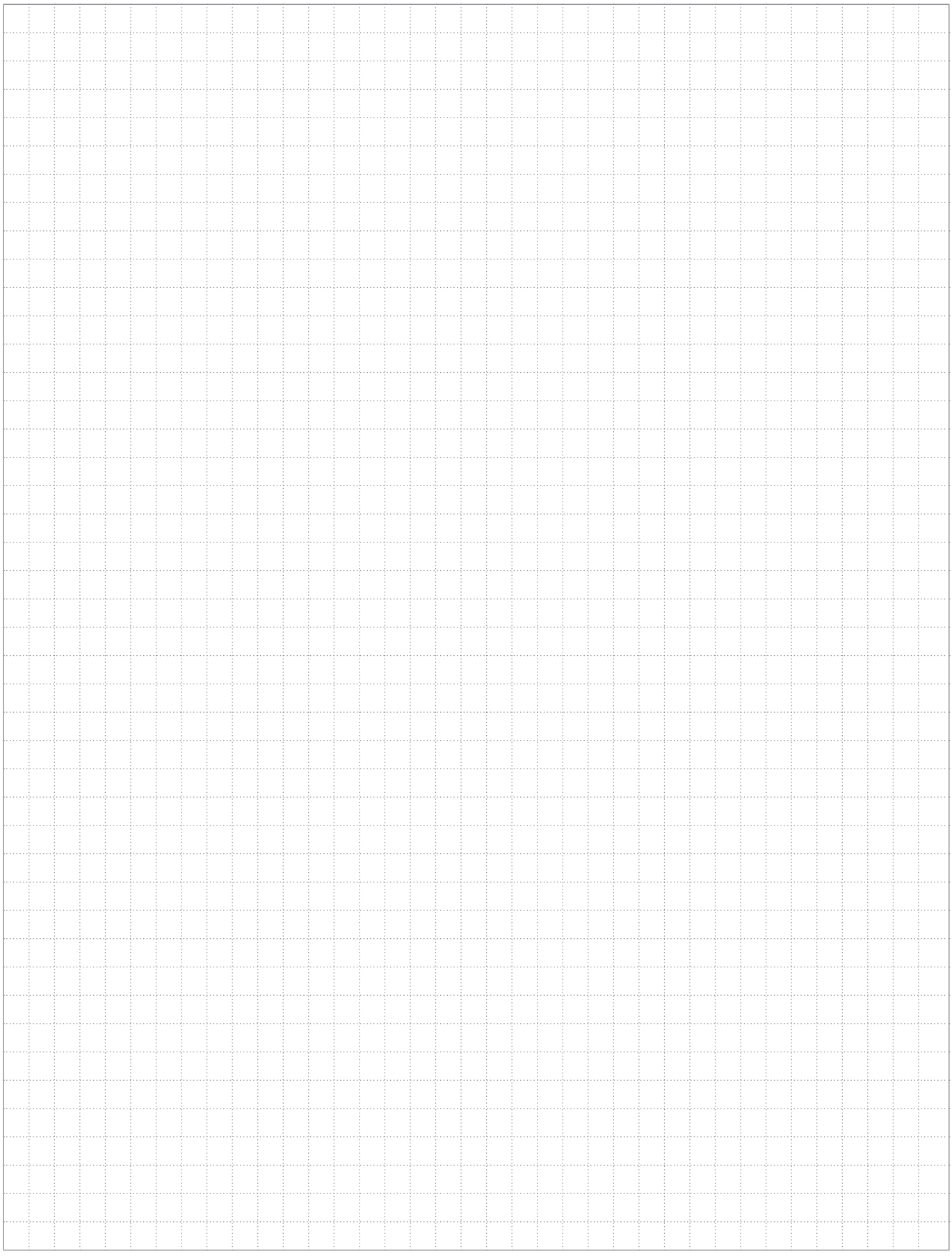
## Built-in auxiliary contacts according to IEC

| Contactor types | AC operated | **AS09..S** | **AS12..S** | **AS16..S** |
|---|---|---|---|---|
| | DC operated | **ASL09..S** | **ASL12..S** | **ASL16..S** |
| Rated operational voltage Ue max. | | 690 V | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | |
| Conventional free air thermal current Ith - θ ≤ 40 °C | | 10 A | | |
| Ie / Rated operational current AC-15 | | | | |
| acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A | | |
| | 220-240 V 50/60 Hz | 4 A | | |
| | 400-440 V 50/60 Hz | 3 A | | |
| | 500 V 50/60 Hz | 2 A | | |
| | 690 V 50/60 Hz | 2 A | | |
| Making capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | | |
| Breaking capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 | | |
| Ie / Rated operational current DC-13 | | | | |
| acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W | | |
| | 48 V DC | 2.8 A / 134 W | | |
| | 72 V DC | 1 A / 72 W | | |
| | 110 V DC | 0.55 A / 60 W | | |
| | 125 V DC | 0.55 A / 69 W | | |
| | 220 V DC | 0.27 A / 60 W | | |
| | 250 V DC | 0.27 A / 68 W | | |
| Short-circuit protection device gG type fuse | | 10 A | | |
| Rated short-time withstand current Icw | for 1.0 s | 100 A | | |
| | for 0.1 s | 140 A | | |
| Minimum switching capacity | | 12 V / 3 m | | |
| with failure rate acc. to IEC 60947-5-4 | | 10-7 | | |
| Non-overlapping time between N.O. and N.C. contacts | | 1.5 ms | | |
| Power dissipation per pole at 6 A | | 0.1 W | | |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h | | |
| | DC-13 | 900 cycles/h | | |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA3 aux. contact blocks) are mechanically linked contacts. | | |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA3 aux. contact blocks) are mirror contacts. | | |

## Built-in auxiliary contacts according to UL / CSA

| Contactor types | AC operated | **AS09..S** | **AS12..S** | **AS16..S** |
|---|---|---|---|---|
| | DC operated | **ASL09..S** | **ASL12..S** | **ASL16..S** |
| Max. operational voltage | | 600 V AC, 250 V DC | | |
| Pilot duty | | A600, Q300 | | |
| AC thermal rated current | | 10 A | | |
| AC maximum volt-ampere making | | 7200 VA | | |
| AC maximum volt-ampere breaking | | 720 VA | | |
| DC thermal rated current | | 2.5 A | | |
| DC maximum volt-ampere making-breaking | | 69 VA | | |

# Notes

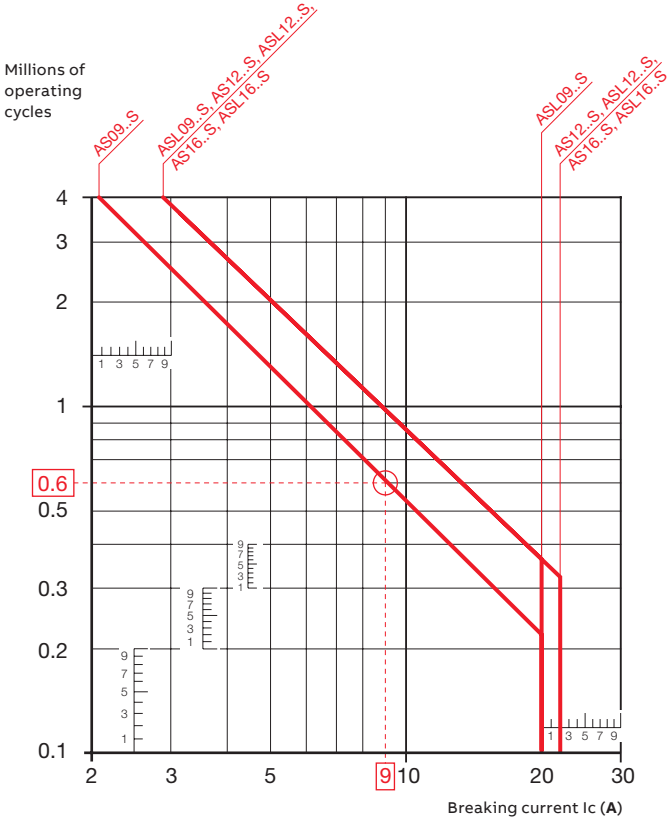


# AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

## Electrical durability

**Electrical durability for AC-1 utilization category - Ue ≤ 690 V**
**Note: AC-1 maximum current is selected according to ambient temperature. Please see technical data.**

Switching non-inductive or slightly inductive loads. The breaking current Ic for AC-1 is equal to the rated operational current of the load. Maximum electrical switching frequency: 600 cycles / hour.



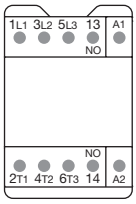

Example:
Breaking current = 9 A.
On the opposite curve at intersection "○" 9 A the corresponding value for the electrical durability is approximately 0.6 millions operating cycles.

# AS09..S ... AS16..S 3-pole contactors - with spring terminals

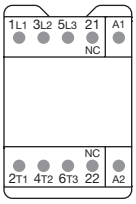
## Terminal marking and positioning

### AS..S contactors - AC operated

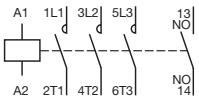
Standard devices without addition of auxiliary contacts



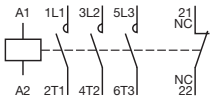

AS09 ... AS16-30-10S



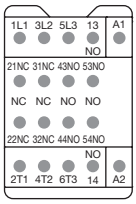

AS09 ... AS16-30-01S



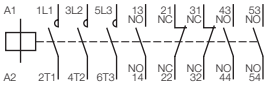

AS09 ... AS16-30-10S




AS09 ... AS16-30-01S

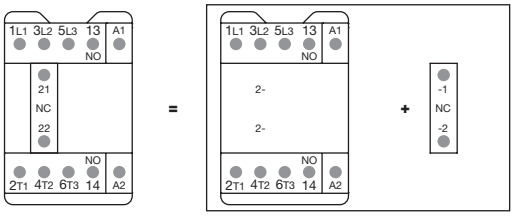



AS09 ... AS16-30-32S

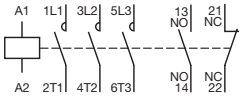



AS09 ... AS16-30-32S

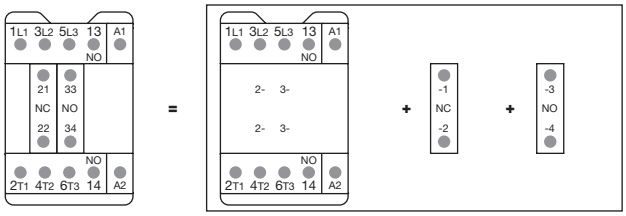
Other possible contact combinations with auxiliary contact blocks added by the user



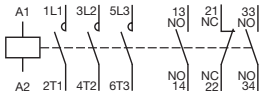

Combination 11 = AS09 ... AS16-30-10S + CA3-01S




Combination 11

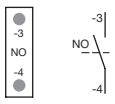



Combination 21 = AS09 ... AS16-30-10S + CA3-01S + CA3-10S

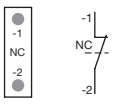



Combination 21

CA3..S 1-pole auxiliary contact blocks




CA3-10S




CA3-01S

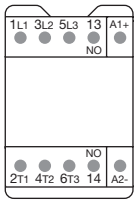
# ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

## Terminal marking and positioning

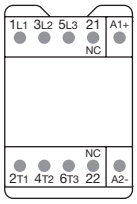


### ASL..S contactors - DC operated (the polarity A1+, A2- must be respected)

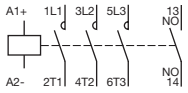
Standard devices without addition of auxiliary contacts



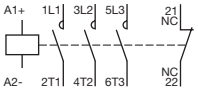

ASL09 ... ASL16-30-10S



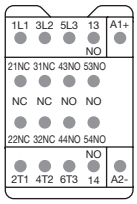

ASL09 ... ASL16-30-01S



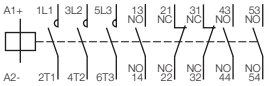

ASL09 ... ASL16-30-10S




ASL09 ... ASL16-30-01S

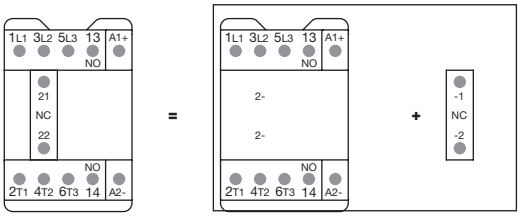



ASL09 ... ASL16-30-32

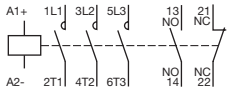



ASL09 ... ASL16-30-32S

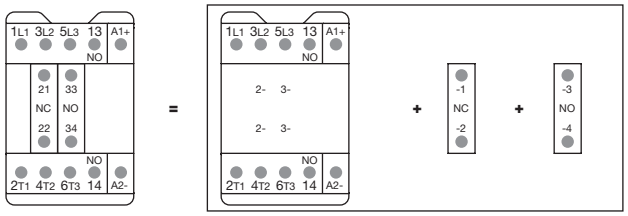
Other possible contact combinations with auxiliary contact blocks added by the user



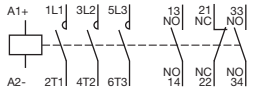

Combination 11 = ASL09 ... ASL16-30-10S + CA3-01S




Combination 11

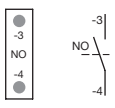



Combination 21 = ASL09 ... ASL16-30-10S + CA3-01S + CA3-10S

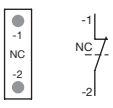



Combination 21

### CA3..S 1-pole auxiliary contact blocks



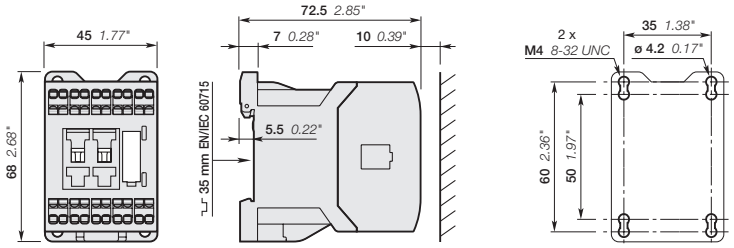

CA3-10S



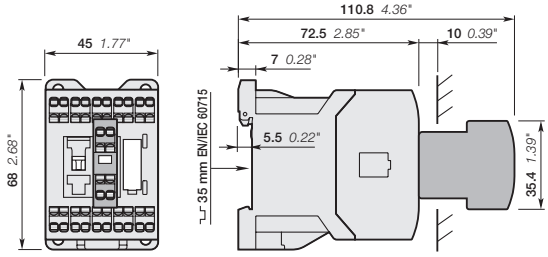

CA3-01S

# AS09..S ... AS16..S 3-pole contactors - with spring terminals

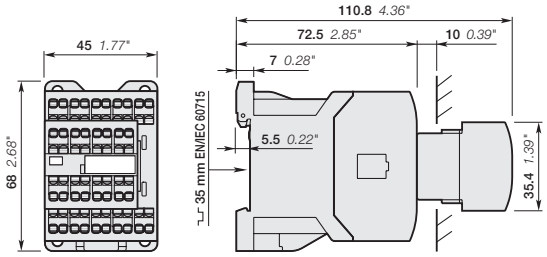
## Dimensions



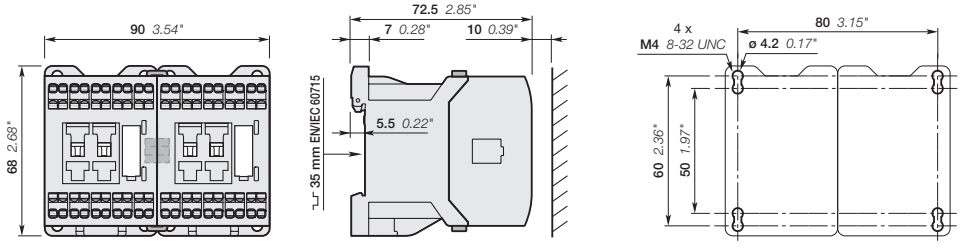

AS09..S, AS12..S, AS16..S




AS09..S, AS12..S, AS16..S
+ CA3..S front-mounted 1-pole auxiliary contact block




AS09...16-30-32S

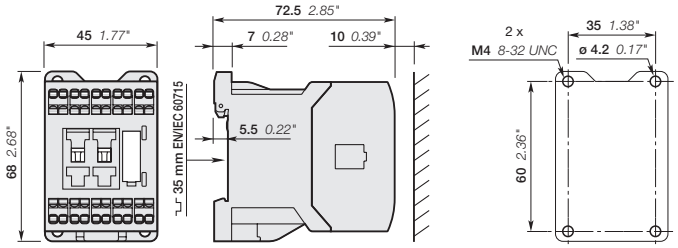



AS09..S, AS12..S, AS16..S
+ VM3 mechanical interlock unit including two BB3 fixing clips

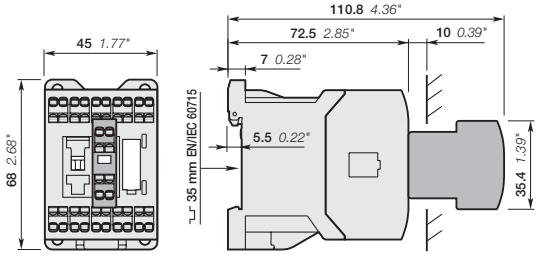
Main dimensions mm, inches

# ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

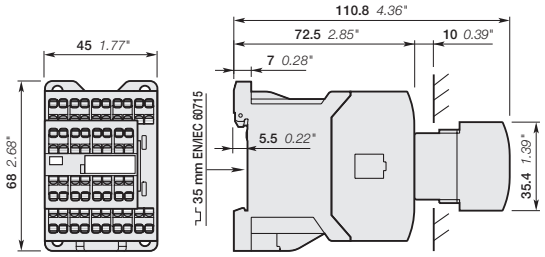
## Dimensions



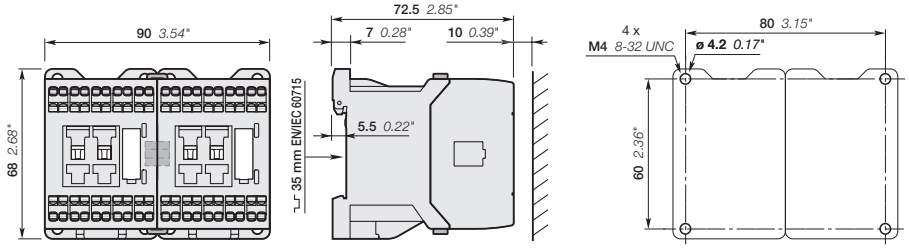

ASL09..S, ASL12..S, ASL16..S




ASL09..S, ASL12..S, ASL16..S
+ CA3..S front-mounted 1-pole auxiliary contact block




ASL09...16-30-32S




ASL09..S, ASL12..S, ASL16..S
+ VM3 mechanical interlock unit including two BB3 fixing clips

Main dimensions mm, inches

# NS..S contactor relays - with spring terminals

## AC operated

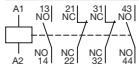
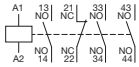
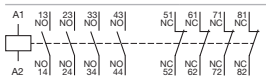
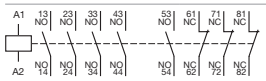
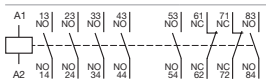
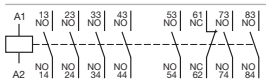



NS22ES

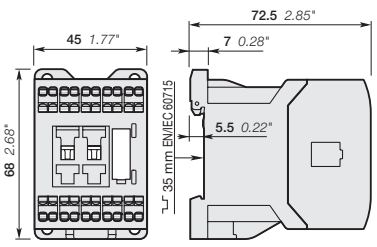
NS..S contactor relays are used for switching auxiliary and control circuits.

These contactor relays are designed with:

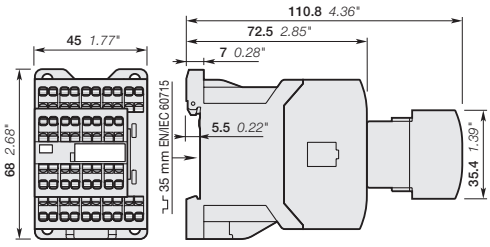
- spring terminals
- 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC operated
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

| Number of contacts<br>1st stack 2nd stack | Rated control circuit voltage Uc (1)<br>V 50 Hz | <br>V 60 Hz | Type | Order code | Weight<br>Pkg (1 pce)<br>kg |
|---|---|---|---|---|---|
|  | 24 | 24 | NS22ES-20 | 1SBH101004R2022 | 0.220 |
| | 220 | 220 | NS22ES-25 Relay | 1SBH101004R2522 | |
| | 230 | 230 | NS22ES-26 | 1SBH101004R2622 | 0.220 |
|  | 24 | 24 | NS31ES-20 | 1SBH101004R2031 | 0.220 |
| | 220 | 220 | NS31ES-25 Relay | 1SBH101004R2531 | |
| | 230 | 230 | NS31ES-26 | 1SBH101004R2631 | 0.220 |
|  | 24 | 24 | NS40ES-20 | 1SBH101004R2040 | 0.220 |
| | 220 | 220 | NS40ES-25 Relay | 1SBH101004R2540 | |
| | 230 | 230 | NS40ES-26 | 1SBH101004R2640 | 0.220 |
|  | 24 | 24 | NS44ES-20 | 1SBH101004R2044 | 0.260 |
| | 220 | 220 | NS44ES-25 Relay | 1SBH101004R2544 | |
| | 230 | 230 | NS44ES-26 | 1SBH101004R2644 | 0.260 |
|  | 24 | 24 | NS53ES-20 | 1SBH101004R2053 | 0.260 |
| | 220 | 220 | NS53ES-25 Relay | 1SBH101004R2553 | |
| | 230 | 230 | NS53ES-26 | 1SBH101004R2653 | 0.260 |
|  | 24 | 24 | NS62ES-20 | 1SBH101004R2062 | 0.260 |
| | 220 | 220 | NS62ES-25 Relay | 1SBH101004R2562 | |
| | 230 | 230 | NS62ES-26 | 1SBH101004R2662 | 0.260 |
|  | 24 | 24 | NS71ES-20 | 1SBH101004R2071 | 0.260 |
| | 220 | 220 | NS71ES-25 Relay | 1SBH101004R2571 | |
| | 230 | 230 | NS71ES-26 | 1SBH101004R2671 | 0.260 |
|  | 24 | 24 | NS80ES-20 | 1SBH101004R2080 | 0.260 |
| | 220 | 220 | NS80ES-25 Relay | 1SBH101004R2580 | |
| | 230 | 230 | NS80ES-26 | 1SBH101004R2680 | 0.260 |

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.




NS22ES, NS31ES, NS40ES




NS44ES, NS53ES, NS62ES, NS71ES, NS80ES

Main dimensions mm, inches

# NSL..S contactor relays - with spring terminals

## DC operated

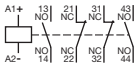
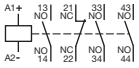
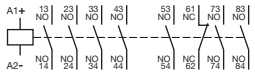



NSL22ES

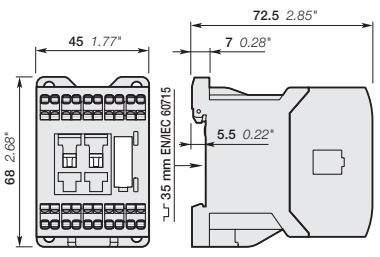
NSL..S contactor relays are used for switching auxiliary and control circuits.

These contactor relays are designed with:

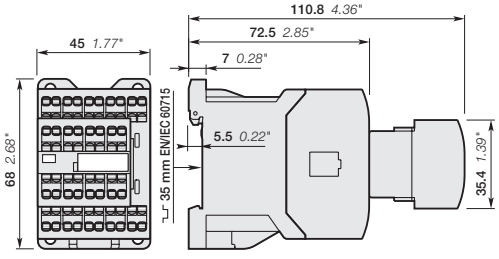
- spring terminals
- 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: low coil consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

| Number of contacts | | Rated control circuit voltage Uc (1) | Type | Order code | Weight |
|---|---|---|---|---|---|
| 1st stack | 2nd stack | V DC | | | Pkg (1 pce) kg |
|  | | 24 | NSL22ES-81 | 1SBH103004R8122 | 0.280 |
|  | | 24 | NSL31ES-81 | 1SBH103004R8131 | 0.280 |
|  | | 24 | NSL40ES-81 | 1SBH103004R8140 | 0.280 |
|  | | 24 | NSL44ES-81 | 1SBH103004R8144 | 0.320 |
|  | | 24 | NSL53ES-81 | 1SBH103004R8153 | 0.320 |
|  | | 24 | NSL62ES-81 | 1SBH103004R8162 | 0.320 |
|  | | 24 | NSL71ES-81 | 1SBH103004R8171 | 0.320 |
|  | | 24 | NSL80ES-81 | 1SBH103004R8180 | 0.320 |

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.




NSL22ES, NSL31ES, NSL40ES

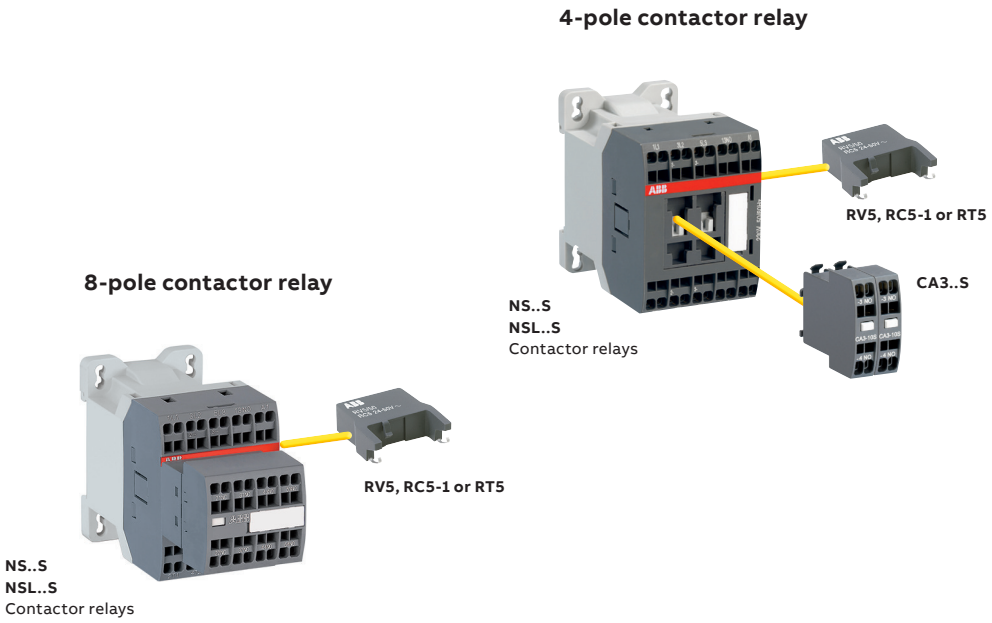



NSL44ES, NSL53ES, NSL62ES, NSL71ES, NSL80ES

Main dimensions mm, inches

# NS..S and NSL..S contactor relays - with spring terminals
## Main accessories

### Contactor relays and main accessories




### Main accessory fitting details

| Contactor types | Main poles | Front-mounted accessories Auxiliary contact blocks 1-pole CA3..S | | Side-mounted accessories Surge suppressors | |
|---|---|---|---|---|---|
| NS..S | 2 2 E | 2 max. | + | RV5 | or RC5-1 |
| NS..S | 3 1 E | | | | |
| NS..S | 4 0 E | | | | |
| NS..S | 4 4 E | – | | RV5 | or RC5-1 |
| NS..S | 5 3 E | | | | |
| NS..S | 6 2 E | | | | |
| NS..S | 7 1 E | | | | |
| NS..S | 8 0 E | | | | |
| NSL..S | 2 2 E | 2 max. | + | RV5 | or RT5 |
| NSL..S | 3 1 E | | | | |
| NSL..S | 4 0 E | | | | |
| NSL..S | 4 4 E | – | | RV5 | or RT5 |
| NSL..S | 5 3 E | | | | |
| NSL..S | 6 2 E | | | | |
| NSL..S | 7 1 E | | | | |
| NSL..S | 8 0 E | | | | |

# NS..S and NSL..S contactor relays - with spring terminals

## Main accessories

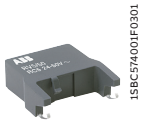



CA3-10S

### Front mounted instantaneous auxiliary contact blocks

| For contactor relays | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| NS..S, NSL..S | 1 0 | CA3-10S | 1SBN011019T1010 | 10 | 0.011 |
| | 0 1 | CA3-01S | 1SBN011019T1001 | 10 | 0.011 |






RV5

### Surge suppressors

| For contactor relays | Rated control circuit voltage - Uc V | AC | DC | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|---|---|
| NS..S, NSL..S | 24...50 | ● | ● | RV5/50 | 1SBN050010R1000 | 2 | 0.015 |
| | 50...133 | ● | ● | RV5/133 | 1SBN050010R1001 | 2 | 0.015 |
| | 110...250 | ● | ● | RV5/250 | 1SBN050010R1002 | 2 | 0.015 |
| | 250...440 | ● | ● | RV5/440 | 1SBN050010R1003 | 2 | 0.015 |
| NS..S | 24...50 | ● | – | RC5-1/50 | 1SBN050100R1000 | 2 | 0.012 |
| | 50...133 | ● | – | RC5-1/133 | 1SBN050100R1001 | 2 | 0.012 |
| | 110...250 | ● | – | RC5-1/250 | 1SBN050100R1002 | 2 | 0.012 |
| | 250...440 | ● | – | RC5-1/440 | 1SBN050100R1003 | 2 | 0.012 |
| NSL..S | 12...32 | – | ● | RT5/32 | 1SBN050020R1000 | 2 | 0.015 |
| | 25...65 | – | ● | RT5/65 | 1SBN050020R1001 | 2 | 0.015 |
| | 50...90 | – | ● | RT5/90 | 1SBN050020R1002 | 2 | 0.015 |
| | 77...150 | – | ● | RT5/150 | 1SBN050020R1003 | 2 | 0.015 |
| | 150...264 | – | ● | RT5/264 | 1SBN050020R1004 | 2 | 0.015 |

# NS..S and NSL..S contactor relays - with spring terminals
## Technical data



### Contact utilization characteristics according to IEC

| | | |
|---|---|---|
| Contactor relay types | AC operated | **NS..S** |
| | DC operated | **NSL..S** |
| Standards | | IEC/EN 60947-5-1 |
| Rated operational voltage Ue max. | | 690 V |
| Rated frequency (without derating) | | 50 / 60 Hz |
| Conventional free-air thermal current Ith θ ≤ 40 °C | | 10 A |
| Ie / Rated operational current AC-15 | | |
| acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A |
| | 220-240 V 50/60 Hz | 4 A |
| | 400-440 V 50/60 Hz | 3 A |
| | 500 V 50/60 Hz | 2 A |
| | 690 V 50/60 Hz | 2 A |
| Making capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 |
| Breaking capacity AC-15 | | 10 x Ie AC-15 acc. to IEC 60947-5-1 |
| Ie / Rated operational current DC-13 | | |
| acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W |
| | 48 V DC | 2.8 A / 134 W |
| | 72 V DC | 1 A / 72 W |
| | 110 V DC | 0.55 A / 60 W |
| | 125 V DC | 0.55 A / 69 W |
| | 220 V DC | 0.27 A / 60 W |
| | 250 V DC | 0.27 A / 68 W |
| Short-circuit protection device for contactors | | |
| Ue ≤ 500 V AC - gG type fuse | | 10 A |
| Rated short-time withstand current Icw | for 1.0 s | 100 A |
| at 40 °C ambient temperature,in free air from a cold state | for 0.1 s | 140 A |
| Minimum switching capacity | | 12 V / 3 mA |
| with failure rate acc. to IEC 60947-5-4 | | 10-7 |
| Non-overlapping time between N.O. and N.C. contacts | | 1.5 ms |
| Power dissipation per pole at 6 A | | 0.1 W |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h |
| | DC-13 | 900 cycles/h |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA3..S aux. contact blocks) are mechanically linked contacts. |

### Contact utilization characteristics according to UL / CSA

| | | |
|---|---|---|
| Contactor relay types | AC operated | **NS..S** |
| | DC operated | **NSL..S** |
| Standards | | UL 508, CSA C22.2 No. 14 |
| Max. operational voltage | | 600 V AC, 250 V DC |
| Pilot duty | | A600, Q300 |
| AC thermal rated current | | 10 A |
| AC maximum volt-ampere making | | 7200 VA |
| AC maximum volt-ampere breaking | | 720 VA |
| DC thermal rated current | | 2.5 A |
| DC maximum volt-ampere making-breaking | | 69 VA |

# NS..S and NSL..S contactor relays - with spring terminals

## Technical data



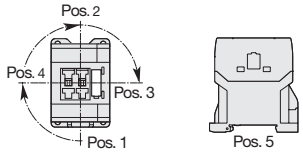
### Magnet system characteristics for NS..S contactor relays

| | | | | |
|---|---|---|---|---|
| Contactor relay types | | | AC operated | **NS..S** |
| Coil operating limits | | | AC supply | |
| acc. to IEC 60947-5-1 | | | | 0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C) |
| AC control voltage | Rated control circuit voltage Uc | | at 50 Hz | 24...415 V |
| | | | at 60 Hz | 24...415 V |
| | Coil consumption | Average pull-in value | 50 Hz | 33 VA |
| | | | 60 Hz | 33 VA |
| | | | 50/60 Hz | 33 VA |
| | | Average holding value | 50 Hz | 6.5 VA / 1.5 W |
| | | | 60 Hz | 5 VA / 1.2 W |
| | | | 50/60 Hz | 6.5 VA / 1.5 W |
| Drop-out voltage | | | | Approx. 30...50 % of Uc |
| Operating time | | | | |
| | Between coil energization and: | | N.O. contact closing | 9...24 ms |
| | | | N.C. contact opening | 6...18 ms |
| | Between coil de-energization and: | | N.O. contact opening (1) | 5...19 ms |
| | | | N.C. contact closing (1) | 7...22 ms |
| | | | | (1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3. |

### Magnet system characteristics for NSL..S contactor relays

| | | | | |
|---|---|---|---|---|
| Contactor relay types | | | DC operated | **NSL..S** |
| Coil operating limits | | | DC supply | |
| acc. to IEC 60947-5-1 | | | | 0.85...1.1 x Uc (at θ ≤ 60 °C); Uc (at θ ≤ 70 °C) |
| DC control voltage | | | | |
| | Rated control circuit voltage Uc | | | 12...240 V DC |
| | Coil consumption | Average pull-in value | | 3 W |
| | | Average holding value | | 3 W |
| Drop-out voltage | | | | Approx. 10...40 % of Uc |
| Coil time constant | | Open | L/R | 12 ms |
| | | Closed | L/R | 40 ms |
| Operating time | | | | |
| | Between coil energization and: | | N.O. contact closing | 36...59 ms |
| | | | N.C. contact opening | 31...53 ms |
| | Between coil de-energization and: | | N.O. contact opening (1) | 13...17 ms |
| | | | N.C. contact closing (1) | 15...20 ms |
| | | | | (1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2. |

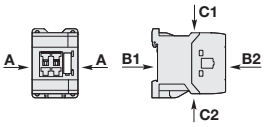
### Mounting characteristics and conditions for use

| | | | |
|---|---|---|---|
| Contactor relay types | | AC operated | **NS..S** |
| | | DC operated | **NSL..S** |
| Mounting positions | | |  |
| Mounting distances | | | The contactor relays can be assembled side by side. |
| Fixing | On rail according to IEC/EN 60715 | | 35 x 7.5 mm or 35 x 15 mm |
| | By screws (not supplied) | | 2 x M4 screws placed diagonally |

# NS..S and NSL..S contactor relays - with spring terminals

## Technical data

### General technical data

| | | | |
|---|---|---|---|
| Contactor relay types | AC operated | **NS..S** | |
| | DC operated | **NSL..S** | |
| Rated insulation voltage Ui | | | |
| acc. to IEC 60947-5-1 | | 690 V | |
| acc. to UL / CSA | | 600 V | |
| Rated impulse withstand voltage Uimp. | | 6 kV | |
| Pollution degree | | 3 | |
| Ambient air temperature close to contactor relay | | | |
| Operation in free air | | -40...+70 °C | |
| Storage | | -60...+80 °C | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | |
| Maximum operating altitude (without derating) | | 3000 m | |
| Mechanical durability | | | |
| Number of operating cycles | | 20 millions operating cycles | |
| Max. switching frequency | | 3600 cycles/h | |
| Shock withstand | | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | |
| acc. to IEC/EN 60068-2-27 | Shock direction | | |
| Mounting position 1 | | NS contactor relays - AC operated | NSL contactor relays - DC operated |
|  | A | 20 g | 20 g closed position / 10 g open position |
| | B1 | 5 g | 15 g closed position / 5 g open position |
| | B2 | 15 g | 10 g |
| | C1 | 19 g closed position / 8 g open position | 19 g closed position / 8 g open position |
| | C2 | 16 g closed position / 13 g open position | 14 g closed position / 8 g open position |
| Vibration withstand | | 5...300 Hz | |
| acc. to IEC 60068-2-6 | | 3 g closed position / 2 g open position | |



### Connecting characteristics

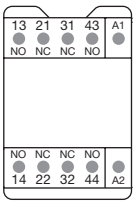
| | | |
|---|---|---|
| Contactor relay types | AC operated | **NS..S** |
| | DC operated | **NSL..S** |
| Main terminals | |  Spring terminals |
| Connection capacity (min. ... max.) | | |
| Pole and coil terminals | | |
| Rigid Solid/Stranded | 1 x | 0.75...2.5 mm² |
| | 2 x | 0.75...2.5 mm² |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² |
| | 2 x | 0.75...2.5 mm² |
| Flexible with insulated ferrule | 1 x | 0.75...1.5 mm² |
| | 2 x | 0.75...1.5 mm² |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 |
| Stripping length | | 10 mm |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | |
| All terminals | | IP20 |
| Screwdriver type | | Flat Ø 3.5 |

# NS..S contactor relays - with spring terminals

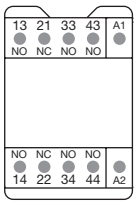
## Terminal marking and positioning

### NS..S contactor relays - AC operated

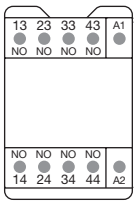
Standard devices without addition of auxiliary contact blocks



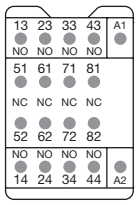

NS22ES



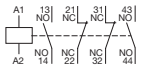

NS31ES



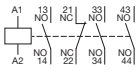

NS40ES




NS44ES



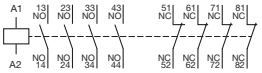

NS22ES



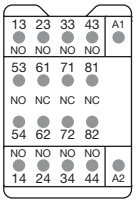

NS31ES



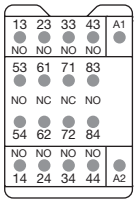

NS40ES



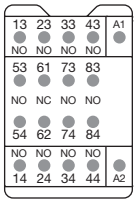

NS44ES



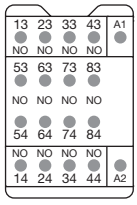

NS53ES




NS62ES




NS71ES




NS80ES



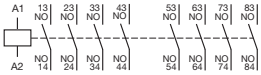

NS53ES




NS62ES

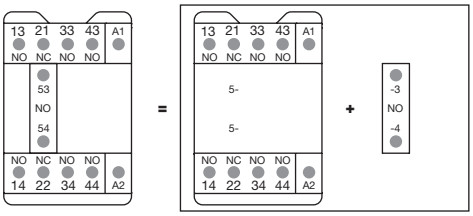



NS71ES

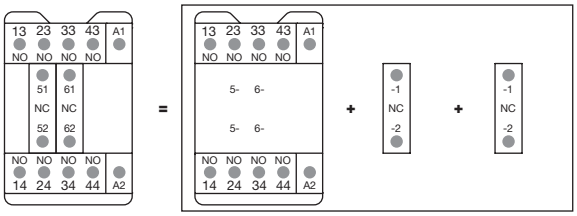



NS80ES

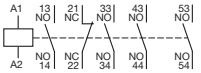
Other possible contact combinations with auxiliary contact blocks added by the user



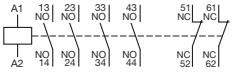

Combination 41E = NS31ES + CA3-10S



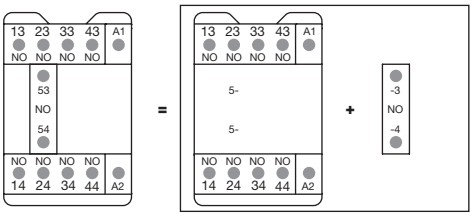

Combination 42E = NS40ES + CA3-01S + CA3-01S



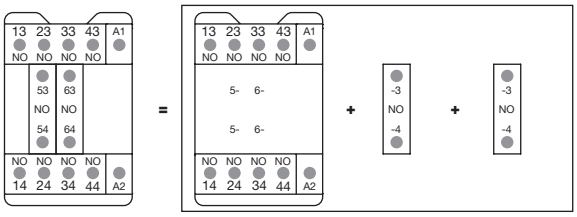

Combination 41E



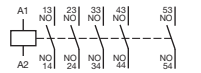

Combination 42E



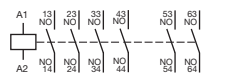

Combination 50E = NS40ES + CA3-10S




Combination 60E = NS40ES + CA3-10S + CA3-10S

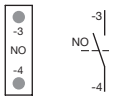



Combination 50E

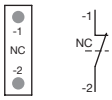



Combination 60E

### CA3..S 1-pole auxiliary contact blocks




CA3-10S



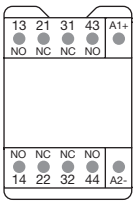

CA3-01S

# NSL..S contactor relays - with spring terminals

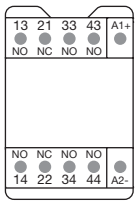
## Terminal marking and positioning

### NSL..S contactor relays - DC operated (the polarity A1+, A2- must be respected)

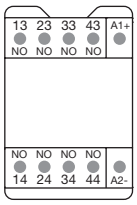
Standard devices without addition of auxiliary contact blocks



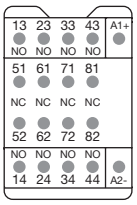

NSL22ES



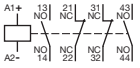

NSL31ES



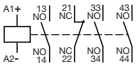

NSL40ES



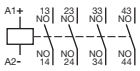

NSL44ES




NSL22ES



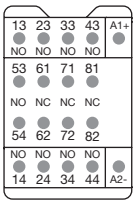

NSL31ES



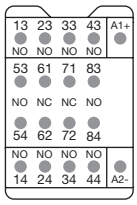

NSL40ES



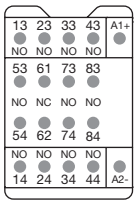

NSL44ES



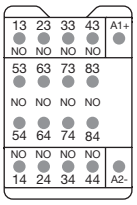

NSL53ES




NSL62ES




NSL71ES



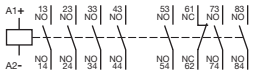

NSL80ES




NSL53ES




NSL62ES

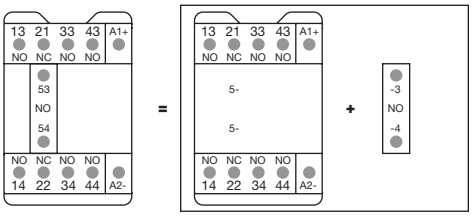



NSL71ES

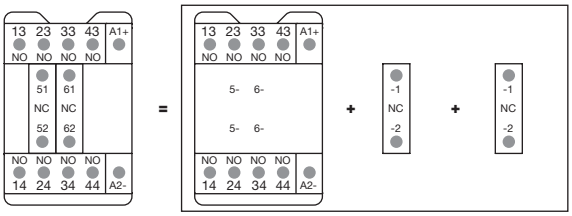



NSL80ES

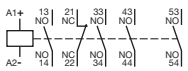
Other possible contact combinations with auxiliary contact blocks added by the user



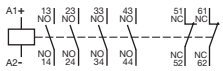

Combination 41E = NSL31ES + CA3-10S



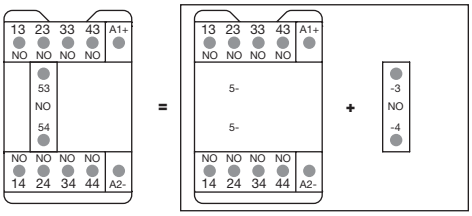

Combination 42E = NS4L0ES + CA3-01S + CA3-01S



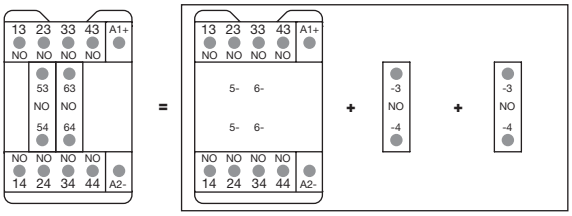

Combination 41E



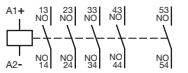

Combination 42E



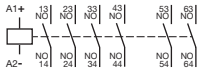

Combination 50E = NSL40ES + CA3-10S




Combination 60E = NSL40ES + CA3-10S + CA3-10S

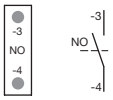



Combination 50E

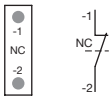



Combination 60E

### CA3..S 1-pole auxiliary contact blocks




CA3-10S

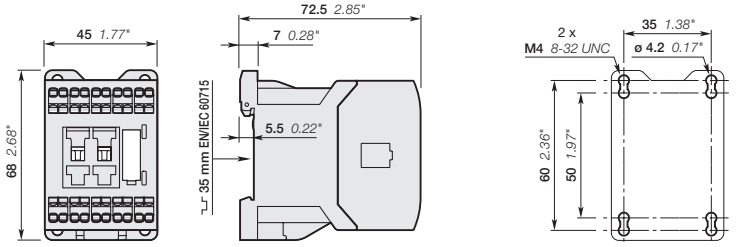



CA3-01S

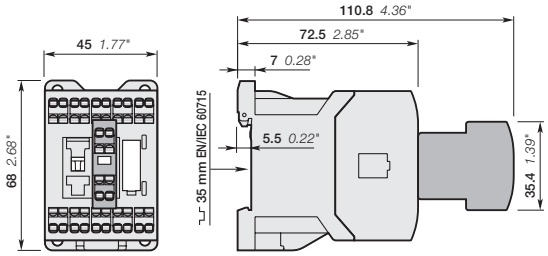
# NS..S contactor relays - with spring terminals
## Dimensions



### 4-pole contactor relays

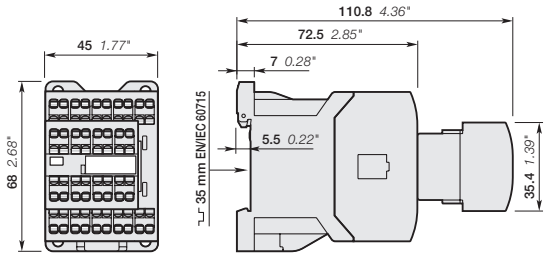



NS22ES, NS31ES, NS40ES




NS22ES, NS31ES, NS40ES
+ CA3..S front-mounted 1-pole auxiliary contact block

### 8-pole contactor relays



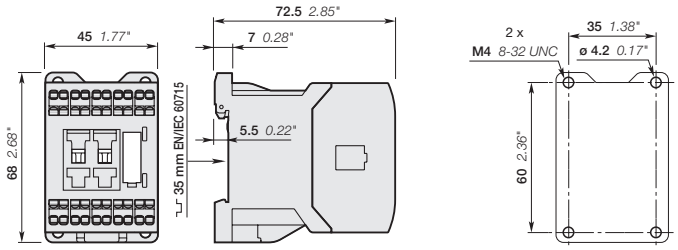

NS44ES, NS53ES, NS62ES, NS71ES, NS80ES

Main dimensions mm, inches

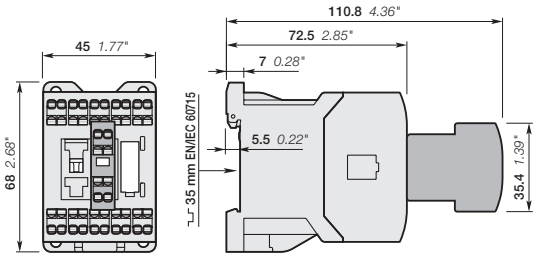
# NSL..S contactor relays - with spring terminals

## Dimensions

### 4-pole contactor relays

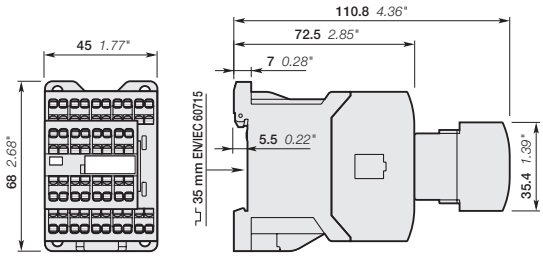



NSL22ES, NSL31ES, NSL40ES




NSL22ES, NSL31ES, NSL40ES
+ CA3..S front-mounted 1-pole auxiliary contact block

### 8-pole contactor relays




NSL44ES, NSL53ES, NSL62ES, NSL71ES, NSL80ES

Main dimensions mm, inches

# Auxiliary contact blocks - with spring terminals

## Accessories




CA3-10S

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits.

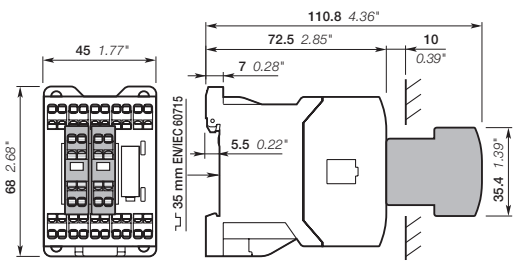
CA3 1-pole auxiliary contact blocks, designed for standard industrial environments, are equipped with:

- N.O. or N.C. contacts.
- spring-type connecting terminals.

All 1-pole auxiliary contact blocks are protected against accidental direct contact and bear the corresponding function marking.

A maximum of two 1-pole auxiliary contact blocks can be front-mounted on 1-stack contactors or 1-stack contactor relays.

| For contactors | For contactor relays | Contact blocks  | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|---|
| **1-pole auxiliary contact blocks with spring terminals** | | | | | | |
| AS09..S ... AS16..S | NS..S, NSL..S | 1 – | CA3-10S | 1SBN011019T1010 | 10 | 0.011 |
| ASL09..S ... ASL16..S | | – 1 | CA3-01S | 1SBN011019T1001 | 10 | 0.011 |




Main dimensions mm, inches

# Auxiliary contact blocks - with spring terminals

Front mounting



## Technical data

| Types | | 1-pole CA3..S |
|---|---|---|
| **Contact utilization characteristics according to IEC** | | |
| Standards | | IEC/EN 60947-5-1 |
| Rated insulation voltage Ui acc. to IEC 60947-5-1 | | 690 V |
| Pollution degree | | 3 |
| Rated impulse withstand voltage Uimp | | 6 kV |
| Rated operational voltage Ue max. | | 690 V |
| Conventional thermal current Ith - θ ≤ 40 °C | | 10 A |
| Ie / Rated operational current AC-15 | | |
| acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A |
| | 220-240 V 50/60 Hz | 4 A |
| | 400-440 V 50/60 Hz | 3 A |
| | 500 V 50/60 Hz | 2 A |
| | 690 V 50/60 Hz | 2 A |
| Making capacity | | 10 x Ie AC-15 acc. to IEC 60947-5-1 |
| Breaking capacity | | 10 x Ie AC-15 acc. to IEC 60947-5-1 |
| Ie / Rated operational current DC-13 | | |
| acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W |
| | 48 V DC | 2.8 A / 134 W |
| | 72 V DC | 1 A / 72 W |
| | 110 V DC | 0.55 A / 60 W |
| | 125 V DC | 0.55 A / 69 W |
| | 220 V DC | 0.27 A / 60 W |
| | 250 V DC | 0.27 A / 68 W |
| Short-circuit protection device gG type fuse | | 10 A |
| Rated short-time withstand current Icw | for 1.0 s | 100 A |
| θ = 40 °C | for 0.1 s | 140 A |
| Minimum switching capacity | | 12 V / 3 mA |
| with failure rate acc. to IEC 60947-5-4 | | 10-7 |
| Power dissipation per pole at 6 A | | 0.1 W |
| Mechanical durability | | |
| Number of operating cycles | | 10 millions operating cycles |
| Max. switching frequency | | 3600 cycles/h |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h |
| | AC-13 | 900 cycles/h |
| Mechanically linked contact acc. to annex L of IEC 60947-5-1 | | Additional N.O. or N.C. auxiliary contacts (CA3..S aux. contact blocks) are mechanically linked contacts |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | Additional N.C. auxiliary contacts (CA3..S aux. contact blocks) are mirror contacts |
| **Contact utilization characteristics according to UL / CSA** | | |
| Standards | | UL 508, CSA C22.2 No. 14 |
| Max. operational voltage | | 690 V AC, 250 V DC |
| Pilot duty | | A600, Q300 |
| AC thermal rated current | | 10 A |
| AC maximum volt-ampere making | | 7200 VA |
| AC maximum volt-ampere breaking | | 720 VA |
| DC thermal rated current | | 2.5 A |
| DC maximum volt-ampere making-breaking | | 69 VA |
| **Connecting characteristics** | | |
| Connection capacity (min. ... max.) | | |
| Rigid Solid/Stranded | 1 x | 0.75...2.5 mm² |
| | 2 x | 0.75...2.5 mm² |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm² |
| | 2 x | 0.75...2.5 mm² |
| Flexible with insulated ferrule | 1 x | 0.75...1.5 mm² |
| | 2 x | 0.75...1.5 mm² |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 |
| Stripping length | | 10 mm |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | IP20 |
| Screw terminals | | |
| All terminals | | Spring terminals |
| Screwdriver type | | Flat Ø 3.5 |

# Auxiliary contact blocks for AS09..S ... AS16..S, ASL09..S ... ASL16..S contactors and NS, NSL contactor relays - with spring terminals

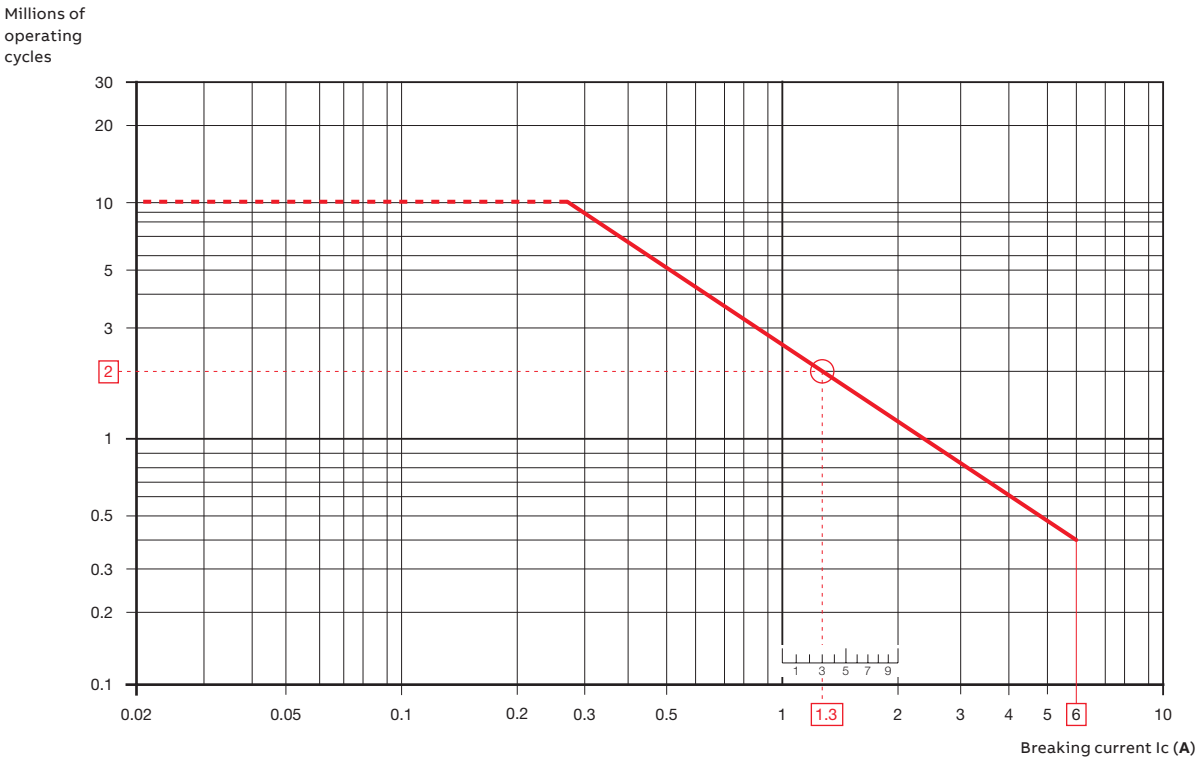
## Electrical durability

### Electrical durability for AC-15 utilization category - Ue ≤ 400 V

AC-15 utilization category according to IEC/EN 60947-5-1:
- making current: 10 x Ie with cos ϕ = 0.7 and Ue
- breaking current: Ie with cos ϕ = 0.4 and Ue.

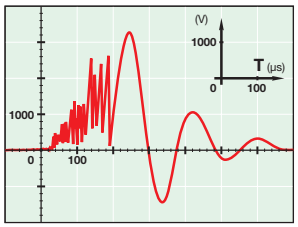
This curve represents the electrical durability of the built-in or add-on auxiliary contacts in relation to the breaking current.

The curve has been drawn for resistive and inductive loads up to 400 V:
- AS09..S ... AS16..S and ASL09..S ... ASL16..S contactor built-in auxiliary contacts
- 1-pole CA3..S
- NS..S and NSL..S contactor relays.




**Example:**
Breaking current = 1.3 A
On the opposite curve at intersection "○" 1.3 A the corresponding value for the electrical durability is approximately 2 millions operating cycles.

# Surge suppressors for contactor coils
## Accessories




The operation of inductive circuits causes overvoltages, in particular on opening the contactor coil.

The electromagnetic energy stored in the coil during contactor closing is restored on opening in the form of surges, the slope and amplitude of which may rise to several kilovolts. A number of drawbacks are observed ranging from interference on the electronic devices to the breakdown of insulators and even the destruction of certain sensitive components.

The graph opposite reproduces the oscillogram showing voltage discharges at the terminals of a 42 V / 50 Hz coil without peak clipping. The coil was switched by 8 series-connected poles of a contactor relay.

Following a burst of discharges with a very steep slope, a damped oscillation emerges with a peak value of 3500 V.

**Overvoltage Factor**

The overvoltage factor k is defined as the ratio of the maximum overvoltage peak value Ûs to the peak value Ûc of the coil rated control voltage Uc:

$k = \frac{\hat{U}s\ max.}{\hat{U}c}$ in DC $k = \frac{\hat{U}s\ max.}{Uc}$ in AC $k = \frac{\hat{U}s\ max.}{Uc\ \sqrt{2}}$

For example the following is obtained for the above graph: $k = \frac{3500}{42\ \sqrt{2}} \approx 60$

To reduce the harmful effects of these overvoltages, ABB has developed a range of surge suppressors designed to reduce the k factor defined above and to limit or even completely eliminate the high pre-damping voltage frequencies.

Each case is different, but the technical data tolerances and generous sizing of parts have enabled us to reduce the number of variants.

We have chosen the following solutions: transil diodes, varistors and RC blocks.

Note: A varistor is a resistor whose value decreases to a very large extent when a certain voltage is applied at its terminals.



RV5

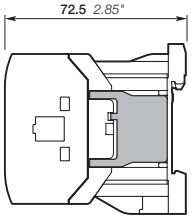


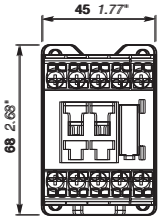
RC5-1



RT5

| For contactors | For contactor relays | Rated control circuit voltage - Uc | | | Type | Order code | Pkg qty | Weight (1 pce) |
|---|---|---|---|---|---|---|---|---|
| | | V | DC | AC | | | | kg |
| AS..S, ASL..S | NS..S, NSL..S | 24...50 | ● | ● | RV5/50 | 1SBN050010R1000 | 2 | 0.015 |
| | | 50...133 | ● | ● | RV5/133 | 1SBN050010R1001 | 2 | 0.015 |
| | | 110...250 | ● | ● | RV5/250 | 1SBN050010R1002 | 2 | 0.015 |
| | | 250...440 | ● | ● | RV5/440 | 1SBN050010R1003 | 2 | 0.015 |
| AS..S | NS..S | 24...50 | – | ● | RC5-1/50 | 1SBN050100R1000 | 2 | 0.012 |
| | | 50...133 | – | ● | RC5-1/133 | 1SBN050100R1001 | 2 | 0.012 |
| | | 110...250 | – | ● | RC5-1/250 | 1SBN050100R1002 | 2 | 0.012 |
| | | 250...440 | – | ● | RC5-1/440 | 1SBN050100R1003 | 2 | 0.012 |
| ASL..S | NSL..S | 12...32 | ● | – | RT5/32 | 1SBN050020R1000 | 2 | 0.015 |
| | | 25...65 | ● | – | RT5/65 | 1SBN050020R1001 | 2 | 0.015 |
| | | 50...90 | ● | – | RT5/90 | 1SBN050020R1002 | 2 | 0.015 |
| | | 77...150 | ● | – | RT5/150 | 1SBN050020R1003 | 2 | 0.015 |
| | | 150...264 | ● | – | RT5/264 | 1SBN050020R1004 | 2 | 0.015 |




Main dimensions mm, inches

**Easy connection to the coil terminals**
(parallel mounting)
Clip-on for both fixing and connection.

**No additional space**
Clipped onto the right side part of the contactor base without changing contactor overall dimensions and keeping a free access to coil terminals.

# Surge suppressors for contactor coils
## Technical data

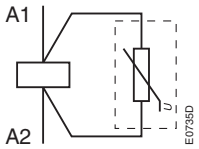


| **Varistor** | **RV5/50** | **RV5/133** | **RV5/250** | **RV5/440** |
|---|---|---|---|---|
| Rated control circuit voltage Uc | 24...50 V AC | 50...133 V AC | 110...250 V AC | 250...440 V AC |
| | 24...50 V DC | 50...133 V DC | 110...250 V DC | 250...440 V DC |
| Residual overvoltage (clipping voltage) | 132 V AC | 270 V AC | 480 V AC | 825 V AC |
| | 132 V DC | 270 V DC | 480 V DC | 825 V DC |
| Opening time growth factor | none | | | |
| Operating temperature | -20...+70 °C | | | |
| Advantages | High energy absorption: good damping - Unpolarized system. | | | |
| Drawback | Clipping as from Uvdr*, thus voltage front up to this point. | | | |
| | *Uvdr = Varistor operating voltage (voltage dependent resistor), tolerance ± 10 %. | | | |

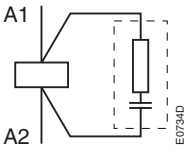
| **RC type** | **RC5-1/50** | **RC5-1/133** | **RC5-1/250** | **RC5-1/440** |
|---|---|---|---|---|
| Rated control circuit voltage Uc | 24...50 V AC | 50...133 V AC | 110...250 V AC | 250...440 V AC |
| Residual overvoltage (clipping voltage) | 2 to 3 x Uc max. | | | |
| Opening time growth factor | 2...3 | | | |
| Operating temperature | -20...+70 °C | | | |
| Advantages | Very fast clipping - Attenuation of steep fronts and thus of high frequencies. | | | |

| **Transil diode** | **RT5/32** | **RT5/65** | **RT5/90** | **RT5/150** | **RT5/264** |
|---|---|---|---|---|---|
| Rated control circuit voltage Uc | 12...32 V DC | 25...65 V DC | 50...90 V DC | 77...150 V DC | 150...264 V DC |
| Residual overvoltage (clipping voltage) | 50 V DC | 100 V DC | 150 V DC | 210 V DC | 390 V DC |
| Opening time growth factor | 1.1...1.2 | | | | |
| Operating temperature | -20...+70 °C | | | | |
| Advantages | Good energy absorption - Unpolarized system - Simple, reliable system. | | | | |
| Drawback | Delay on drop out which does not however reduce contactor breaking capacity. | | | | |

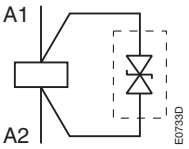
### Wiring diagrams



Varistor

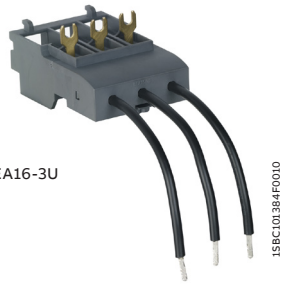


RC type



Transil diode

# Connecting links for starting solutions and other accessories




BEA16-3U

## Connecting links

The BEA16-3U insulated connecting links are used to connect an AS..S AC operated contactor or an ASL..S DC operated contactor with a manual motor starter.

The connecting link ensure the electrical and mechanical connection between the contactor and the manual motor starter.

| For contactors | Manual motor starter | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|---|
| AS09..S ... AS16..S<br>ASL09..S ... ASL16..S | MS116-0.16 ... MS116-16<br>MS132-0.16 ... MS132-16 | BEA16-3U | 1SBN081020R1000 | 1 | 0.045 |




BDT4

## Test block

BDT4 test block is suitable for switching on contactor off-load.

Marking on the block indicates the contactor type to fit with.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| AS..S, ASL..S, NS..S, NSL..S | BDT4 | 1SBN110122T1000 | 10 | 0.007 |




BA4

## Function markers

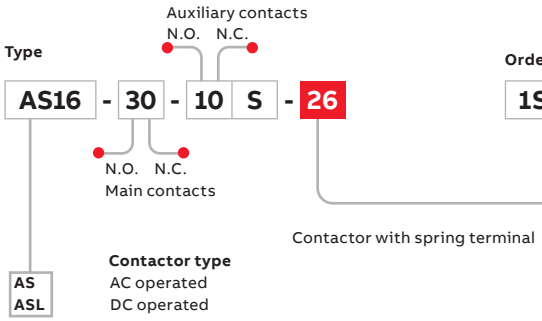
Box of 16 blank cards (16 markers by card) designed to be clipped onto the front face of contactors or contactor relays.
Marker dimensions: 7 x 20 mm (.276" x .787").

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---|---|---|---|
| AS..S, ASL..S, NS..S, NSL..S | BA4 | 1SNA235156R2700 | 16 | 0.011 |

# Voltage code table

The below tables indicate the available coil voltages and corresponding digits for order codes. When placing an order, please give either type or order code. Select a standard contactor from ordering detail pages. Change the coil voltage code in the type or in the order code according to the table below. Example: for contactor AS09-30-10S and coil 42 V 50/60 Hz, type is AS09-30-10S-21 and order code is 1SBL101004R2110.

## 3-pole contactors - with spring terminals

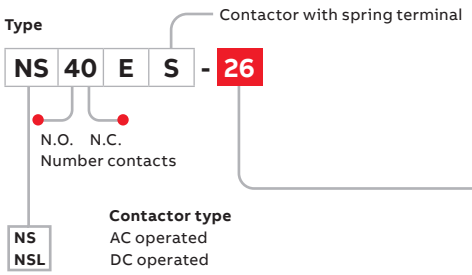



Order code: 1SBL121004R 26 10

| AC coil code | 50 Hz | 60 Hz |
|---|---|---|
| 20 | 24 V | 24 V |
| 21 | 42 V | 42 V |
| 22 | 48 V | 48 V |
| 23 | 110 V | 110 V |
| 24 | 115 V | 115 V |
| 16 | – | 120 V |
| 25 | 220 V | 220 V |
| **26** | **230 V** | **230 V** |
| 27 | 240 V | 240 V |
| 17 | – | 277 V |
| 13 | 380 V | – |
| 28 | 400 V | 400 V |
| 29 | 415 V | 415 V |

| DC coil code | |
|---|---|
| 80 | 12 V |
| 81 | 24 V |
| 83 | 48 V |
| 84 | 60 V |
| 86 | 110 V |
| 87 | 125 V |
| 88 | 220 V |
| 89 | 240 V |

## Contactor relays - with spring terminals

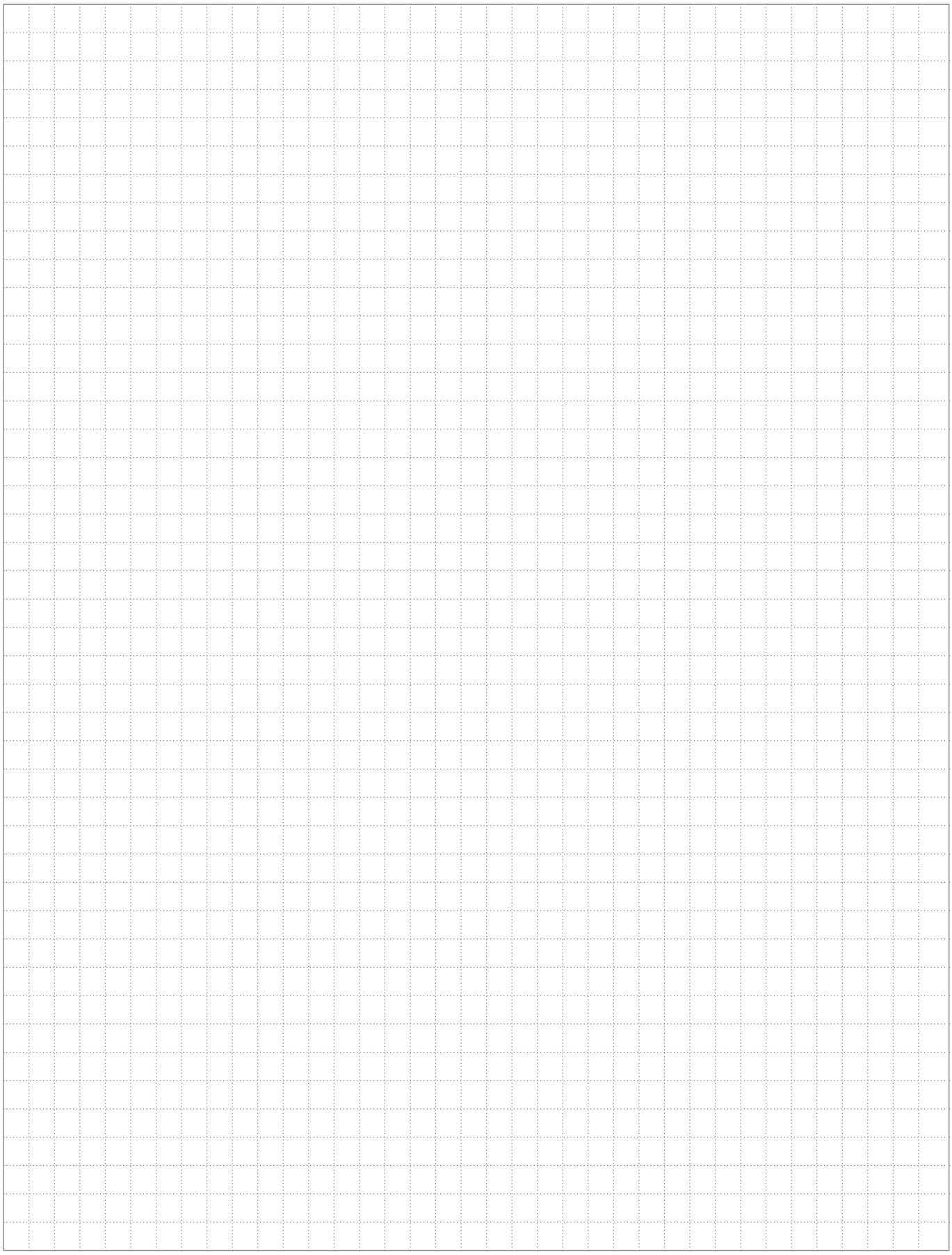



Order code: 1SBH101004R 26 40

| AC coil code | 50 Hz | 60 Hz |
|---|---|---|
| 20 | 24 V | 24 V |
| 21 | 42 V | 42 V |
| 22 | 48 V | 48 V |
| 23 | 110 V | 110 V |
| 24 | 115 V | 115 V |
| 16 | – | 120 V |
| 25 | 220 V | 220 V |
| 26 | 230 V | 230 V |
| 27 | 240 V | 240 V |
| 17 | – | 277 V |
| 13 | 380 V | – |
| 28 | 400 V | 400 V |
| 29 | 415 V | 415 V |

| DC coil code | |
|---|---|
| 80 | 12 V |
| 81 | 24 V |
| 83 | 48 V |
| 84 | 60 V |
| 86 | 110 V |
| 87 | 125 V |
| 88 | 220 V |
| 89 | 240 V |

# Notes





**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**1SAZ711201R1025**

# Overload relays


**6/**2 **Overview**

**Thermal overload relays**

**6/**8 T16 thermal overload relays – 0.10 to 16.0 A
**6/**12 TF42 thermal overload relays – 0.10 to 38.0 A
**6/**17 TF65 thermal overload relays – 22.0 to 67.0 A
**6/**21 TF96 thermal overload relays – 40.0 to 96.0 A
**6/**25 TF140DU thermal overload relays – 66 to 142 A
**6/**29 TA200DU thermal overload relays – 66 to 200 A

**Electronic overload relays**

**6/**33 E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A
**6/**38 EF65, EF96, EF146 electronic overload relays – 20 to 150 A
**6/**43 EF205, EF370 electronic overload relays – 63 to 380 A
**6/**47 EF460, EF750, EF1250DU electronic overload relays 150 to 1250 A

**6/**51 **General accessories**

# Overload relays
## Protection concepts for your individual needs





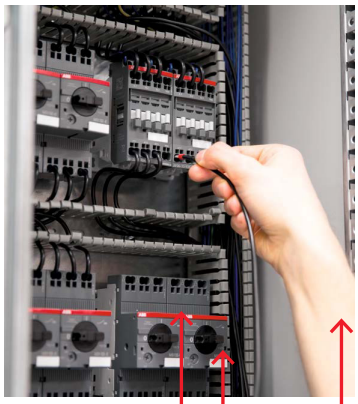


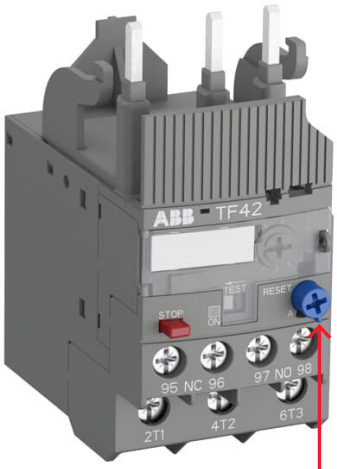

Thermal and electronic overload relays provide, in combination with contactors, reliable protection against overloads and phase failures for motors. They allow to set up customized motor starting solutions according to individual needs

**Easy application and storage**
**Cut your costs**
Overload relays are a perfect fit to ABB's contactors (e.g. AF, mini contactors) and can be directly mounted and connected without further wiring. By combining wide current setting ranges with three trip classes, electronic overload relays allow to reduce the number of variants in stock.

**Continuous operation**
**Secure uptime**
The selectable automatic reset mode allows to reduce downtimes and travelling costs for installation in dispersed locations. The manual reset mode can be complemented by the DRS-F reset coil that allows a remote control over large distances.

**Optimized design**
**Efficient operation**
Electronic overload relays combine a high accuracy with an energy efficient design that does not need extra external supply. Thanks to its overlapping current setting ranges, the usage at the limits of the setting range can be avoided which reduces power heat loss.






**Wide current setting range**
Electronic overload relays come with an optimized current setting range, that allows to reduce stock keeping.

**Trip Class Selection**
Electronic overload relays allow to choose between Trip Class 10, 20 or 30.

**Manual or automatic reset modes**
Selection between both reset modes. Accessories also allow the remote control of the manual mode.

**Compatible with ABB Contactors**
Easy and faultless combination without further wiring.

**Protection wherever you are**
Overload relays are suitable for worldwide use. The wide range of certifications covers standards like IEC (CB), cULus, CCC and various ship approvals. Furthermore they also apply to ATEX standards for hazardous areas.

**Wide portfolio**
Thermal overload relays cover a current range from 0.1 A to 200 A while electronic overload relays cover an even larger current range from 0.1 A to 1250 A.

# Individual motor starting solutions






## Direct-On-Line Starter

A direct-on-line starter is a simple and economic solution for controlling three-phase asynchronous motors.

You can easily assemble a direct-on-line starter by connecting an AF contactor with a TF thermal overload relay or EF electronic overload relay. In an extended combination with a MO manual motor starter, also a protection against short circuits can be implemented.




## Reversing starters

Reversing starters use two contactors to interchange the connection of two terminals. This allows to change the direction of the motor.

Thanks to our complete range of accessories, you can easily assemble reversing starter combinations.



## Star-Delta starters

This starting mode is a popular way to protect the motor during start-up and can be used with most squirrel cage motors. Star-delta starters are ideal for machines having high starting torque such as pumps, centrifugal compressors or wood-working machines.

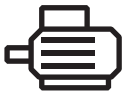
You can assemble star-delta starters with any contactor thanks to our complete range of connection sets.



All starting solutions can also be realized with ABB mini contactors in combination with suitable overload relays. This allows to create individual starting solutions in applications where space is at a premium.

Technical details regarding the creation of motor starting solutions with AF contactors are shown in chapter 13.

# Application examples



## MOTOR PROTECTION

ABB overload relays in combination with contactors offer reliable protection for motors in the event of overload or phase failure. In combination with 3 pole contactors, ABB overload relays allow to set up customized starter solutions, like direct-on-line starter, reversing starters or star-delta starters. Further combinations with fuses or manual motor starters allow additional protection against short-circuits.



## LONG DISTANCE INSTALLATIONS

The reset modes of ABB overload relays can be selected between manual or automatic reset. In installations with dispersed locations (e.g. wind turbines), the automatic reset mode allows to reduce costs by avoiding travel time.



## EXTREME CONDITIONS

Regardless if high-altitudes, shock and vibration environments or hazardous areas, ABB's overload relays are designed and certified to withstand harsh conditions. Specific versions for rolling stock applications are part of our offer.



## DC LOADS

Despite AC applications, thermal overload relays are also rated for direct current loads (e.g. for motors used in solar panel tracking systems). They can be used for three- and single-phase applications.



## SMALL SPACE INSTALLATION

Overload Relays are compatible to contactors and can be connected without further wiring. In combination with ABB mini contactors (compatible to T16 and E16DU overload relays), the installation in narrow spaces is possible.



## EFFICIENT APPLICATIONS

Electronic overload relays can reduce energy costs due to their comparably low power consumption. Furthermore, the current measurement is more exact compared to thermal protection devices so that deviations in the tripping time are minimized.

# Thermal and electronic overload relays

## Thermal overload relays





| | | | | | |
|---|---|---|---|---|---|
| IEC: rated operational power AC-3 | 400 V | 0.06 ... 7.5 kW | | 0.06 ... 18.5 kW | 11 ... 37 kW |
| UL/CSA: 3-phase hp-ratings | 480 V | 1/2 ... 10 hp | | 1/2 ... 25 hp | 15 ... 50 hp |
| Fitting to contactors | | B6, B7, MC1, MC2 | | AF09 ... AF38 | AF40, AF52, AF65 |
| **Type** | | **T16** | | **TF42** | **TF65** |
| Current range | | 0.10 ... 16 A | | 0.10 ... 38 A | 22 ... 67 A |
| Trip class | | 10 | | 10 | 10 |
| Suitable for 1-phase | | yes | | yes | yes |
| Single mounting kit | | DB16 | | DB42 | DB65 |

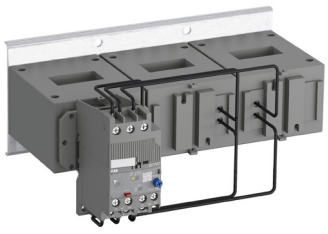
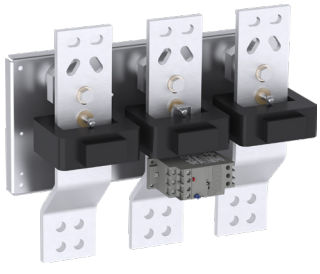
## Electronic overload relays with integrated CT



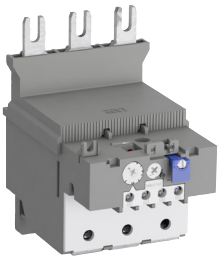
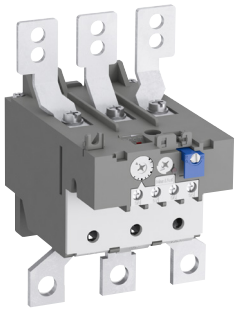



| | | | | | |
|---|---|---|---|---|---|
| IEC: rated operational power AC-3 | 400 V | 0.06 ... 7.5 kW | 0.06 ... 7.5 kW | 4 ... 22 kW | 7.5 ... 37 kW |
| UL/CSA: 3-phase hp-ratings | 480 V | 1/2 ... 10 hp | 1/2 ... 10 hp | 5 ... 30 hp | 15 ... 50 hp |
| Fitting to contactors | | B6, B7, BC6, BC7, VB6, VB7, VBC6, VBC7 | AF09 ... AF38 | AF26 ... AF38 | AF40, AF52, AF65 |
| **Type** | | **E16DU** | **EF19** | **EF45** | **EF65** |
| Current range | | 0.10 ... 18.9 A | 0.10 ... 18.9 A | 9 ... 45 A | 20 ... 70 A |
| Trip class | | 10E, 20E, 30E selectable | | | |
| Suitable for 1-phase | | no | no | no | no |
| Single mounting kit | | DB16E | DB19EF | DB45EF | - |

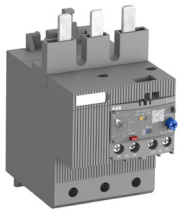
## Electronic overload relays with external separate CT

| | | | | |
|---|---|---|---|---|
| IEC: rated operational power AC-3 | 400 V | 75 ... 250 kW | 132 ... 400 kW | 250 ... 710 kW |
| UL/CSA: 3-phase hp-ratings | 480 V | 100 ... 400 hp | 200 ... 500 hp | 600 ... 900 hp |
| Fitting to contactors | | AF400, AF460 | AF580, AF750, AF1250 | AF1350, AF1650, AF2050 |
| **Type** | | **EF460** | **EF750** | **EF1250DU** |
| Current range | | 150 ... 500 A | 250 ... 800 A | 375 ... 1250 A |
| Trip class | | 10E, 20E, 30E selectable | | |

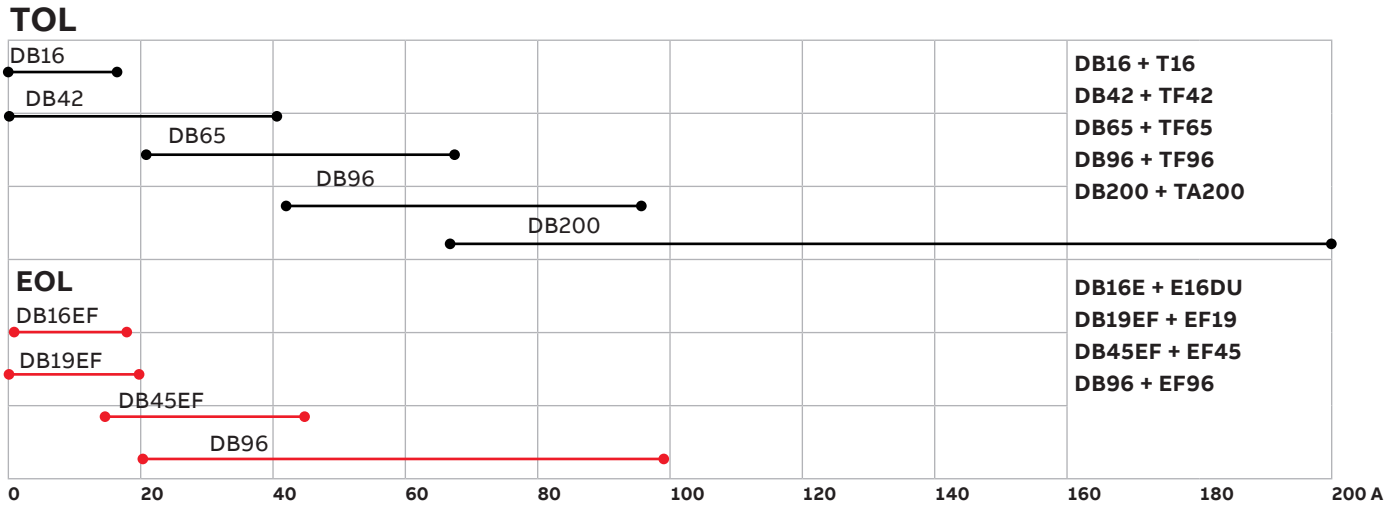
| | | | |
|---|---|---|---|
| 18.5 ... 45 kW | 37 ... 75 kW | 37 ... 110 kW | |
| 30 ... 75 hp | 50 ... 100 hp | 50 ... 150 hp | |
| AF80, AF96 | AF116, AF140, AF146 | AF190, AF205 | |
| **TF96** | **TF140DU** | **TA200DU** | |
| 40 ... 96 A | 66 ... 142 A | 66 ... 200 A | |
| 10 | 10A | 10A | |
| yes | yes | yes | |
| DB96 | - | DB200 | |






| | | | |
|---|---|---|---|
| 22 ... 55 kW | 30 ... 75 kW | 37 ... 110 kW | 75 ... 200 kW |
| 30 ... 75 hp | 50 ... 100 hp | 50 ... 150 hp | 100 ... 300 hp |
| AF80, AF96 | AF116, AF140, AF146 | AF190, AF205 | AF265, AF305, AF370 |
| **EF96** | **EF146** | **EF205** | **EF370** |
| 20 ... 100 A | 54 ... 150 A | 63 ... 210 A | 115 ... 380 A |
| 10E, 20E, 30E selectable | | | |
| no | no | no | no |
| DB96 | - | - | - |

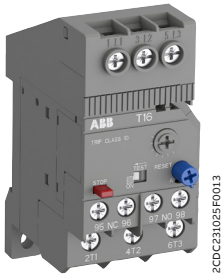
## Single mounting kit overview



# T16 thermal overload relays – 0.10 to 16.0 A
## Ordering details




T16




T16 + DB16




KPR-101L




DB16

The T16 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure.
The devices have trip class 10.

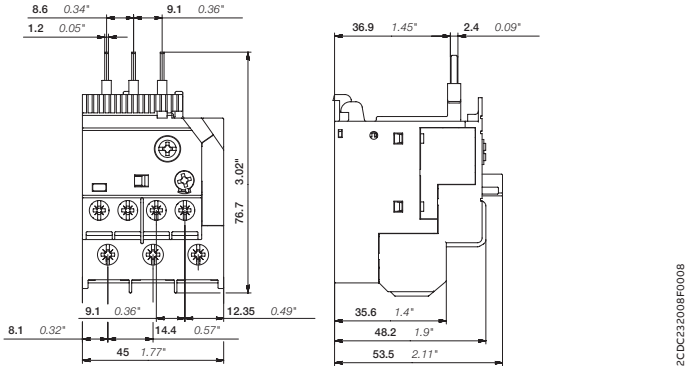
The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications

| Setting range<br>A | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|
| **Suitable for AS09...AS16, B6, B7, MC1 and MC2 all variants** | | | | | |
| 0.10 ... 0.13 | 0.5 A, fuse type T | 10 | T16-0.13 | 1SAZ711201R1005 | 0.100 |
| 0.13 ... 0.17 | 1.0 A, fuse type T | 10 | T16-0.17 | 1SAZ711201R1008 | 0.100 |
| 0.17 ... 0.23 | 1.0 A, fuse type T | 10 | T16-0.23 | 1SAZ711201R1009 | 0.100 |
| 0.23 ... 0.31 | 1.0 A, fuse type T | 10 | T16-0.31 | 1SAZ711201R1013 | 0.100 |
| 0.31 ... 0.41 | 2.0 A, fuse type gG | 10 | T16-0.41 | 1SAZ711201R1014 | 0.100 |
| 0.41 ... 0.55 | 2.0 A, fuse type gG | 10 | T16-0.55 | 1SAZ711201R1017 | 0.100 |
| 0.55 ... 0.74 | 4.0 A, fuse type gG | 10 | T16-0.74 | 1SAZ711201R1021 | 0.100 |
| 0.74 ... 1.00 | 6.0 A, fuse type gG | 10 | T16-1.0 | 1SAZ711201R1023 | 0.100 |
| 1.00 ... 1.30 | 6.0 A, fuse type gG | 10 | T16-1.3 | 1SAZ711201R1025 | 0.100 |
| 1.30 ... 1.70 | 10.0 A, fuse type gG | 10 | T16-1.7 | 1SAZ711201R1028 | 0.100 |
| 1.70 ... 2.30 | 10.0 A, fuse type gG | 10 | T16-2.3 | 1SAZ711201R1031 | 0.100 |
| 2.30 ... 3.10 | 10.0 A, fuse type gG | 10 | T16-3.1 | 1SAZ711201R1033 | 0.100 |
| 3.10 ... 4.20 | 20.0 A, fuse type gG | 10 | T16-4.2 | 1SAZ711201R1035 | 0.100 |
| 4.20 ... 5.70 | 20.0 A, fuse type gG | 10 | T16-5.7 | 1SAZ711201R1038 | 0.100 |
| 5.70 ... 7.60 | 35.0 A, fuse type gG | 10 | T16-7.6 | 1SAZ711201R1040 | 0.100 |
| 7.60 ... 10.0 | 35.0 A, fuse type gG | 10 | T16-10 | 1SAZ711201R1043 | 0.104 |
| 10.0 ... 13.0 | 40.0 A, fuse type gG | 10 | T16-13 | 1SAZ711201R1045 | 0.104 |
| 13.0 ... 16.0 | 40.0 A, fuse type gG | 10 | T16-16 | 1SAZ711201R1047 | 0.104 |

### Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|
| Single mounting kit | T16 | DB16 | 1SAZ701901R0001 | 0.032 |
| Reset push button | E16, EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.027 |




T16

Main dimensions mm, inches

# T16 thermal overload relays – 0.10 to 16.0 A
Technical data



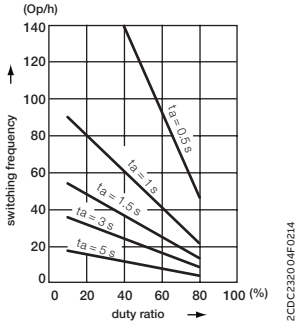
## Main circuit – Utilization characteristics according to IEC/EN

| Type | | T16 |
|---|---|---|
| Standards | | IEC/EN 60947–4–1, IEC/EN 60947-5-1, IEC/EN 60947-1 |
| Rated operational voltage Ue | | 690 V AC<br>- V DC |
| Rated frequency | | 50/60 Hz |
| Trip class | | 10 |
| Number of poles | | 3 |
| Duty time | | 100% |
| Operating frequency without early tripping | | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" |
| Rated impulse withstand voltage Uimp | | 6 kV |
| Rated insulation voltage Ui | | 690 V AC |

## Auxiliary circuit according to IEC/EN

| Type | | T16 |
|---|---|---|
| Rated operational voltage Ue | | 600 V |
| Conventional free air thermal current Ith | N.C., 95-96 | 6 A |
| | N.O., 97-98 | 4 A |
| Rated frequency | | DC, 50/60 Hz |
| Number of poles | | 1 N.O. + 1 N.C. |
| Ie / Rated operational current AC-15<br>acc. to IEC/EN 60947-5-1 for utilization category | | |
| 110-120 V | N.C., 95-96 | 3.00 A |
| | N.O., 97-98 | 0.50 A |
| 220-230-240 V | N.C., 95-96 | 3.00 A |
| | N.O., 97-98 | 0.50 A |
| 440 V | N.C., 95-96 | 0.75 A |
| | N.O., 97-98 | 0.50 A |
| 480-500 V | N.C., 95-96 | 0.75 A |
| | N.O., 97-98 | 0.50 A |
| Ie / Rated operational current DC-13<br>acc. to IEC/EN 60947-5-1 for utilization category | | |
| 24 V | N.C., 95-96 | 1.25 A |
| | N.O., 97-98 | 1.25 A |
| 60 V | N.C., 95-96 | 0.55 A |
| | N.O., 97-98 | 0.55 A |
| 110-120-125 V | N.C., 95-96 | 0.55 A |
| | N.O., 97-98 | 0.55 A |
| 250 V | N.C., 95-96 | 0.27 A |
| | N.O., 97-98 | 0.27 A |
| Minimum switching capacity | | 17 V / 3 mA |
| Short-circuit protective device | N.C., 95-96 | 6 A, fuse type gG |
| | N.O., 97-98 | 4 A, fuse type gG |
| Rated impulse withstand voltage Uimp | | 6 kV |
| Rated insulation voltage Ui | | 690 V |

## Technical diagram – Intermittent periodic duty




ta: Motor starting time

# T16 thermal overload relays – 0.10 to 16.0 A

## Technical data

### Main circuit – Utilization characteristics according to UL/CSA

| Type | | **T16** |
|---|---|---|
| Standards | | UL 508, CSA 22.2 No. 14 |
| Maximum operational voltage | | 600 V AC |
| Trip rating | | 125% of FLA |
| Full load amps (FLA) | | See table "Full load amps and short-circuit protective device" |
| Short-circuit rating RMS symmetrical | | See table "Full load amps and short-circuit protective device" |
| Short-circuit protective device | | See table "Full load amps and short-circuit protective device" |

### Auxiliary circuit according to UL/CSA

| Type | | **T16** |
|---|---|---|
| Contact rating | N.C., 95-96 | B600, Q300 |
| | N.O., 97-98 | D300, Q300 |
| Conventional thermal current | N.C., 95-96 | 5 A |
| | N.O., 97-98 | 2.5 A |

### Full load amps and short-circuit protective device

| **Type** | **Full load amps (FLA)** | **Short-circuit protective device** | | | |
|---|---|---|---|---|---|
| | | **480 / 600 V AC** | | **480 / 600 V AC** | |
| | | **Short circuit rating RMS symmetrical** | **Fuse type** | **Short circuit rating RMS symmetrical** | **Fuse type** |
| T16-0.13 | 0.13 A | 18 kA | 1 A, K5 | 100 kA | 30 A, Class J |
| T16-0.17 | 0.17 A | 18 kA | 1 A, K5 | 100 kA | 30 A, Class J |
| T16-0.23 | 0.23 A | 18 kA | 1 A, K5 | 100 kA | 30 A, Class J |
| T16-0.31 | 0.31 A | 18 kA | 3 A, K5 | 100 kA | 30 A, Class J |
| T16-0.41 | 0.41 A | 18 kA | 3 A, K5 | 100 kA | 30 A, Class J |
| T16-0.55 | 0.55 A | 18 kA | 3 A, K5 | 100 kA | 30 A, Class J |
| T16-0.74 | 0.74 A | 18 kA | 3 A, K5 | 100 kA | 30 A, Class J |
| T16-1.0 | 1.00 A | 18 kA | 6 A, K5 | 100 kA | 30 A, Class J |
| T16-1.3 | 1.30 A | 18 kA | 6 A, K5 | 100 kA | 30 A, Class J |
| T16-1.7 | 1.70 A | 18 kA | 6 A, K5 | 100 kA | 30 A, Class J |
| T16-2.3 | 2.30 A | 18 kA | 10 A, K5 | 100 kA | 30 A, Class J |
| T16-3.1 | 3.10 A | 18 kA | 10 A, K5 | 100 kA | 30 A, Class J |
| T16-4.2 | 4.20 A | 18 kA | 15 A, K5 | 100 kA | 30 A, Class J |
| T16-5.7 | 5.70 A | 18 kA | 20 A, K5 | 100 kA | 30 A, Class J |
| T16-7.6 | 7.60 A | 18 kA | 25 A, K5 | 100 kA | 30 A, Class J |
| T16-10 | 10.0 A | 18 kA | 35 A, K5 | 100 kA | 45 A, Class J |
| T16-13 | 13.0 A | 18 kA | 40 A, K5 | 100 kA | 45 A, Class J |
| T16-16 | 16.0 A | 18 kA | 60 A, K5 | 100 kA | 45 A, Class J |

# T16 thermal overload relays – 0.10 to 16.0 A

Technical data

## General technical data

| | | | |
|---|---|---|---|
| Type | | | **T16** |
| Pollution degree | | | 3 |
| Phase loss sensitive | | | Yes |
| Ambient air temperature | | | |
| Operation | Open - compensated | | -25 ... +60 °C |
| | Open | | -25 ... +60 °C |
| Storage | | | -50 ... +80 °C |
| Ambient air temperature compensation | | | Acc. to IEC/EN60947-4-1 |
| Maximum operating altitude permissible | | | 2000 m |
| Resistance to shock acc. to IEC 60068-2-27 | | | 25g / 11 ms |
| Resistance to vibrations acc. to IEC 60068-2-6 | | | 3g / 3 ... 150 Hz |
| Mounting position | | | Position 1-5 |
| Mounting | | | Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm) |
| Degree of protection | Housing | | IP20 |
| | Main circuit terminals | | IP10 |

## Electrical connection

### Main circuit

| | | | |
|---|---|---|---|
| Type | | | **T16** |
| Connecting capacity | | | |
| Rigid | | 1 x | 0.75 ... 4 mm² |
| | | 2 x | 0.75 ... 1.5 mm² or 1.5 ... 4 mm² (1) |
| Flexible | | 1 or 2 x | 0.75 ... 4 mm² |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 18-10 |
| | Flexible acc. to UL/CSA | 1 or 2 x | AWG 18-10 |
| Stripping length | | | 12 mm |
| Tightening torque | | | 1.1 ... 1.5 Nm / 9 ... 13 lb.in |
| Recommended screw driver | | | M4 (Pozidriv 2) |

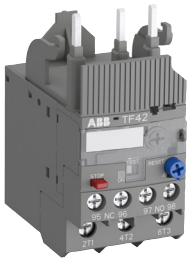
### Auxiliary circuit

| | | | |
|---|---|---|---|
| Type | | | **T16** |
| Connecting capacity | | | |
| Rigid | | 1 or 2 x | 0.75 ... 4 mm² |
| Flexible with ferrule | | 1 or 2 x | 0.75 ... 2.5 mm² |
| Flexible with insulated ferrule | | 1 x | 0.75 ... 2.5 mm² |
| | | 2 x | 0.75 ... 1.5 mm² |
| Flexible | | 1 or 2 x | 0.75 ... 1 mm² or 1 ... 2.5 mm² (1) |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 18-12 |
| | Flexible acc. to UL/CSA | 1 or 2 x | AWG 18-12 |
| Stripping length | | | 9 mm |
| Tightening torque | | | 1.1 ... 1.5 Nm / 9 ... 13 lb.in |
| Recommended screw driver | | | M3 (Pozidriv 2) |

(1) Only connect two different "conductor/wire" cross-sections, if they are within the indicated ranges

# TF42 thermal overload relays – 0.10 to 38.0 A

## Ordering details




TF42



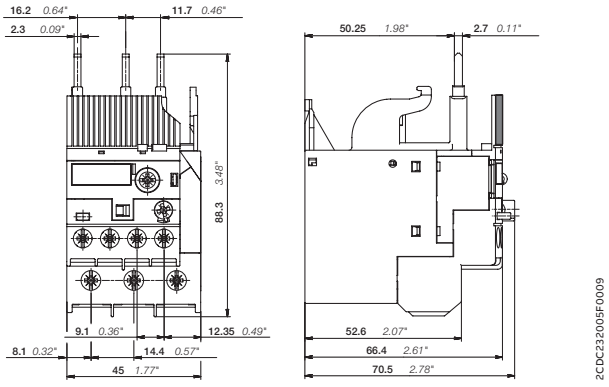

TF42 + DB42

The TF42 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- With ATEX certification

| Setting range<br>A | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|
| **Suitable for AF09...AF38 contactors** | | | | | |
| 0.10 ... 0.13 | 0.5 A, fuse type T | 10 | TF42-0.13 | 1SAZ721201R1005 | 0.130 |
| 0.13 ... 0.17 | 1.0 A, fuse type T | 10 | TF42-0.17 | 1SAZ721201R1008 | 0.130 |
| 0.17 ... 0.23 | 1.0 A, fuse type T | 10 | TF42-0.23 | 1SAZ721201R1009 | 0.130 |
| 0.23 ... 0.31 | 1.0 A, fuse type T | 10 | TF42-0.31 | 1SAZ721201R1013 | 0.130 |
| 0.31 ... 0.41 | 2.0 A, fuse type gG | 10 | TF42-0.41 | 1SAZ721201R1014 | 0.130 |
| 0.41 ... 0.55 | 2.0 A, fuse type gG | 10 | TF42-0.55 | 1SAZ721201R1017 | 0.130 |
| 0.55 ... 0.74 | 4.0 A, fuse type gG | 10 | TF42-0.74 | 1SAZ721201R1021 | 0.130 |
| 0.74 ... 1.00 | 6.0 A, fuse type gG | 10 | TF42-1.0 | 1SAZ721201R1023 | 0.130 |
| 1.00 ... 1.30 | 6.0 A, fuse type gG | 10 | TF42-1.3 | 1SAZ721201R1025 | 0.130 |
| 1.30 ... 1.70 | 10.0 A, fuse type gG | 10 | TF42-1.7 | 1SAZ721201R1028 | 0.130 |
| 1.70 ... 2.30 | 10.0 A, fuse type gG | 10 | TF42-2.3 | 1SAZ721201R1031 | 0.130 |
| 2.30 ... 3.10 | 10.0 A, fuse type gG | 10 | TF42-3.1 | 1SAZ721201R1033 | 0.130 |
| 3.10 ... 4.20 | 20.0 A, fuse type gG | 10 | TF42-4.2 | 1SAZ721201R1035 | 0.130 |
| 4.20 ... 5.70 | 20.0 A, fuse type gG | 10 | TF42-5.7 | 1SAZ721201R1038 | 0.130 |
| 5.70 ... 7.60 | 35.0 A, fuse type gG | 10 | TF42-7.6 | 1SAZ721201R1040 | 0.130 |
| 7.60 ... 10.0 | 35.0 A, fuse type gG | 10 | TF42-10 | 1SAZ721201R1043 | 0.130 |
| 10.0 ... 13.0 | 40.0 A, fuse type gG | 10 | TF42-13 | 1SAZ721201R1045 | 0.130 |
| 13.0 ... 16.0 | 40.0 A, fuse type gG | 10 | TF42-16 | 1SAZ721201R1047 | 0.130 |
| 16.0 ... 20.0 | 63.0 A, fuse type gG | 10 | TF42-20 | 1SAZ721201R1049 | 0.130 |
| 20.0 ... 24.0 | 63.0 A, fuse type gG | 10 | TF42-24 | 1SAZ721201R1051 | 0.145 |
| 24.0 ... 29.0 | 63.0 A, fuse type gG | 10 | TF42-29 | 1SAZ721201R1052 | 0.145 |
| 29.0 ... 35.0 | 80.0 A, fuse type gG | 10 | TF42-35 | 1SAZ721201R1053 | 0.145 |
| 35.0 ... 38.0/40.0 | 80.0 A, fuse type gG | 10 | TF42-38 | 1SAZ721201R1055 | 0.145 |




TF42

Main dimensions mm, inches

# TF42 thermal overload relays – 0.10 to 38.0 A
## Ordering details



DB42



KPR-101L



DRS-F

### Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce) kg |
|---|---|---|---|---|
| Single mounting kit | TF42 | DB42 | 1SAZ701902R0001 | 0.087 |
| Reset push button | EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.019 |
| Remote reset coil 24-30 V AC/DC | TF42, TF65, TF96 | DRS-F-01 | 1SAX101911R1001 | 0.076 |
| Remote reset coil 48-60 V AC/DC | | DRS-F-02 | 1SAX101911R1002 | 0.077 |
| Remote reset coil 110-127 V AC/DC | | DRS-F-03 | 1SAX101911R1003 | 0.078 |
| Remote reset coil 220-240 V AC/DC | | DRS-F-04 | 1SAX101911R1004 | 0.076 |
| Remote stop coil 24-30 V DC | | DRS-F-TF-01 | 1SAZ701904R1001 | 0.072 |
| Remote stop coil 48-60 V DC | | DRS-F-TF-02 | 1SAZ701904R1002 | 0.075 |
| Remote stop coil 110-127 V DC | | DRS-F-TF-03 | 1SAZ701904R1003 | 0.071 |
| Remote stop coil 220-240 V DC | | DRS-F-TF-04 | 1SAZ701904R1004 | 0.076 |

# TF42 thermal overload relays – 0.10 to 38.0 A
Technical data



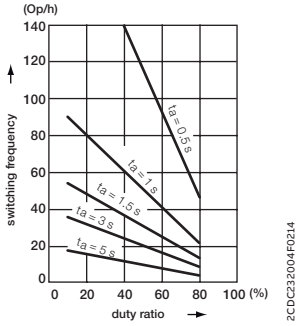
## Main circuit – Utilization characteristics according to IEC/EN

| Type | | TF42 |
|---|---|---|
| Standards | | IEC/EN 60947–4–1, IEC/EN 60947-5-1, IEC/EN 60947-1 |
| Rated operational voltage Ue | | 690 V AC, 600 V DC |
| Rated frequency | | DC, 50/60 Hz, 400 Hz |
| Trip class | | 10 |
| Number of poles | | 3 |
| Duty time | | 100% |
| Operating frequency without early tripping | | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" |
| Rated impulse withstand voltage Uimp | | 6 kV |
| Rated insulation voltage Ui | | 690 V AC |

## Auxiliary circuit according to IEC/EN

| Type | | TF42 |
|---|---|---|
| Rated operational voltage Ue | | 600 V |
| Conventional free air thermal current Ith | N.C., 95-96 | 6 A |
| | N.O., 97-98 | 4 A |
| Rated frequency | | DC, 50/60 Hz |
| Number of poles | | 1 N.O. + 1 N.C. |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | | |
| 110-120 V | N.C., 95-96 | 3.00 A |
| | N.O., 97-98 | 0.50 A |
| 220-230-240 V | N.C., 95-96 | 3.00 A |
| | N.O., 97-98 | 0.50 A |
| 440 V | N.C., 95-96 | 0.75 A |
| | N.O., 97-98 | 0.50 A |
| 480-500 V | N.C., 95-96 | 0.75 A |
| | N.O., 97-98 | 0.50 A |
| Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | | |
| 24 V | N.C., 95-96 | 1.25 A |
| | N.O., 97-98 | 1.25 A |
| 110-120-125 V | N.C., 95-96 | 0.55 A |
| | N.O., 97-98 | 0.55 A |
| 250 V | N.C., 95-96 | 0.27 A |
| | N.O., 97-98 | 0.27 A |
| Minimum switching capacity | | 17 V / 3 mA |
| Short-circuit protective device | N.C., 95-96 | 6 A, fuse type gG |
| | N.O., 97-98 | 4 A, fuse type gG |
| Rated impulse withstand voltage Uimp | | 6 kV |
| Rated insulation voltage Ui | | 690 V |

## Technical diagram – Intermittent periodic duty




ta: Motor starting time

# TF42 thermal overload relays – 0.10 to 38.0 A

Technical data

### Main circuit – Utilization characteristics according to UL/CSA

| Type | TF42 |
|---|---|
| Standards | UL 508, CSA 22.2 No. 14 |
| Maximum operational voltage | 600 V AC/DC |
| Trip rating | 125% of FLA |
| Full load amps (FLA) | See table "Full load amps and short-circuit protective device" |
| Short-circuit rating RMS symmetrical | See table "Full load amps and short-circuit protective device" |
| Short-circuit protective device | See table "Full load amps and short-circuit protective device" |

### Auxiliary circuit according to UL/CSA

| Type | | TF42 |
|---|---|---|
| Contact rating | N.C., 95-96 | B600, Q600 |
| | N.O., 97-98 | D300, Q600 |
| Conventional thermal current | N.C., 95-96 | 5 A |
| | N.O., 97-98 | 2.5 A |

### Full load amps and short-circuit protective device

| Type | Full load amps (FLA) | Short-circuit protective device | | | |
|---|---|---|---|---|---|
| | | 480 / 600 V AC | | 480 / 600 V AC | |
| | | Short circuit rating RMS symmetrical | Fuse type | Short circuit rating RMS symmetrical | Fuse type |
| TF42-0.13 | 0.13 A | 18 kA | 1 A, K5 | 100 kA | 30 A, Class J |
| TF42-0.17 | 0.17 A | 18 kA | 1 A, K5 | 100 kA | 30 A, Class J |
| TF42-0.23 | 0.23 A | 18 kA | 1 A, K5 | 100 kA | 30 A, Class J |
| TF42-0.31 | 0.31 A | 18 kA | 3 A, K5 | 100 kA | 30 A, Class J |
| TF42-0.41 | 0.41 A | 18 kA | 3 A, K5 | 100 kA | 30 A, Class J |
| TF42-0.55 | 0.55 A | 18 kA | 3 A, K5 | 100 kA | 30 A, Class J |
| TF42-0.74 | 0.74 A | 18 kA | 3 A, K5 | 100 kA | 30 A, Class J |
| TF42-1.0 | 1.00 A | 18 kA | 6 A, K5 | 100 kA | 30 A, Class J |
| TF42-1.3 | 1.30 A | 18 kA | 6 A, K5 | 100 kA | 30 A, Class J |
| TF42-1.7 | 1.70 A | 18 kA | 6 A, K5 | 100 kA | 30 A, Class J |
| TF42-2.3 | 2.30 A | 18 kA | 10 A, K5 | 100 kA | 30 A, Class J |
| TF42-3.1 | 3.10 A | 18 kA | 10 A, K5 | 100 kA | 30 A, Class J |
| TF42-4.2 | 4.20 A | 18 kA | 15 A, K5 | 100 kA | 30 A, Class J |
| TF42-5.7 | 5.70 A | 18 kA | 20 A, K5 | 100 kA | 30 A, Class J |
| TF42-7.6 | 7.60 A | 18 kA | 25 A, K5 | 100 kA | 30 A, Class J |
| TF42-10 | 10.0 A | 18 kA | 35 A, K5 | 100 kA | 45 A, Class J |
| TF42-13 | 13.0 A | 18 kA | 40 A, K5 | 100 kA | 45 A, Class J |
| TF42-16 | 16.0 A | 18 kA | 60 A, K5 | 100 kA | 45 A, Class J |
| TF42-20 | 20.0 A | 18 kA | 80 A, K5 | 100 kA | 60 A, Class J |
| TF42-24 | 24.0 A | 18 kA | 80 A, K5 | 100 kA | 60 A, Class J |
| TF42-29 | 29.0 A | 18 kA | 100 A, K5 | 100 kA | 100 A, Class J |
| TF42-35 | 35.0 A | 18 kA | 150 A, K5 | 100 kA | 175 A, Class J |
| TF42-38 | 38.0 A | 18 kA | 150 A, K5 | 100 kA | 175 A, Class J |

# TF42 thermal overload relays – 0.10 to 38.0 A
Technical data

## General technical data

| | | | |
|---|---|---|---|
| Type | | | **TF42** |
| Pollution degree | | | 3 |
| Phase loss sensitive | | | Yes |
| Ambient air temperature | | | |
| | Operation | Open - compensated | -25 ... +60 °C |
| | | Open | -25 ... +60 °C |
| | Storage | | -50 ... +80 °C |
| Ambient air temperature compensation | | | Acc. to IEC/EN60947-4-1 |
| Maximum operating altitude permissible | | | 2000 m |
| Resistance to shock acc. to IEC 60068-2-27 | | | 25g / 11 ms |
| Resistance to vibrations acc. to IEC 60068-2-6 | | | 5g / 3 ... 150 Hz |
| Mounting position | | | Position 1-5 |
| Mounting | | | Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm) |
| Degree of protection | | Housing | IP20 |
| | | Main circuit terminals | IP10 |



## Electrical connection

### Main circuit

| Type | | | **TF42 (TF42-0.13 ... TF42-20)** | **TF42 (TF42-24 ... TF42-38)** |
|---|---|---|---|---|
| Connecting capacity | | | | |
| | Rigid | 1 or 2 x | 0.75 ... 4 mm² | 1.5 ... 2.5 mm² or 2.5 ... 10 mm² (1) |
| | Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 4 mm² | 2.5 ... 4 mm² or 4 ... 6 mm² (1) |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 18-10 | AWG 14-6 |
| | Flexible acc. to UL/CSA | 1 or 2 x | AWG 18-10 | AWG 14-6 |
| Stripping length | | | 12 mm | |
| Tightening torque | | | 1.5 - 2.5 Nm / 13 ... 22 lb.in | 2.5 - 2.7 Nm / 22 lb.in |
| Recommended screw driver | | | M4 (Pozidriv 2) | |

### Auxiliary circuit

| Type | | | **TF42** |
|---|---|---|---|
| Connecting capacity | | | |
| | Rigid | 1 or 2 x | 0.75 ... 4 mm² |
| | Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm² |
| | Flexible with insulated ferrule | 1 x | 0.75 ... 2.5 mm² |
| | | 2 x | 0.75 ... 1.5 mm² |
| | Flexible | 1 or 2 x | 0.75 ... 1 mm² or 1 ... 2.5 mm² (1) |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 18-12 |
| | Flexible acc. to UL/CSA | 1 or 2 x | AWG 18-12 |
| Stripping length | | | 9 mm |
| Tightening torque | | | 1 ... 1.2 Nm / 9 ... 11 lb.in |
| Recommended screw driver | | | M3 (Pozidriv 2) |

(1) Only connect two different "conductor/wire" cross-sections, if they are within the indicated ranges.

# TF65 thermal overload relays – 22.0 to 67.0 A

## Ordering details




TF65



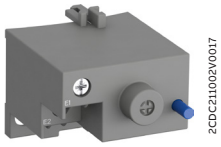

DB65




DB65 + TF65




KPR-101L




DRS-F

The TF65 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure.
The devices have trip class 10.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

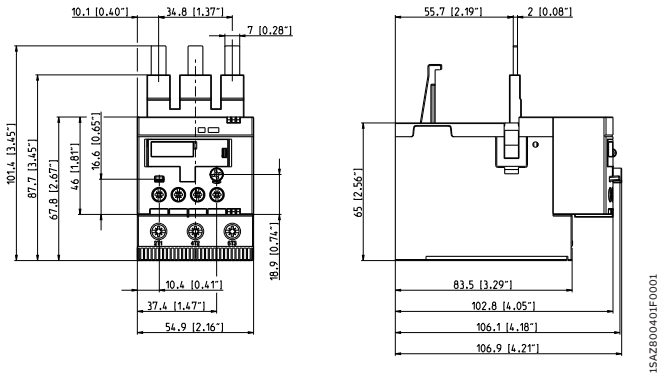
- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- With ATEX certification (1)

| Setting range<br>A | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|
| **Suitable for AF40...AF65 contactors** | | | | | |
| 22.0 ... 28.0 | 80 A, gG Type Fuses | 10 | TF65-28 | 1SAZ811201R1001 | 0.372 |
| 25.0 ... 33.0 | 80 A, gG Type Fuses | 10 | TF65-33 | 1SAZ811201R1002 | 0.372 |
| 30.0 ... 40.0 | 100 A, gG Type Fuses | 10 | TF65-40 | 1SAZ811201R1003 | 0.372 |
| 36.0 ... 47.0 | 125 A, gG Type Fuses | 10 | TF65-47 | 1SAZ811201R1004 | 0.372 |
| 44.0 ... 53.0 | 125 A, gG Type Fuses | 10 | TF65-53 | 1SAZ811201R1005 | 0.372 |
| 50.0 ... 60.0 | 125 A, gG Type Fuses | 10 | TF65-60 | 1SAZ811201R1006 | 0.382 |
| 57.0 ... 67.0 | 160 A, gG Type Fuses | 10 | TF65-67 | 1SAZ811201R1007 | 0.382 |

### Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|
| Single mounting kit | TF65 | DB65 | 1SAZ801901R1001 | 0.132 |
| Reset push button | E16, EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.019 |
| Remote reset coil 24-30 V AC / DC | TF42, TF65, TF96 | DRS-F-01 | 1SAX101911R1001 | 0.076 |
| Remote reset coil 48-60 V AC / DC | | DRS-F-02 | 1SAX101911R1002 | 0.077 |
| Remote reset coil 110-127 V AC / DC | | DRS-F-03 | 1SAX101911R1003 | 0.078 |
| Remote reset coil 220-240 V AC / DC | | DRS-F-04 | 1SAX101911R1004 | 0.076 |
| Remote stop coil 24-30 V DC | | DRS-F-TF-01 | 1SAZ701904R1001 | 0.072 |
| Remote stop coil 48-60 V DC | | DRS-F-TF-02 | 1SAZ701904R1002 | 0.075 |
| Remote stop coil 110-127 V DC | | DRS-F-TF-03 | 1SAZ701904R1003 | 0.071 |
| Remote stop coil 220-240 V DC | | DRS-F-TF-04 | 1SAZ701904R1004 | 0.076 |

1) ATEX is valid for products, produced from week 26, 2015.




TF65

Main dimensions mm, inches

# TF65 thermal overload relays – 22.0 to 67.0 A
Technical data



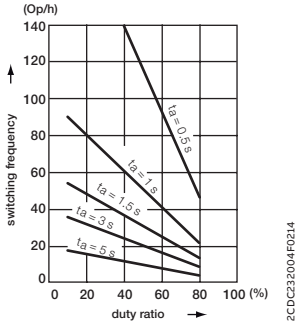
## Main circuit – Utilization characteristics according to IEC/EN

| Type | | **TF65** |
|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1 |
| Rated operational voltage Ue | | 690 V AC, 440 V DC |
| Rated frequency | | DC, 50/60 Hz |
| Trip class | | 10 |
| Number of poles | | 3 |
| Duty time | | 100% |
| Operating frequency without early tripping | | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" |
| Rated impulse withstand voltage Uimp | | 8 kV |
| Rated insulation voltage Ui | | 690 V |

## Auxiliary circuit according to IEC/EN

| Type | | **TF65** |
|---|---|---|
| Rated operational voltage Ue | | 600 V |
| Conventional free air thermal current Ith | N.C., 95-96 | 6 A |
| | N.O., 97-98 | 4 A |
| Rated frequency | | DC, 50/60 Hz |
| Number of poles | | 1 N.O. + 1 N.C. |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | | |
| 110-120 V | N.C., 95-96 | 3.00 A |
| | N.O., 97-98 | 0.50 A |
| 220-230-240 V | N.C., 95-96 | 3.00 A |
| | N.O., 97-98 | 0.50 A |
| 440 V | N.C., 95-96 | 0.75 A |
| | N.O., 97-98 | 0.50 A |
| 480-500 V | N.C., 95-96 | 0.75 A |
| | N.O., 97-98 | 0.50 A |
| Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | | |
| 24 V | N.C., 95-96 | 1.25 A |
| | N.O., 97-98 | 1.25 A |
| 110-120-125 V | N.C., 95-96 | 0.55 A |
| | N.O., 97-98 | 0.55 A |
| 250 V | N.C., 95-96 | 0.27 A |
| | N.O., 97-98 | 0.27 A |
| Minimum switching capacity | | 12 V / 3 mA |
| Short-circuit protective device | N.C., 95-96 | 6 A, gG Type Fuses |
| | N.O., 97-98 | 4 A, gG Type Fuses |
| Rated impulse withstand voltage Uimp | | 6 kV |
| Rated insulation voltage Ui | | 690 V |

## Technical diagram – Intermittent periodic duty




ta: Motor starting time

# TF65 thermal overload relays – 22.0 to 67.0 A

Technical data

### Main circuit – Utilization characteristics according to UL/CSA

| Type | TF65 |
|---|---|
| Standards | UL 60947-1, UL 60947-4-1 |
| Maximum operational voltage | 600 V AC/DC |
| Trip rating | 125% of FLA |
| Full load amps (FLA) | See table "Full load amps and short-circuit protective device" |
| Short-circuit rating RMS symmetrical | See table "Full load amps and short-circuit protective device" |
| Short-circuit protective device | See table "Full load amps and short-circuit protective device" |

### Auxiliary circuit according to UL/CSA

| Type | | TF65 |
|---|---|---|
| Contact rating | N.C., 95-96 | B600, Q600 |
| | N.O., 97-98 | D300, Q600 |
| Conventional thermal current | N.C., 95-96 | 5 A |
| | N.O., 97-98 | 2.5 A |

### Full load amps and short-circuit protective device

| Type | Full load amps (FLA) | Short-circuit protective device | | | |
|---|---|---|---|---|---|
| | | 480 / 600 V AC | | 480 / 600 V AC | |
| | | Short circuit rating RMS symmetrical | Fuse type | Short circuit rating RMS symmetrical | Fuse type |
| TF65-28 | 28 A | 5 kA | 100 A, K5 / RK5 | 18 kA | 110 A, Class J |
| TF65-33 | 33 A | 5 kA | 100 A, K5 / RK5 | 18 kA | 110 A, Class J |
| TF65-40 | 40 A | 5 kA | 100 A, K5 / RK5 | 18 kA | 110 A, Class J |
| TF65-47 | 47 A | 5 kA | 125 A, K5 / RK5 | 18 kA | 125 A, Class J |
| TF65-53 | 53 A | 10 kA | 125 A, K5 / RK5 | 18 kA | 125 A, Class J |
| TF65-60 | 60 A | 10 kA | 150 A, K5 / RK5 | 18 kA | 150 A, Class J |
| TF65-67 | 67 A | 10 kA | 150 A, K5 / RK5 | 18 kA | 150 A, Class J |

# TF65 thermal overload relays – 22.0 to 67.0 A
Technical data

## General technical data

| | | |
|---|---|---|
| Type | | **TF65** |
| Pollution degree | | 3 |
| Phase loss sensitive | | Yes |
| Ambient air temperature | | |
| Operation (1) | Open - compensated | -40 ... +70 °C |
| | Open | -40 ... +70 °C |
| Storage | | -50 ... +85 °C |
| Ambient air temperature compensation | | Acc. to IEC/EN 60947-4-1 |
| Maximum operating altitude permissible | | 2000 m |
| Resistance to shock acc. to IEC 60068-2-27 | | 25g / 11 ms |
| Resistance to vibrations acc. to IEC 60068-2-6 | | 5g / 3 ... 150 Hz |
| Mounting position | | Position 1 to 6 |
| Mounting | | Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm) |
| Degree of protection | Housing | IP20 |
| | Main circuit terminals | IP10 |

(1) Valid for TF65 produced from week 11, 2016. Otherwise, -25 ...+60 °C range is valid.
Derating might be applicable for temperatures > 50°C. Data on request



## Electrical connection

### Main circuit

| Type | | | **TF65** |
|---|---|---|---|
| Connecting capacity | | | |
|  | Rigid | 1 or 2 x | 2.5 ... 16 mm² |
| | | 1 x | 2.5 ... 35 mm² |
|  | Flexible with ferrule | 1 or 2 x | 2.5 ... 10 mm² |
| | | 1 x | 2.5 ... 35 mm² |
|  | Flexible with insulated ferrule | 1 or 2 x | 2.5 ... 10 mm² |
| | | 1 x | 2.5 ... 35 mm² |
|  | Flexible | 1 or 2 x | 2.5 ... 16 mm² |
| | | 1 x | 2.5 ... 35 mm² |
| | Stranded acc. to UL/CSA | 1 x | AWG 12 ... 2 |
| | | 2 x | AWG 12 ... 6 |
| | Flexible acc. to UL/CSA | 1 x | AWG 12 ... 2 |
| | | 2 x | AWG 12 ... 6 |
| Stripping length | | | 17 mm |
| Tightening torque | | | 4.0 - 4.5 Nm / 35 ... 40 lb.in |
| Recommended screw driver | | | M6 (Pozidriv 2) |

### Auxiliary circuit

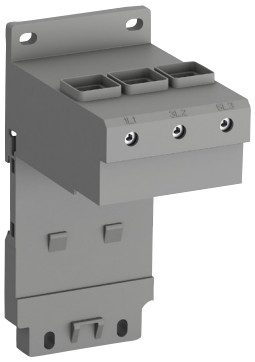
| Type | | | **TF65** |
|---|---|---|---|
| Connecting capacity | | | |
|  | Rigid | 1 or 2 x | 0.75 ... 4 mm² |
|  | Flexible with ferrule | 1 or 2 x | 0.75 ... 4 mm² |
|  | Flexible with insulated ferrule | 1 x | 0.75 ... 2.5 mm² |
| | | 2 x | 0.75 ... 1.5 mm² |
|  | Flexible | 1 or 2 x | 0.75 ... 1 mm² or 1 ... 2.5 mm² |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 18 ... 12 |
| | Flexible acc. to UL/CSA | 1 or 2 x | AWG 18 ... 12 |
| Stripping length | | | 9 mm |
| Tightening torque | | | 1 ... 1.2 Nm / 9 ... 11 lb.in |
| Recommended screw driver | | | M3 (Pozidriv 2) |

# TF96 thermal overload relays – 40.0 to 96.0 A

## Ordering details




TF96



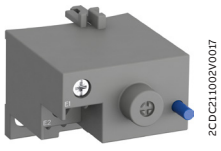

DB96




DB96 + TF96




KPR-101L




DRS-F

The TF96 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

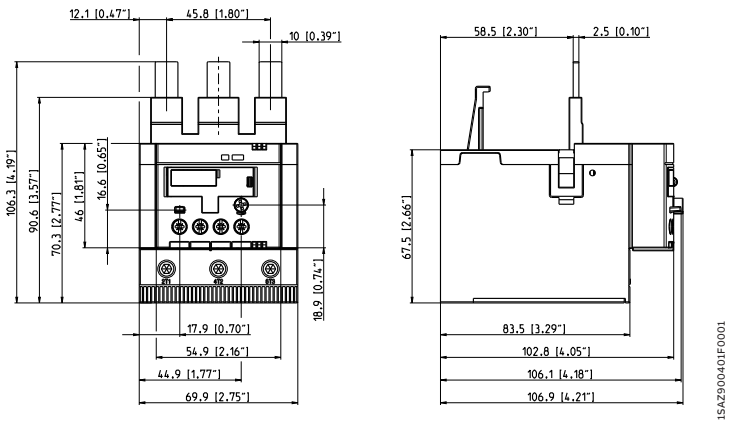
- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- With ATEX certification (1)

| Setting range<br>A | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|
| **Suitable for AF80, AF96 contactors** | | | | | |
| 40.0 ... 51.0 | 125 A, gG Type Fuses | 10 | TF96-51 | 1SAZ911201R1001 | 0.520 |
| 48.0 ... 60.0 | 160 A, gG Type Fuses | 10 | TF96-60 | 1SAZ911201R1002 | 0.520 |
| 57.0 ... 68.0 | 160 A, gG Type Fuses | 10 | TF96-68 | 1SAZ911201R1003 | 0.520 |
| 65.0 ... 78.0 | 200 A, gG Type Fuses | 10 | TF96-78 | 1SAZ911201R1004 | 0.520 |
| 75.0 ... 87.0 | 200 A, gG Type Fuses | 10 | TF96-87 | 1SAZ911201R1005 | 0.520 |
| 84.0 ... 96.0 | 250 A, gG Type Fuses | 10 | TF96-96 | 1SAZ911201R1006 | 0.530 |

### Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|
| Single mounting kit | TF96, EF96 | DB96 | 1SAZ901901R1001 | 0.190 |
| Reset push button | E16, EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.019 |
| Remote reset coil 24-30 V AC/DC | TF42, TF65, TF96 | DRS-F-01 | 1SAX101911R1001 | 0.076 |
| Remote reset coil 48-60 V AC/DC | | DRS-F-02 | 1SAX101911R1002 | 0.077 |
| Remote reset coil 110-127 V AC/DC | | DRS-F-03 | 1SAX101911R1003 | 0.078 |
| Remote reset coil 220-240 V AC/DC | | DRS-F-04 | 1SAX101911R1004 | 0.076 |
| Remote stop coil 24-30 V DC | | DRS-F-TF-01 | 1SAZ701904R1001 | 0.072 |
| Remote stop coil 48-60 V DC | | DRS-F-TF-02 | 1SAZ701904R1002 | 0.077 |
| Remote stop coil 110-127 V DC | | DRS-F-TF-03 | 1SAZ701904R1003 | 0.071 |
| Remote stop coil 220-240 V DC | | DRS-F-TF-04 | 1SAZ701904R1004 | 0.076 |

(1) ATEX is valid for products, produced from week 26, 2015.




TF96

Main dimensions mm, inches

# TF96 thermal overload relays – 40.0 to 96.0 A

## Technical data

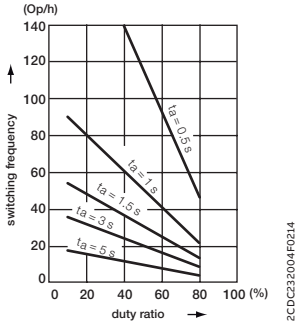
### Main circuit – Utilization characteristics according to IEC/EN

| Type | | **TF96** |
|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1 |
| Rated operational voltage Ue | | 690 V AC, 440 V DC |
| Rated frequency | | DC, 50/60 Hz |
| Trip class | | 10 |
| Number of poles | | 3 |
| Duty time | | 100% |
| Operating frequency without early tripping | | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" |
| Rated impulse withstand voltage Uimp | | 8 kV |
| Rated insulation voltage Ui | | 690 V |

### Auxiliary circuit according to IEC/EN

| Type | | **TF96** |
|---|---|---|
| Rated operational voltage Ue | | 600 V |
| Conventional free air thermal current Ith | N.C., 95-96 | 6 A |
| | N.O., 97-98 | 4 A |
| Rated frequency | | DC, 50/60 Hz |
| Number of poles | | 1 N.O. + 1 N.C. |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | | |
| 110-120 V | N.C., 95-96 | 3.00 A |
| | N.O., 97-98 | 0.50 A |
| 220-230-240 V | N.C., 95-96 | 3.00 A |
| | N.O., 97-98 | 0.50 A |
| 440 V | N.C., 95-96 | 0.75 A |
| | N.O., 97-98 | 0.50 A |
| 480-500 V | N.C., 95-96 | 0.75 A |
| | N.O., 97-98 | 0.50 A |
| Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | | |
| 24 V | N.C., 95-96 | 1.25 A |
| | N.O., 97-98 | 1.25 A |
| 110-120-125 V | N.C., 95-96 | 0.55 A |
| | N.O., 97-98 | 0.55 A |
| 250 V | N.C., 95-96 | 0.27 A |
| | N.O., 97-98 | 0.27 A |
| Minimum switching capacity | | 12 V / 3 mA |
| Short-circuit protective device | N.C., 95-96 | 6 A, fuse type gG |
| | N.O., 97-98 | 4 A, fuse type gG |
| Rated impulse withstand voltage Uimp | | 6 kV |
| Rated insulation voltage Ui | | 690 V |

### Technical diagram – Intermittent periodic duty




ta: Motor starting time

# TF96 thermal overload relays – 40.0 to 96.0 A
Technical data

### Main circuit – Utilization characteristics according to UL/CSA

| Type | TF96 |
|---|---|
| Standards | UL 60947-1, UL 60947-4-1 |
| Maximum operational voltage | 600 V AC/DC |
| Trip rating | 125% of FLA |
| Full load amps (FLA) | See table "Full load amps and short-circuit protective device" |
| Short-circuit rating RMS symmetrical | See table "Full load amps and short-circuit protective device" |
| Short-circuit protective device | See table "Full load amps and short-circuit protective device" |

### Auxiliary circuit according to UL/CSA

| Type | | TF96 |
|---|---|---|
| Contact rating | N.C., 95-96 | B600, Q600 |
| | N.O., 97-98 | D300, Q600 |
| Conventional thermal current | N.C., 95-96 | 5 A |
| | N.O., 97-98 | 2.5 A |

### Full load amps and short-circuit protective device

| Type | Full load amps (FLA) | Short-circuit protective device | | | |
|---|---|---|---|---|---|
| | | 480 / 600 V AC | | 480 / 600 V AC | |
| | | Short circuit rating RMS symmetrical | Fuse type | Short circuit rating RMS symmetrical | Fuse type |
| TF96-51 | 51 A | 5 kA | 150 A, K5 / RK5 | 18 kA | 125 A, Class J |
| TF96-60 | 60 A | 10 kA | 150 A, K5 / RK5 | 18 kA | 150 A, Class J |
| TF96-68 | 68 A | 10 kA | 150 A, K5 / RK5 | 18 kA | 150 A, Class J |
| TF96-78 | 78 A | 10 kA | 175 A, K5 / RK5 | 18 kA | 175 A, Class J |
| TF96-87 | 87 A | 10 kA | 200 A, K5 / RK5 | 18 kA | 200 A, Class J |
| TF96-96 | 96 A | 10 kA | 250 A, K5 / RK5 | 18 kA | 200 A, Class J |

# TF96 thermal overload relays – 40.0 to 96.0 A
Technical data

## General technical data

| | | |
|---|---|---|
| Type | | **TF96** |
| Pollution degree | | 3 |
| Phase loss sensitive | | Yes |
| Ambient air temperature | | |
| Operation (1) | Open - compensated | -40 ... +70 °C |
| | Open | -40 ... +70 °C |
| Storage | | -50 ... +85 °C |
| Ambient air temperature compensation | | Acc. to IEC/EN60947-4-1 |
| Maximum operating altitude permissible | | 2000 m |
| Resistance to shock acc. to IEC 60068-2-27 | | 25g / 11 ms |
| Resistance to vibrations acc. to IEC 60068-2-6 | | 5g / 3 ... 150 Hz |
| Mounting position | | Position 1 to 6 |
| Mounting | | Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm) |
| Degree of protection | Housing | IP20 |
| | Main circuit terminals | IP10 |

(1) Valid for TF96 produced from week 11, 2016. Otherwise, -25 ...+60 °C range is valid.
Derating might be applicable for temperatures > 50°C. Data on request.



## Electrical connection

### Main circuit

| | | | |
|---|---|---|---|
| Type | | | **TF96** |
| Connecting capacity | | | |
|  | Rigid | 1 or 2 x | 6 ... 35 mm² |
| | | 1 x | 6 ... 50 mm² |
|  | Flexible with ferrule | 1 or 2 x | 6 ... 35 mm² |
| | | 1 x | 6 ... 50 mm² |
|  | Flexible with insulated ferrule | 1 or 2 x | 6 ... 16 mm² |
| | | 1 x | 6 ... 50 mm² |
|  | Flexible | 1 or 2 x | 6 ... 35 mm² |
| | | 1 x | 6 ... 50 mm² |
| | Stranded acc. to UL/CSA | 1 x | AWG 8 ... 1 |
| | | 2 x | AWG 8 ... 3 |
| | Flexible acc. to UL/CSA | 1 x | AWG 8 ... 1 |
| | | 2 x | AWG 8 ... 3 |
| Stripping length | | | 20 mm (1) |
| Tightening torque | | | 6 ... 9 Nm / 53 ... 80 lb.in (2) |
| Recommended screw driver | | | M8 (Hexagon) |

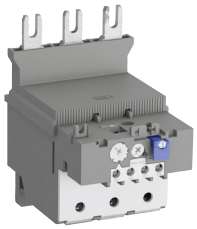
(2) Valid for products, produced from week 27, 2015

### Auxiliary circuit

| | | | |
|---|---|---|---|
| Type | | | **TF96** |
| Connecting capacity | | | |
|  | Rigid | 1 or 2 x | 0.75 ... 4 mm² |
|  | Flexible with ferrule | 1 or 2 x | 0.75 ... 4 mm² |
|  | Flexible with insulated ferrule | 1 x | 0.75 ... 2.5 mm² |
| | | 2 x | 0.75 ... 1.5 mm² |
|  | Flexible | 1 or 2 x | 0.75 ... 1 mm² or 1 ... 2.5 mm² |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 18 ...12 |
| | Flexible acc. to UL/CSA | 1 or 2 x | AWG 18 ... 12 |
| Stripping length | | | 9 mm |
| Tightening torque | | | 1 ... 1.2 Nm / 9 ... 11 lb.in |
| Recommended screw driver | | | M3 (Pozidriv 2) |

# TF140DU thermal overload relays – 66 to 142 A

## Ordering details




TF140DU




KPR-101L

The TF140DU thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10A.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

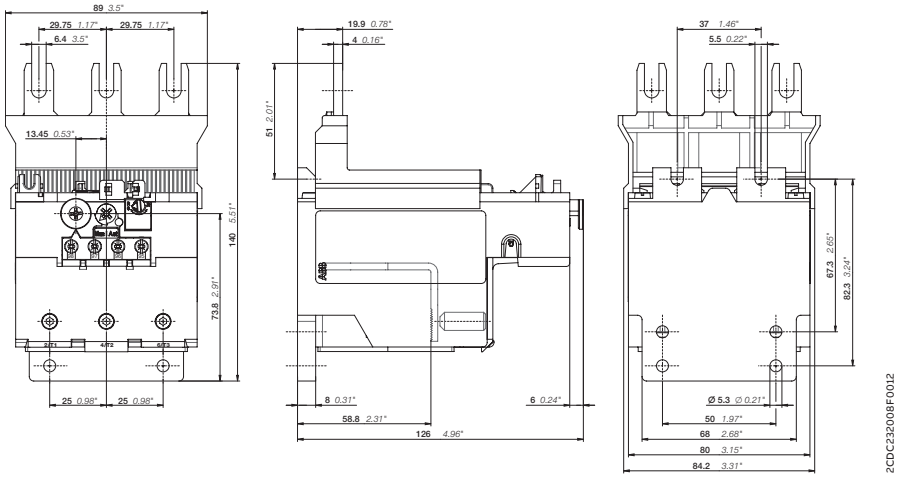
- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- ATEX variants available

| Setting range<br>A | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|
| **Suitable for AF116...AF140 contactors** | | | | | |
| 66 ... 90 | 200 A, fuse type gG | 10A | TF140DU-90 | 1SAZ431201R1001 | 0.882 |
| 80 ... 110 | 224 A, fuse type gG | 10A | TF140DU-110 | 1SAZ431201R1002 | 0.824 |
| 100 ... 135 | 224 A, fuse type gG | 10A | TF140DU-135 | 1SAZ431201R1003 | 0.818 |
| 110 ... 142 | 250 A, fuse type gG | 10A | TF140DU-142 | 1SAZ431201R1004 | 0.828 |
| 66 ... 90 | 200 A, fuse type gG | 10A | TF140DU-90-V1000* | 1SAZ431301R1001 | 0.882 |
| 80 ... 110 | 224 A, fuse type gG | 10A | TF140DU-110-V1000* | 1SAZ431301R1002 | 0.824 |
| 100 ... 135 | 224 A, fuse type gG | 10A | TF140DU-135-V1000* | 1SAZ431301R1003 | 0.818 |
| 110 ... 142 | 250 A, fuse type gG | 10A | TF140DU-142-V1000* | 1SAZ431301R1004 | 0.828 |

*Note: ATEX variant

### Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|
| Reset push button | E16, EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.027 |




TF140DU

Main dimensions mm, inches

# TF140DU thermal overload relays – 66 to 142 A
Technical data



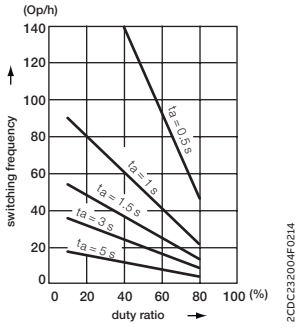
## Main circuit – Utilization characteristics according to IEC/EN

| Type | | **TF140DU / TF140DU-V1000** |
|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1 |
| Rated operational voltage Ue | | 690 V AC, 440 V DC |
| Rated frequency | | DC, 50/60 Hz |
| Frequency range | | 0 ... 400 Hz |
| Trip class | | 10A |
| Number of poles | | 3 |
| Duty time | | 100% |
| Operating frequency without early tripping | | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" |
| Rated impulse withstand voltage Uimp | | 8 kV |
| Rated insulation voltage Ui | | 690 V |

## Auxiliary circuit according to IEC/EN

| Type | | **TF140DU / TF140DU-V1000** |
|---|---|---|
| Rated operational voltage Ue | | 500 V AC, 440 V DC |
| Conventional free air thermal current Ith | N.C., 95-96 | 10 A |
| | N.O., 97-98 | 6 A |
| Rated frequency | | DC, 50/60 Hz |
| Number of poles | | 1 N.O. + 1 N.C. |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | | |
| 110-120 V | N.C., 95-96 | 3.00 A |
| | N.O., 97-98 | 1.50 A |
| 220-230-240 V | N.C., 95-96 | 3.00 A |
| | N.O., 97-98 | 1.20 A |
| 440 V | N.C., 95-96 | 0.75 A |
| | N.O., 97-98 | 0.37 A |
| 480-500 V | N.C., 95-96 | 0.30 A |
| | N.O., 97-98 | 0.25 A |
| Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | | |
| 24 V | N.C., 95-96 | 1.25 A |
| | N.O., 97-98 | 1.25 A |
| 60 V | N.C., 95-96 | 0.25 A |
| | N.O., 97-98 | 0.25 A |
| 110-120-125 V | N.C., 95-96 | 0.25 A |
| | N.O., 97-98 | 0.25 A |
| 250 V | N.C., 95-96 | 0.12 A |
| | N.O., 97-98 | 0.04 A |
| Minimum switching capacity | | 17 V / 3 mA |
| Short-circuit protective device | N.C., 95-96 | 10 A, fuse type gG |
| | N.O., 97-98 | 6 A, fuse type gG |
| Rated impulse withstand voltage Uimp | | 6 kV |
| Rated insulation voltage Ui | | 690 V |

## Technical diagram – Intermittent periodic duty




ta: Motor starting time

# TF140DU thermal overload relays – 66 to 142 A
Technical data

### Main circuit – Utilization characteristics according to UL/CSA

| Type | TF140DU / TF140DU-V1000 |
|---|---|
| Standards | UL 508, CSA 22.2 No. 14, UL 60947-4-1A |
| Maximum operational voltage | 600 V AC/DC |
| Trip rating | 125% of FLA |
| Full load amps (FLA) | See table "Full load amps and short-circuit protective device" |
| Short-circuit rating RMS symmetrical | See table "Full load amps and short-circuit protective device" |
| Short-circuit protective device | See table "Full load amps and short-circuit protective device" |

### Auxiliary circuit according to UL/CSA

| Type | | TF140DU / TF140DU-V1000 |
|---|---|---|
| Contact rating | N.C., 95-96 | C600 |
| | N.O., 97-98 | B600 |
| Conventional thermal current | N.C./N.O. | 10 A / 6 A |

### Full load amps and short-circuit protective device

| Type | Full load amps (FLA) | Short-circuit protective device | | | | | |
|---|---|---|---|---|---|---|---|
| | | 480 / 600 V AC | | 480 / 600 V AC | | 480 / 600 V AC | |
| | | Short circuit rating RMS symmetrical | Fuse type | Short circuit rating RMS symmetrical | Fuse type | Short circuit rating RMS symmetrical | Listed circuit breaker |
| TF140DU-90 / TF140DU-90-V1000 | 90 A | 10 kA | 250 A, K5 / RK5 | 100 kA | 250 A, Class J | 100 kA | 250 A |
| TF140DU-110 / TF140DU-110-V1000 | 110 A | 10 kA | 250 A, K5 / RK5 | 100 kA | 250 A, Class J | 100 kA | 250 A |
| TF140DU-135 / TF140DU-135-V1000 | 135 A | 10 kA | 250 A, K5 / RK5 | 100 kA | 250 A, Class J | 100 kA | 250 A |
| TF140DU-142 / TF140DU-142-V1000 | 142 A | 10 kA | 250 A, K5 / RK5 | 100 kA | 250 A, Class J | 100 kA | 250 A |

# TF140DU thermal overload relays – 66 to 142 A
Technical data

## General technical data

| | | | |
|---|---|---|---|
| Type | | | **TF140DU / TF140DU-V1000** |
| Pollution degree | | | 3 |
| Phase loss sensitive | | | Yes |
| Ambient air temperature | | | |
| | Operation | Open - compensated | -25 ... +55 °C |
| | | Open | -25 ... +55 °C |
| | Storage | | -40 ... +70 °C |
| Ambient air temperature compensation | | | Acc. to IEC/EN 60947-4-1 |
| Maximum operating altitude permissible | | | 2000 m |
| Resistance to shock acc. to IEC 60068-2-27 | | | 15 g / 11 ms |
| Mounting position | | | Position 1-5 |
| Mounting | | | Mount on the contactor and tighten the screws of the main circuit terminals |
| Degree of protection | Housing | | IP20 |
| | Main circuit terminals | | IP10 |



## Electrical connection

### Main circuit

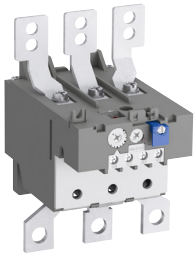
| | | | |
|---|---|---|---|
| Type | | | **TF140DU / TF140DU-V1000** |
| Connecting capacity | | | |
|  | Rigid | 1 x | 16 ... 70 mm² |
| | | 2 x | - |
|  | Flexible | 1 x | 16 ... 70 mm² |
| | | 2 x | - |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 6-2/0 |
| | Flexible acc. to UL/CSA | 1 or 2 x | AWG 6-2/0 |
| Stripping length | | | 25 mm |
| Tightening torque | | | 8 ... 10 Nm / 77 ... 88 lb.in |
| Recommended screw driver | | | M8 (Hexagon) |

### Auxiliary circuit

| | | | |
|---|---|---|---|
| Type | | | **TF140DU / TF140DU-V1000** |
| Connecting capacity | | | |
|  | Rigid | 1 or 2 x | 0.75 ... 4 mm² |
|  | Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm² |
|  | Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 2.5 mm² |
|  | Flexible | 1 or 2 x | 0.75 ... 2.5 mm² |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 18-14 |
| | Flexible acc. to UL/CSA | 1 or 2 x | AWG 18-14 |
| Stripping length | | | 9 mm |
| Tightening torque | | | 0.8 ... 1.2 Nm / 12 lb.in |
| Recommended screw driver | | | M3.5 (Pozidriv 2) |

# TA200DU thermal overload relays – 66 to 200 A

## Ordering details



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TA200DU



15FC151224F0002

KPR-101L

The TA200DU thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10A.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

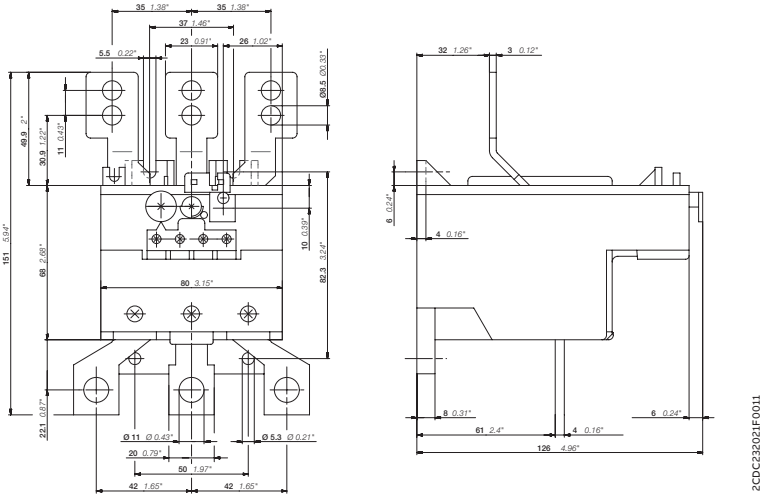
- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- ATEX variants available

| Setting range<br>A | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|
| **Suitable for AF190...AF205 contactors** | | | | | |
| 66 ... 90 | 200 A, fuse type gG / 125 A aM | 10A | TA200DU-90 | 1SAZ421201R1001 | 0.755 |
| 80 ... 110 | 224 A, fuse type gG / 160 A aM | 10A | TA200DU-110 | 1SAZ421201R1002 | 0.760 |
| 100 ... 135 | 224 A, fuse type gG / 200 A aM | 10A | TA200DU-135 | 1SAZ421201R1003 | 0.760 |
| 110 ... 150 | 250 A, fuse type gG / 200 A aM | 10A | TA200DU-150 | 1SAZ421201R1004 | 0.760 |
| 130 ... 175 | 315 A, fuse type gG / 250 A aM | 10A | TA200DU-175 | 1SAZ421201R1005 | 0.770 |
| 150 ... 200 | 315 A, fuse type gG / 250 A aM | 10A | TA200DU-200 | 1SAZ421201R1006 | 0.785 |
| 66 ... 90 | 200 A, fuse type gG / 125 A aM | 10A | TA200DU-90-V1000 (1) | 1SAZ421301R1001 | 0.755 |
| 80 ... 110 | 224 A, fuse type gG / 160 A aM | 10A | TA200DU-110-V1000 (1) | 1SAZ421301R1002 | 0.760 |
| 100 ... 135 | 224 A, fuse type gG / 200 A aM | 10A | TA200DU-135-V1000 (1) | 1SAZ421301R1003 | 0.760 |
| 110 ... 150 | 250 A, fuse type gG / 200 A aM | 10A | TA200DU-150-V1000 (1) | 1SAZ421301R1004 | 0.760 |
| 130 ... 175 | 315 A, fuse type gG / 250 A aM | 10A | TA200DU-175-V1000 (1) | 1SAZ421301R1005 | 0.770 |
| 150 ... 200 | 315 A, fuse type gG / 250 A aM | 10A | TA200DU-200-V1000 (1) | 1SAZ421301R1006 | 0.785 |

(1) ATEX variant

### Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|
| Terminal shroud | TA200DU | LT200/A | 1SAZ401901R1001 | 0.090 |
| Single mounting kit | TA200DU | DB200 | 1SAZ401110R0001 | 0.225 |
| Reset push button | E16, EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.027 |



2CDC232021F0011

TA200DU

Main dimensions mm, inches

# TA200DU thermal overload relays – 66 to 200 A
Technical data



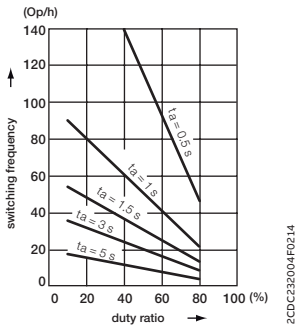
## Main circuit – Utilization characteristics according to IEC/EN

| Type | | **TA200DU / TA200DU-V1000** |
|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1 |
| Rated operational voltage Ue | | 690 V AC / 440 V DC |
| Rated frequency | | DC, 50/60 Hz |
| Frequency range | | 0 ... 400 Hz |
| Trip class | | 10A |
| Number of poles | | 3 |
| Duty time | | 100% |
| Operating frequency without early tripping | | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" |
| Rated impulse withstand voltage Uimp | | 6 kV |
| Rated insulation voltage Ui | | 690 V AC |

## Auxiliary circuit according to IEC/EN

| Type | | **TA200DU / TA200DU-V1000** |
|---|---|---|
| Rated operational voltage Ue | | 500 V AC, 440 V DC |
| Conventional free air thermal current Ith | N.C., 95-96 | 10 A |
| | N.O., 97-98 | 6 A |
| Rated frequency | | DC, 50/60 Hz |
| Number of poles | | 1 N.O. + 1 N.C. |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | | |
| 110-120 V | N.C., 95-96 | 3.00 A |
| | N.O., 97-98 | 1.50 A |
| 220-230-240 V | N.C., 95-96 | 3.00 A |
| | N.O., 97-98 | 1.20 A |
| 440 V | N.C., 95-96 | 0.75 A |
| | N.O., 97-98 | 0.37 A |
| 480-500 V | N.C., 95-96 | 0.30 A |
| | N.O., 97-98 | 0.25 A |
| Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | | |
| 24 V | N.C., 95-96 | 1.25 A |
| | N.O., 97-98 | 1.25 A |
| 60 V | N.C., 95-96 | 0.25 A |
| | N.O., 97-98 | 0.25 A |
| 110-120-125 V | N.C., 95-96 | 0.25 A |
| | N.O., 97-98 | 0.25 A |
| 250 V | N.C., 95-96 | 0.12 A |
| | N.O., 97-98 | 0.04 A |
| Minimum switching capacity | | 17 V / 3 mA |
| Short-circuit protective device | N.C., 95-96 | 10 A, fuse type gG |
| | N.O., 97-98 | 6 A, fuse type gG |
| Rated impulse withstand voltage Uimp | | 6 kV |
| Rated insulation voltage Ui | | 690 V |

## Technical diagram – Intermittent periodic duty




ta: Motor starting time

# TA200DU thermal overload relays – 66 to 200 A
Technical data

### Main circuit – Utilization characteristics according to UL/CSA

| Type | TA200DU / TA200DU-V1000 |
|---|---|
| Standards | UL 508, CSA 22.2 No. 14 |
| Maximum operational voltage | 600 V AC/DC |
| Trip rating | 125% of FLA |
| Full load amps (FLA) | See table "Full load amps and short-circuit protective device" |
| Short-circuit rating RMS symmetrical | See table "Full load amps and short-circuit protective device" |
| Short-circuit protective device | See table "Full load amps and short-circuit protective device" |

### Auxiliary circuit according to UL/CSA

| Type | | TA200DU / TA200DU-V1000 |
|---|---|---|
| Contact rating | N.C., 95-96 | C600 |
| | N.O., 97-98 | B600 |
| Conventional thermal current | | 5 A |

### Full load amps and short-circuit protective device

| Type | Full load amps (FLA) | Short-circuit protective device 480 / 600 V AC | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Short circuit rating RMS symmetrical | Fuse type | Listed circuit breaker | Short circuit rating RMS symmetrical | Fuse type | Short circuit rating RMS symmetrical | Listed circuit breaker |
| TA200DU-90 / TA200DU-90-V1000 | 90 A | 10 kA | 250 A, K5 / RK5 | 225 A | 100 kA | 250 A, Class J | 100 kA | 250 A |
| TA200DU-110 / TA200DU-110-V1000 | 110 A | 10 kA | 250 A, K5 / RK5 | 225 A | 100 kA | 250 A, Class J | 100 kA | 250 A |
| TA200DU-135 / TA200DU-135-V1000 | 135 A | 10 kA | 300 A, K5 / RK5 | 225 A | 100 kA | 250 A, Class J | 100 kA | 250 A |
| TA200DU-150 / TA200DU-150-V1000 | 150 A | 10 kA | 300 A, K5 / RK5 | 225 A | 100 kA | 250 A, Class J | 100 kA | 250 A |
| TA200DU-175 / TA200DU-175-V1000 | 175 A | 10 kA | 300 A, K5 / RK5 | 225 A | 100 kA | 300 A, Class J | 100 kA | 300 A |
| TA200DU-200 / TA200DU-200-V1000 | 200 A | 10 kA | 400 A, K5 / RK5 | 400 A | 100 kA | 400 A, Class J | 100 kA | 400 A |

# TA200DU thermal overload relays – 66 to 200 A
Technical data

## General technical data

| Type | | | TA200DU | TA200DU-V1000 |
|---|---|---|---|---|
| Pollution degree | | | 3 | |
| Phase loss sensitive | | | Yes | |
| Ambient air temperature | | | | |
| | Operation | Open - compensated | -25 ... +55 °C | -5 ... +40 °C |
| | | Open | -25 ... +55 °C | -5 ... +40 °C |
| | Storage | | -40 ... +70 °C | |
| Ambient air temperature compensation | | | Acc. to IEC/EN60947-4-1 | |
| Maximum operating altitude permissible | | | 2000 m | |
| Resistance to shock acc. to IEC 60068-2-27 | | | 12g / 15 ms | |
| Mounting position | | | Position 1-6 | |
| Mounting | | | Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit | |
| Degree of protection | | Housing | IP20 | |
| | | Main circuit terminals | IP00 | |



## Electrical connection

### Main circuit

| Type | | | TA200DU / TA200DU-V1000 |
|---|---|---|---|
| Connecting capacity | | | |
| | Rigid | 1 x | 25 ... 120 mm² |
| | Flexible | 1 x | 25 ... 120 mm² |
| | Stranded acc. to UL/CSA | 1 x | AWG 4 ... 0000 |
| | Flexible acc. to UL/CSA | 1 x | AWG 4 ... 0000 |
| | Lugs | | L > 10 mm |
| Tightening torque | | | 25 Nm / 220 lb.in |
| Recommended screwdriver | | | Open bars |

### Auxiliary circuit

| Type | | | TA200DU / TA200DU-V1000 |
|---|---|---|---|
| Connecting capacity | | | |
| | Rigid | 1 or 2 x | 0.75 ... 4 mm² |
| | Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm² |
| | Flexible with insulated ferrule | 1 x | 0.75 ... 2.5 mm² |
| | | 2 x | 0.75 ... 1 mm² |
| | Flexible | 1 or 2 x | 0.75 ... 2.5 mm² |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 18 ... 14 |
| | Flexible acc. to UL/CSA | 1 or 2 x | AWG 18 ... 14 |
| Stripping length | | | 9 mm |
| Tightening torque | | | 0.8 ... 1.3 Nm / 12 lb.in |
| Recommended screwdriver | | | M3.5 (Pozidriv 2) |

# E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A

## Ordering details



E16DU-1-0



1SBC101147F0010

EF19-18.9



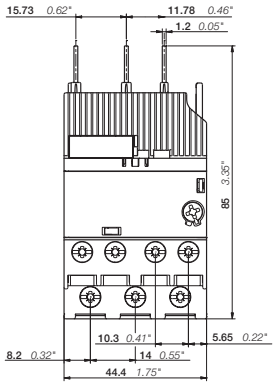
1SBC101148F0010

EF45-30

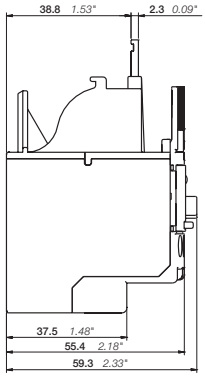
The E16DU, EF19 and EF45 are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic overload relay is convincing, above all, due to its wide setting range, high accuracy, high operational temperature range and the possibility to select a trip class (10E, 20E, 30E). Further features are the temperature compensation, trip contact (N.C.), signal contact (N.O.), automatic or manual reset selectable, trip-free mechanism, STOP and TEST function and a trip indication. The overload relays are connected directly to the contactors. The EF19 and EF45 have ATEX and IECEx certification (1).

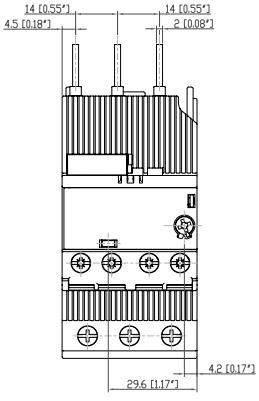
| Setting range<br>A | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|
| **E16DU electronic overload relays, suitable for B6 and B7** | | | | | |
| 0.10 ... 0.32 | 1 A, fuse type gG | 10E, 20E, 30E | E16DU-0.32 | 1SAX111001R1101 | 0.158 |
| 0.30 ... 1.00 | 4 A, fuse type gG | 10E, 20E, 30E | E16DU-1.0 | 1SAX111001R1102 | 0.158 |
| 0.80 ... 2.70 | 10 A, fuse type gG | 10E, 20E, 30E | E16DU-2.7 | 1SAX111001R1103 | 0.158 |
| 2.00 ... 6.30 | 20 A, fuse type gG | 10E, 20E, 30E | E16DU-6.3 | 1SAX111001R1104 | 0.158 |
| 5.70 ... 18.9 | 50 A, fuse type gG | 10E, 20E, 30E | E16DU-18.9 | 1SAX111001R1105 | 0.158 |
| **EF19 electronic overload relays, suitable for AF09 ... AF38 / AFC09 ... AFC38 (1)** | | | | | |
| 0.10 ... 0.32 | 1 A, fuse type gG | 10E, 20E, 30E | EF19-0.32 | 1SAX121001R1101 | 0.158 |
| 0.30 ... 1.00 | 4 A, fuse type gG | 10E, 20E, 30E | EF19-1.0 | 1SAX121001R1102 | 0.158 |
| 0.80 ... 2.70 | 10 A, fuse type gG | 10E, 20E, 30E | EF19-2.7 | 1SAX121001R1103 | 0.158 |
| 1.90 ... 6.30 | 20 A, fuse type gG | 10E, 20E, 30E | EF19-6.3 | 1SAX121001R1104 | 0.158 |
| 5.70 ... 18.9 | 50 A, fuse type gG | 10E, 20E, 30E | EF19-18.9 | 1SAX121001R1105 | 0.158 |
| **EF45-30 also suitable for AF26 ... AF38 (1)** | | | | | |
| 9.00 ... 30.0 | 160 A, fuse type gG | 10E, 20E, 30E | EF45-30 | 1SAX221001R1101 | 0.362 |
| 15.0 ... 45.0 | 160 A, fuse type gG | 10E, 20E, 30E | EF45-45 | 1SAX221001R1102 | 0.362 |

(1) ATEX is valid for products produced from week 42, 2014. IECEx is valid for products produced from week 15, 2017.

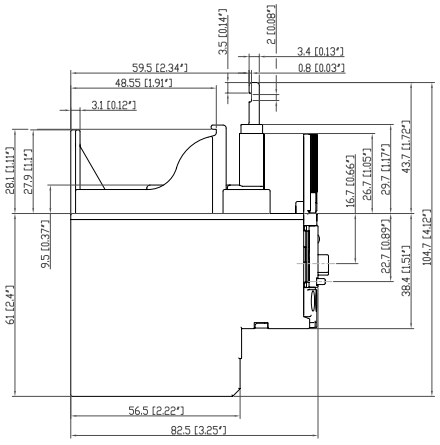


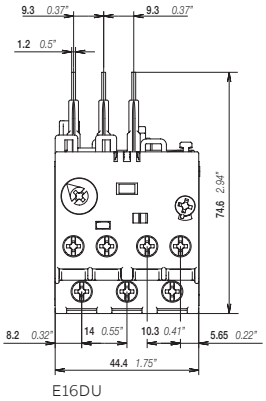

EF19



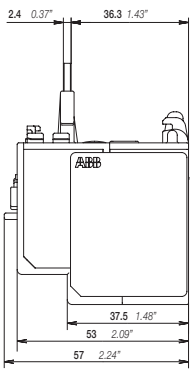




EF45



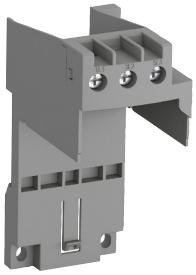




E16DU




Main dimensions mm, inches

# E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A
## Ordering details



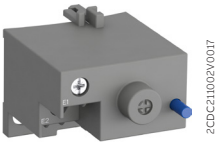

DB19EF




DB45EF




KPR-101L

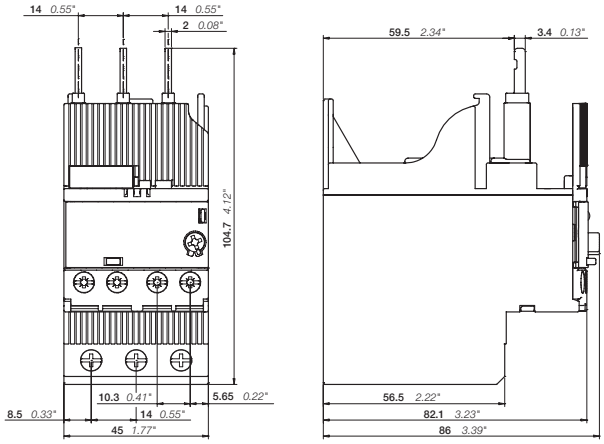



DRS-F

### Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce) kg |
|---|---|---|---|---|
| Single mounting kit | E16DU | DB16E | 1SAX101110R0001 | 0.035 |
| Single mounting kit | EF19 | DB19EF | 1SAX101910R1001 | 0.046 |
| Single mounting kit | EF45 | DB45EF | 1SAX201910R0001 | 0.100 |
| Reset push button | E16, EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.019 |
| Remote reset coil 24-30 V DC | EF19, EF45, EF65, EF96, EF146, EF205, EF370, EF460, EF750 | DRS-F-01 | 1SAX101911R1001 | 0.076 |
| Remote reset coil 48-60 V DC | | DRS-F-02 | 1SAX101911R1002 | 0.077 |
| Remote reset coil 110-127 V DC | | DRS-F-03 | 1SAX101911R1003 | 0.078 |
| Remote reset coil 220-240 V DC | | DRS-F-04 | 1SAX101911R1004 | 0.076 |
| Remote stop coil 24-30 V AC/DC | | DRS-F-EF-01 | 1SAX101911R1011 | 0.075 |
| Remote stop coil 48-60 V AC/DC | | DRS-F-EF-02 | 1SAX101911R1012 | 0.076 |
| Remote stop coil 110-127 V AC/DC | | DRS-F-EF-03 | 1SAX101911R1013 | 0.076 |
| Remote stop coil 220-240 V AC/DC | | DRS-F-EF-04 | 1SAX101911R1014 | 0.074 |

# E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A
## Technical data




EF45



### Main circuit – Utilization characteristics according to IEC/EN

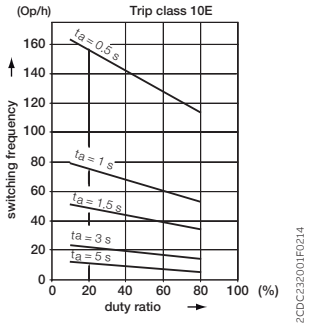
| Type | E16DU | EF19 | EF45 |
|---|---|---|---|
| Standards | IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1 | | |
| Rated operational voltage Ue | 690 V AC | | |
| Rated frequency | 50/60 Hz – not suitable for DC applications | | |
| Trip class | 10E, 20E, 30E, selectable | | |
| Number of poles | 3 | | |
| Duty time | 100% | | |
| Operating frequency without early tripping | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" | | |
| Rated impulse withstand voltage Uimp | 6 kV | | |
| Rated insulation voltage Ui | 690 V AC | | |

### Auxiliary circuit according to IEC/EN

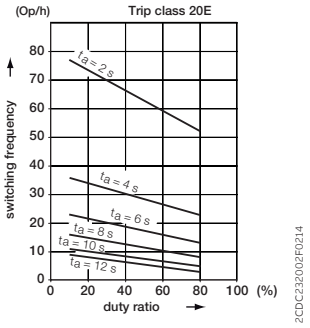
| Type | | E16DU | EF19 | EF45 |
|---|---|---|---|---|
| Rated operational voltage Ue | | 600 V AC / DC | | |
| Conventional free air thermal current Ith | | 6 A | | |
| Rated frequency | | DC, 50/60 Hz | | |
| Number of poles | | 1 N.C. + 1 N.O. | | |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | | | | |
| 110-120 V | 50/60 Hz | 3.00 A | | |
| 220-230-240 V | 50/60 Hz | 3.00 A | | |
| 400 V | 50/60 Hz | 1.10 A | | |
| 480-500 V | 50/60 Hz | 0.72 A | 0.75 A | |
| Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | | | | |
| 24 V | | 1.50 A | | |
| 60 V | | 0.55 A | | |
| 110-120-125 V | | 0.55 A | | |
| 250 V | | 0.27 A | | |
| Minimum switching capacity | | 12 V / 3 mA | | |
| Short-circuit protective devices | | 6 A, fuse type gG | | |
| Rated impulse withstand voltage Uimp | | 6 kV | | |
| Rated insulation voltage Ui | | 690 V | | |

# E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A
Technical data

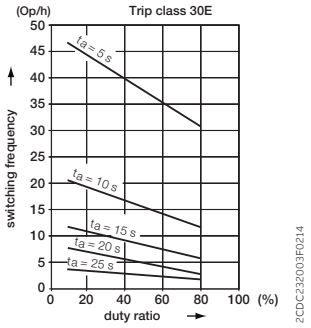
### Technical diagram – Intermittent periodic duty




Trip class 10E




Trip class 20E




Trip class 30E

### Main circuit – Utilization characteristics according to UL/CSA

| Type | E16DU | EF19 | EF45 |
|---|---|---|---|
| Standards | UL 508, CSA 22.2 No. 14 | | |
| Maximum operational voltage | 600 V AC | | |
| Trip rating | 125% of FLA | | |
| Full load amps (FLA) | See table "Full load amps and short-circuit protective device" | | |
| Short-circuit rating RMS symmetrical | See table "Full load amps and short-circuit protective device" | | |
| Short-circuit protective device | See table "Full load amps and short-circuit protective device" | | |

### Auxiliary circuit according to UL/CSA

| Type | | E16DU | EF19 | EF45 |
|---|---|---|---|---|
| Contact rating | N.C., 95-96 | B600, Q300 | B600, Q600 | |
| | N.O., 97-98 | B600, Q300 | B600, Q600 | |
| Conventional free-air thermal current | | 5 A | | |

### Full load amps and short-circuit protective device

| Type | Full load amps (FLA) | Short-circuit protective device | | | | | |
|---|---|---|---|---|---|---|---|
| | | 480 V AC | | 600 V AC | | | |
| | | SCCR | Fuse type | SCCR | Fuse type | SCCR | Fuse type |
| E16DU-0.32 | 0.32 A | 50 kA | 2 A, Class J | 5 kA | 2 A, K5 / RK5 | 100 kA | 2 A, Class J |
| E16DU-1.0 | 1.00 A | 50 kA | 2 A, K5 / RK5 | 5 kA | 2 A, K5 / RK5 | 100 kA | 2 A, Class J |
| E16DU-2.7 | 2.70 A | 50 kA | 4 A, K5 / RK5 | 5 kA | 4 A, K5 / RK5 | 100 kA | 4 A, Class J |
| E16DU-6.3 | 6.30 A | 50 kA | 15 A, K5 / RK5 | 5 kA | 15 A, K5 / RK5 | 100 kA | 15 A, Class J |
| E16DU-18.9 | 18.90 A | 50 kA | 30 A, K5 / RK5 | 5 kA | 30 A, K5 / RK5 | 100 kA | 30 A, Class J |

| Type | Full load amps (FLA) | Short-circuit protective device | | | | | |
|---|---|---|---|---|---|---|---|
| | | 480 V AC | | 600 V AC | | | |
| | | SCCR | Fuse type | SCCR | Fuse type | SCCR | Fuse type |
| EF19-0.32 | 0.32 A | 50 kA | 2 A, Class J | 5 kA | 2 A, K5 / RK5 | 100 kA | 2 A, Class J |
| EF19-1.0 | 1.00 A | 50 kA | 2 A, K5 / RK5 | 5 kA | 2 A, K5 / RK5 | 100 kA | 2 A, Class J |
| EF19-2.7 | 2.70 A | 50 kA | 4 A, K5 / RK5 | 5 kA | 4 A, K5 / RK5 | 100 kA | 4 A, Class J |
| EF19-6.3 | 6.30 A | 50 kA | 15 A, K5 / RK5 | 5 kA | 15 A, K5 / RK5 | 100 kA | 15 A, Class J |
| EF19-18.9 | 18.90 A | 50 kA | 30 A, K5 / RK5 | 5 kA | 30 A, K5 / RK5 | 100 kA | 30 A, Class J |

| Type | Full load amps (FLA) | Short-circuit protective device | | | | | |
|---|---|---|---|---|---|---|---|
| | | 480 V AC | | 600 V AC | | | |
| | | SCCR | Fuse type | SCCR | Fuse type | SCCR | Fuse type |
| EF45-30 | 30 A | 18 kA | 150 A, K5 / RK5 | 18 kA | 150 A, K5 / RK5 | 100 kA | 150 A, Class J |
| EF45-45 | 45 A | 18 kA | 200 A, K5 / RK5 | 18 kA | 200 A, K5 / RK5 | 100 kA | 200 A, Class J |

# E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A
Technical data

## General data

| Type | | | E16DU | EF19 | EF45 |
|---|---|---|---|---|---|
| Pollution degree | | | 3 | | |
| Phase loss sensitive | | | Yes | | |
| Ambient air temperature | | | | | |
| | Operation | Open - compensated | -25 ... +70 °C | | |
| | Storage | | -50 ... +85 °C | | |
| Ambient air temperature compensation | | | Acc. to IEC/EN60947-4-1 | | |
| Maximum operating altitude permissible | | | 2000 m | | |
| Resistance to shock acc. to IEC 60068-2-27 | | | 15g / 11 ms pulse | 25g / 11 ms pulse | |
| Resistance to vibrations acc. to IEC 60068-2-6 | | | 5g / 3 ... 150 Hz | 3g / 3 ... 150 Hz | 5g / 3 ... 150 Hz |
| Mounting position | | | Position 1-6 | | |
| Mounting | | | Mount on the contactor and tighten the screws of the main circuit terminals | | |
| Degree of protection | Housing | | IP20 | | |
| | Main circuit terminals | | IP20 | | |

## Electrical connection

### Main circuit

| Type | | | E16DU | EF19 | EF45 |
|---|---|---|---|---|---|
| Connecting capacity | | | | | |
| Rigid | | 1 or 2 x | 1 ... 4 mm² | 1 ... 4 mm² | 2.5 ... 16 mm² |
| Flexible with insulated ferrule | | 1 or 2 x | 0.75 ... 2.5 mm² | 0.75 ... 2.5 mm² | 2.5 ... 10 mm² |
| Stranded acc. to UL/CSA | | 1 or 2 x | AWG 16-10 | AWG 16-10 | AWG 14-6 |
| Flexible acc. to UL/CSA | | 1 or 2 x | AWG 16-10 | AWG 16-10 | AWG 14-6 |
| Stripping length | | | 9 mm | 9 mm | 13 mm |
| Tightening torque | | | 0.8 ... 1.5 Nm / 7 ... 13 lb.in | 0.8 ... 1.5 Nm / 7 ... 13 lb.in | 2.3 ... 2.6 Nm / 20 ... 22 lb.in |
| Recommended screw driver | | | M3.5 (Pozidriv 2) | M3.5 (Pozidriv 2) | M5 (Pozidriv 2) |

### Auxiliary circuit

| Type | | | E16DU | EF19 | EF45 |
|---|---|---|---|---|---|
| Connecting capacity | | | | | |
| Rigid | | 1 or 2 x | 1 ... 4 mm² | 1 ... 4 mm² | 1 ... 4 mm² |
| Flexible with ferrule | | 1 or 2 x | 0.75 ... 2.5 mm² | 0.75 ... 2.5 mm² | 0.75 ... 2.5 mm² |
| Flexible with insulated ferrule | | 1 or 2 x | 0.75 ... 2.5 mm² | 0.75 ... 2.5 mm² | 0.75 ... 2.5 mm² |
| Flexible | | 1 or 2 x | 0.75 ... 2.5 mm² | 0.75 ... 2.5 mm² | 0.75 ... 2.5 mm² |
| Stranded acc. to UL/CSA | | 1 or 2 x | AWG 16-10 | AWG 18-10 | AWG 18-10 |
| Flexible acc. to UL/CSA | | 1 or 2 x | AWG 16-10 | AWG 18-10 | AWG 18-10 |
| Stripping length | | | 9 mm | 9 mm | 9 mm |
| Tightening torque | | | 0.8 ... 1.2 Nm / 7 ... 11 lb.in | 0.8 ... 1.2 Nm / 7 ... 11 lb.in | 0.8 ... 1.2 Nm / 7 ... 11 lb.in |
| Recommended screw driver | | | M3.5 (Pozidriv 2) | M3.5 (Pozidriv 2) | M3.5 (Pozidriv 2) |

# EF65, EF96, EF146 electronic overload relays – 20 to 150 A

## Ordering details




EF65-70




EF96-100

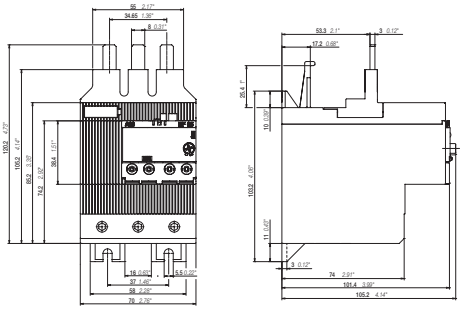



EF146-150

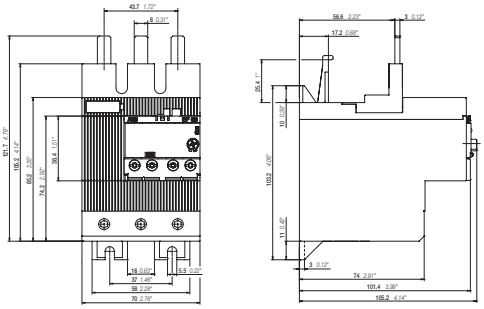
The EF65, EF96 and EF146 are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic overload relay is convincing, above all, due to its wide setting range, high accuracy, high operational temperature range and the possibility to select a trip class (10E, 20E, 30E). Further features are the temperature compensation, trip contact (N.C.), signal contact (N.O.), automatic or manual reset selectable, trip-free mechanism, STOP and TEST function and a trip indication. The overload relays are connected directly to the contactors. The EF65, EF96 and EF146 have ATEX and IECEx certification (1).

| Setting range<br>A | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|
| **Suitable for AF40, AF52, AF65** | | | | | |
| 20 ... 56 | 160 A, fuse type gG | 10E, 20E, 30E | EF65-56 | 1SAX331001R1102 | 0.821 |
| 25 ... 70 | 160 A, fuse type gG | 10E, 20E, 30E | EF65-70 | 1SAX331001R1101 | 0.821 |
| **Suitable for AF80, AF96** | | | | | |
| 20 ... 56 | 160A, fuse type gG | 10E, 20E, 30E | EF96-56 | 1SAX341001R1102 | 0.802 |
| 36 ... 100 | 200 A, fuse type gG | 10E, 20E, 30E | EF96-100 | 1SAX341001R1101 | 0.802 |
| **Suitable for AF116, AF140, AF146** | | | | | |
| 54 ... 150 | 315 A, fuse type gG | 10E, 20E, 30E | EF146-150 | 1SAX351001R1101 | 0.890 |

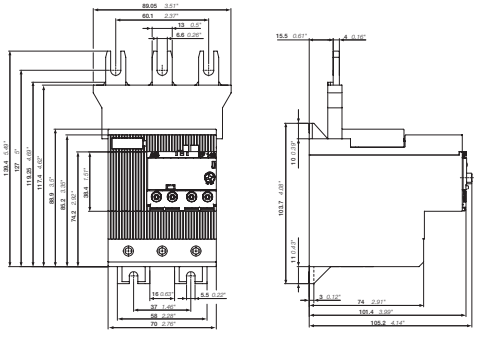
(1) ATEX is valid for products produced from week 42, 2014. ATEX certification is valid for EF65-56 produced from week 47, 2015. IECEx is valid for products produced from week 15, 2017.



EF65-56 / EF65-70



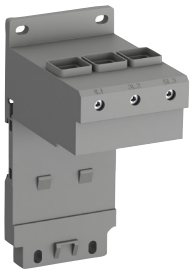
EF96-56 / EF96-100



EF146-150

Main dimensions mm, inches

# EF65, EF96, EF146 electronic overload relays – 20 to 150 A
## Ordering details



DB96



DB96 + EF96



KPR-101L



DRS-F

### Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce) kg |
|---|---|---|---|---|
| Single mounting kit | EF96, TF96 | DB96 | 1SAZ901901R1001 | 0.190 |
| Reset push button | E16, EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.019 |
| Remote reset coil 24-30 V DC | EF19, EF45, EF65, EF96, EF146, EF205, EF370, EF460, EF750 | DRS-F-01 | 1SAX101911R1001 | 0.076 |
| Remote reset coil 48-60 V DC | | DRS-F-02 | 1SAX101911R1002 | 0.077 |
| Remote reset coil 110-127 V DC | | DRS-F-03 | 1SAX101911R1003 | 0.078 |
| Remote reset coil 220-240 V DC | | DRS-F-04 | 1SAX101911R1004 | 0.076 |
| Remote stop coil 24-30 V AC/DC | | DRS-F-EF-01 | 1SAX101911R1011 | 0.075 |
| Remote stop coil 48-60 V AC/DC | | DRS-F-EF-02 | 1SAX101911R1012 | 0.076 |
| Remote stop coil 110-127 V AC/DC | | DRS-F-EF-03 | 1SAX101911R1013 | 0.076 |
| Remote stop coil 220-240 V AC/DC | | DRS-F-EF-04 | 1SAX101911R1014 | 0.074 |

# EF65, EF96, EF146 electronic overload relays – 20 to 150 A
Technical data



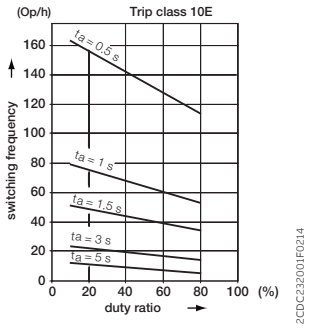
## Main circuit – Utilization characteristics according to IEC/EN

| Type | **EF65, EF96, EF146** |
|---|---|
| Standards | IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1 |
| Rated operational voltage Ue | 1000 V AC |
| Rated frequency | 50/60 Hz – not suitable for DC applications |
| Trip class | 10E, 20E, 30E, selectable |
| Number of poles | 3 |
| Duty time | 100% |
| Operating frequency without early tripping | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" |
| Rated impulse withstand voltage Uimp | 8 kV |
| Rated insulation voltage Ui | 1000 V |

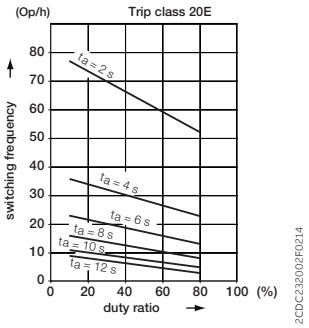
## Auxiliary circuit according to IEC/EN

| Type | | **EF65, EF96, EF146** |
|---|---|---|
| Rated operational voltage Ue | | 600 V AC / DC |
| Conventional free air thermal current Ith | | 6 A |
| Rated frequency | | DC, 50/60 Hz |
| Number of poles | | 1 N.C. + 1 N.O. |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | | |
| 110-120 V | 50/60 Hz | 3.00 A |
| 220-230-240 V | 50/60 Hz | 3.00 A |
| 400 V | 50/60 Hz | 1.10 A |
| 480-500 V | 50/60 Hz | 0.75 A |
| Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | | |
| 24 V | | 1.50 A |
| 60 V | | 0.55 A |
| 110-120-125 V | | 0.55 A |
| 250 V | | 0.27 A |
| Minimum switching capacity | | 12 V / 3 mA |
| Short-circuit protective device | | 6 A, fuse type gG |
| Rated impulse withstand voltage Uimp | | 6 kV |
| Rated insulation voltage Ui | | 690 V |

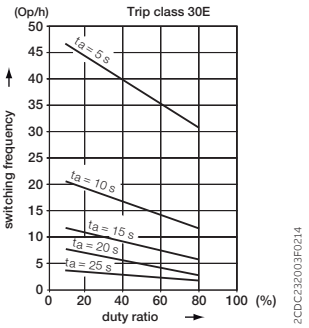
## Technical diagram – Intermittent periodic duty




Trip class 10E




Trip class 20E




Trip class 30E

# EF65, EF96, EF146 electronic overload relays – 20 to 150 A
Technical data

### Main circuit – Utilization characteristics according to UL/CSA

| Type | EF65, EF96, EF146 |
|---|---|
| Standards | UL 508, CSA 22.2 No. 14, UL 60947-4-1A |
| Maximum operational voltage | 600 V AC |
| Trip rating | 125% of FLA |
| Full load amps (FLA) | See table "Full load amps and short-circuit protective device" |
| Short-circuit rating RMS symmetrical | See table "Full load amps and short-circuit protective device" |
| Short-circuit protective device | See table "Full load amps and short-circuit protective device" |

### Auxiliary circuit according to UL/CSA

| Type | | EF65, EF96, EF146 |
|---|---|---|
| Contact rating | N.C., 95-96 | B600, Q600 |
| | N.O., 97-98 | B600, Q600 |
| Conventional thermal current | | 5 A |

### Full load amps and short-circuit protective device

| Type | Full load amps (FLA) | Short-circuit protective device | | | | | |
|---|---|---|---|---|---|---|---|
| | | 480 V AC | | 600 V AC | | | |
| | | SCCR | Fuse type | SCCR | Fuse type | SCCR | Fuse type |
| EF65-56 | 56 A | 10 kA | 150 A, K5/RK5 | 10 kA | 150 A, K5/RK5 | 100 kA | 150 A, J |
| EF65-70 | 70 A | 10 kA | 150 A, K5/RK5 | 10 kA | 150 A, K5/RK5 | 100 kA | 150 A, J |
| EF96-65 | 56 A | 10 kA | 150 A, K5/RK5 | 10 kA | 150 A, K5/RK5 | 100 kA | 150 A, J |
| EF96-100 | 100 A | 10 kA | 200 A, K5/RK5 | 10 kA | 200 A, K5/RK5 | 100 kA | 200 A, J |
| EF146-150 | 150 A | 10 kA | 250 A, K5/RK5 | 10 kA | 250 A, K5/RK5 | 100 kA | 200 A, J |

# EF65, EF96, EF146 electronic overload relays – 20 to 150 A
Technical data

## General data

| Type | | | **EF65, EF96, EF146** |
|---|---|---|---|
| Pollution degree | | | 3 |
| Phase loss sensitive | | | Yes |
| Ambient air temperature | | | |
| | Operation | Open - compensated | -25 ... +70 °C |
| | Storage | | -50 ... +85 °C |
| Ambient air temperature compensation | | | Acc. to IEC/EN 60947-4-1 |
| Maximum operating altitude permissible | | | 2000 m |
| Resistance to shock acc. to IEC 60068-2-27 | | | 15g / 11 ms |
| Resistance to vibrations acc. to IEC 60068-2-6 | | | 5g / 3 ... 150 Hz |
| Mounting position | | | Position 1-6 |
| Mounting | | | Mount on the contactor and tighten the screws of the main circuit terminals |
| Degree of protection | Housing | | IP20 |
| | Main circuit terminals | | IP10 |

## Electrical connection

### Main circuit

| Type | | | **EF65** | **EF96** | **EF146** |
|---|---|---|---|---|---|
| Connecting capacity | | | | | |
|  | Rigid (1) | 1 x | 4 ... 35 mm² | 4 ... 70 mm² | 10 ... 95 mm² |
| | | 2 x | 4 ... 35 mm² | 4 ... 35 mm² | 10 ... 35 mm² |
|  | Flexible (1) | 1 x | 4 ... 35 mm² | 4 ... 50 mm² | 10 ... 70 mm² |
| | | 2 x | 2.5 ... 35 mm² | 4 ... 35 mm² | 10 ... 35 mm² |
| | Stranded acc. to UL/CSA | 1 x | AWG 10-2 | AWG 10-2 | AWG 6-00 |
| | | 2 x | | | AWG 6-2 |
| | Flexible acc. to UL/CSA | 1 x | AWG 10-2 | AWG 10-2 | AWG 6-00 |
| | | 2 x | | | AWG 6-2 |
| Stripping length | | | 20 mm | 20 mm | 20 mm |
| Tightening torque | | | 4 Nm / 35 lb.in | 6 Nm / 55 lb.in | 10 Nm / 70 lb.in |
| Recommended screw driver | | | M8 (Pozidriv 2) | M8 (Hexagon 4) | M8 (Hexagon 4) |

(1) Only one wire size allowed when using 2 wires

### Auxiliary circuit

| Type | | | **EF65, EF96, EF146** |
|---|---|---|---|
| Connecting capacity | | | |
|  | Rigid | 1 or 2 x | 1 ... 4 mm² |
|  | Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm² |
|  | Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 2.5 mm² |
|  | Flexible | 1 or 2 x | 0.75 ... 2.5 mm² |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 18-10 |
| | Flexible acc. to UL/CSA | 1 or 2 x | AWG 18-10 |
| Stripping length | | | 9 mm |
| Tightening torque | | | 0.8 ... 1.2 Nm / 7 ... 11 lb.in |
| Recommended screw driver | | | M3.5 (Pozidriv 2) |

# EF205, EF370 electronic overload relays – 63 to 380 A

## Ordering details




EF205-210




EF370-380




KPR-101L




DRS-F

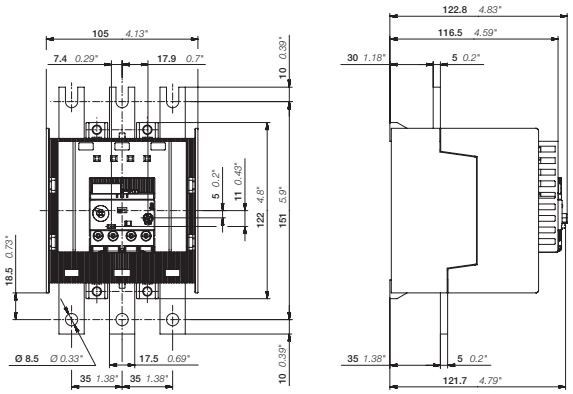
The EF205 and EF370 are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic overload relay is convincing, above all, due to its wide setting range, high accuracy, high operational temperature range and the possibility to select a trip class (10E, 20E, 30E). Further features are the temperature compensation, trip contact (N.C.), signal contact (N.O.), automatic or manual reset selectable, trip-free mechanism, STOP and TEST function and a trip indication. The overload relays are connected directly to the contactors. The EF205 and EF370 have ATEX and IECEx certification (1).

| Setting range<br>A | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|
| **Suitable for AF145, AF185, AF190, AF205** | | | | | |
| 63 ... 210 | 1250 A, fuse type gG | 10E, 20E, 30E | EF205-210 | 1SAX531001R1101 | 1.210 |
| **Suitable for AF210, AF260, AF265, AF300, AF305, AF370** | | | | | |
| 115 ... 380 | 1600 A, fuse type gG | 10E, 20E, 30E | EF370-380 | 1SAX611001R1101 | 1.430 |

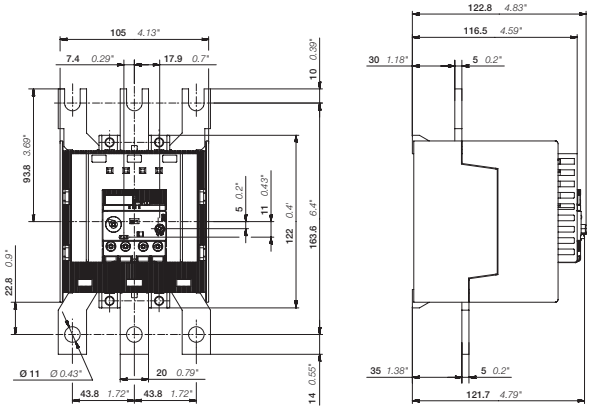
(1) ATEX is valid for products produced from week 42, 2015. IECEx is valid for products produced from week 15, 2017.

### Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|
| Reset push button | E16, EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.027 |
| Terminal shroud | EF205 | LT200E | 1SAX501904R0001 | 0.085 |
| Terminal shroud | EF370 | LT320E | 1SAX601904R0001 | 0.105 |
| Remote reset coil 24-30 V DC | EF19, EF45, EF65, EF96, EF146, EF205, EF370, EF460, EF750 | DRS-F-01 | 1SAX101911R1001 | 0.077 |
| Remote reset coil 48-60 V DC | | DRS-F-02 | 1SAX101911R1002 | 0.077 |
| Remote reset coil 110-127 V DC | | DRS-F-03 | 1SAX101911R1003 | 0.077 |
| Remote reset coil 220-240 V DC | | DRS-F-04 | 1SAX101911R1004 | 0.077 |
| Remote stop coil 24-30 V AC/DC | | DRS-F-EF-01 | 1SAX101911R1011 | 0.077 |
| Remote stop coil 48-60 V AC/DC | | DRS-F-EF-02 | 1SAX101911R1012 | 0.077 |
| Remote stop coil 110-127 V AC/DC | | DRS-F-EF-03 | 1SAX101911R1013 | 0.077 |
| Remote stop coil 220-240 V AC/DC | | DRS-F-EF-04 | 1SAX101911R1014 | 0.077 |




EF205-210




EF370-380

Main dimensions mm, inches

# EF205, EF370 electronic overload relays – 63 to 380 A
Technical data



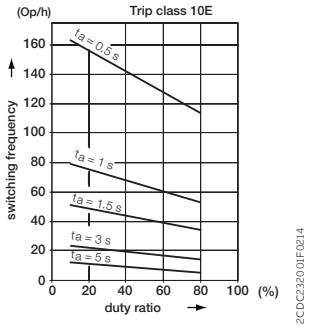
## Main circuit – Utilization characteristics according to IEC/EN

| Type | **EF205, EF370** |
|---|---|
| Standards | IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1 |
| Rated operational voltage Ue | 1000 V AC |
| Rated frequency | 50/60 Hz – not suitable for DC applications |
| Trip class | 10E, 20E, 30E, selectable |
| Number of poles | 3 |
| Duty time | 100% |
| Operating frequency without early tripping | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" |
| Rated impulse withstand voltage Uimp | 8 kV |
| Rated insulation voltage Ui | 1000 V |

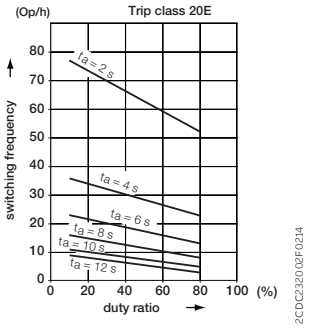
## Auxiliary circuit according to IEC/EN

| Type | | **EF205, EF370** |
|---|---|---|
| Rated operational voltage Ue | | 600 V AC / DC |
| Conventional free air thermal current Ith | | 6 A |
| Rated frequency | | DC, 50/60 Hz |
| Number of poles | | 1 N.C. + 1 N.O. |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | | |
| 110-120 V | 50/60 Hz | 3.00 A |
| 220-230-240 V | 50/60 Hz | 3.00 A |
| 400 V | 50/60 Hz | 1.10 A |
| 480-500 V | 50/60 Hz | 0.75 A |
| Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | | |
| 24 V | | 1.50 A |
| 60 V | | 0.55 A |
| 110-120-125 V | | 0.55 A |
| 250 V | | 0.27 A |
| Minimum switching capacity | | 12 V / 3 mA |
| Short-circuit protective device | | 6 A, fuse type gG |
| Rated impulse withstand voltage Uimp | | 6 kV |
| Rated insulation voltage Ui | | 690 V |

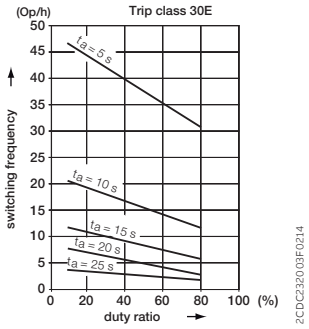
## Technical diagram – Intermittent periodic duty




Trip class 10E




Trip class 20E




Trip class 30E

# EF205, EF370 electronic overload relays – 63 to 380 A
Technical data

### Main circuit – Utilization characteristics according to UL/CSA

| Type | **EF205, EF370** |
|---|---|
| Standards | UL 508, CSA 22.2 No. 14, UL 60947-4-1A |
| Maximum operational voltage | 600 V AC |
| Trip rating | 125% of FLA |
| Full load amps (FLA) | See table "Full load amps and short-circuit protective device" |
| Short-circuit rating RMS symmetrical | See table "Full load amps and short-circuit protective device" |
| Short-circuit protective device | See table "Full load amps and short-circuit protective device" |

### Auxiliary circuit according to UL/CSA

| Type | | **EF205, EF370** |
|---|---|---|
| Contact rating | N.C., 95-96 | B600, Q600 |
| | N.O., 97-98 | B600, Q600 |
| Conventional thermal current | | 6 A |

### Full load amps and short-circuit protective device

| **Type** | **Full load amps (FLA)** | **Short-circuit protective device** | | | | | |
|---|---|---|---|---|---|---|---|
| | | **480 V AC** | | **600 V AC** | | | |
| | | SCCR | Fuse type | SCCR | Fuse type | SCCR | Fuse type |
| EF205-210 | 210 A | 10 kA | 400 A, R5/RK5 | 10kA | 400 A, R5/RK5 | 100 kA | 400 A, J |
| EF370-380 | 380 A | 18 kA | 800 A, L/T | 18kA | 800 A, L/T | - | - |

# EF205, EF370 electronic overload relays – 63 to 380 A
Technical data



## General data

| Type | | | EF205 | EF370 |
|---|---|---|---|---|
| Pollution degree | | | 3 | |
| Phase loss sensitive | | | Yes | |
| Ambient air temperature | | | | |
| | Operation | Open - compensated | -25 ... +70 °C | |
| | Storage | | -50 ... +85 °C | |
| Ambient air temperature compensation | | | Acc. to IEC/EN 60947-4-1 | |
| Maximum operating altitude permissible | | | 2000 m | |
| Resistance to shock acc. to IEC 60068-2-27 | | | 25g / 11 ms | |
| Resistance to vibrations acc. to IEC 60068-2-6 | | | 5g / 3 ... 150 Hz | |
| Mounting position | | | Position 1-6 | |
| Mounting | | | Mount on the contactor and tighten the screws of the main circuit terminals | |
| Degree of protection | Housing | | IP20 | |
| | Main circuit terminals | | IP00 | |

## Electrical connection

### Main circuit

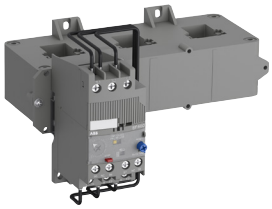
| Type | | | EF205 | EF370 |
|---|---|---|---|---|
| Connecting capacity | | | | |
| | Rigid | 1 x | 16 ... 185 mm² | 50 ... 240 mm² |
| | | 2 x | 16 ... 120 mm² | 50 ... 150 mm² |
| | Flexible | 1 x | 16 ... 185 mm² | 50 ... 240 mm² |
| | | 2 x | 16 ... 120 mm² | 50 ... 150 mm² |
| | Lugs | L ≤ | 24 mm | 32 mm |
| | Bars | Ø > | 8 mm | 10 mm |
| | Stranded acc. to UL/CSA | 1 x | AWG 6-0000 | AWG 1-500 kcmil |
| | | 2 x | AWG 6-0000 | AWG 1-500 kcmil |
| | Flexible acc. to UL/CSA | 1 x | AWG 6-0000 | AWG 1-500 kcmil |
| | | 2 x | AWG 6-0000 | AWG 1-500 kcmil |
| Stripping length | | | - | - |
| Tightening torque | | | 18 Nm / 160 lb.in | 28 Nm / 247 lb.in |
| Recommended screw driver | | | M8 | M10 |

### Auxiliary circuit

| Type | | | EF205, EF370 |
|---|---|---|---|
| Connecting capacity | | | |
| | Rigid | 1 or 2 x | 1 ... 4 mm² |
| | Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm² |
| | Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 2.5 mm² |
| | Flexible | 1 or 2 x | 0.75 ... 2.5 mm² |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 18-10 |
| | Flexible acc. to UL/CSA | 1 or 2 x | AWG 18-10 |
| Stripping length | | | 9 mm |
| Tightening torque | | | 0.8 ... 1.2 Nm / 7 ... 11 lb.in |
| Recommended screw driver | | | M3.5 (Pozidriv 2) |

# EF460, EF750, EF1250DU electronic overload relays – 150 to 1250 A

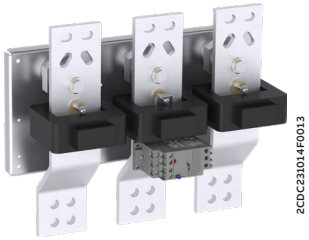
## Ordering details




EF460-500




EF750-800



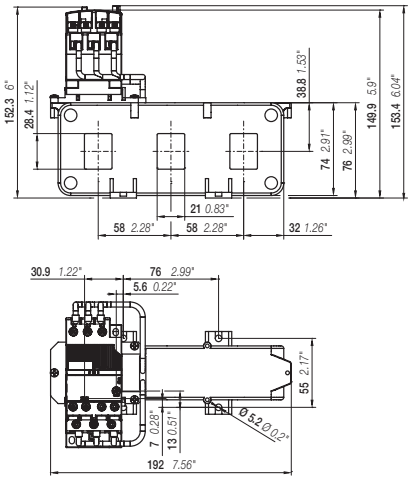

EF1250DU-1250

The EF460, EF750 and EF1250DU are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic overload relay is convincing, above all, due to its wide setting range, high accuracy, high operational temperature range and the possibility to select a trip class (10E, 20E, 30E). Further features are the temperature compensation, trip contact (N.C.), signal contact (N.O.), automatic or manual reset selectable, trip-free mechanism, STOP and TEST function and a trip indication. Busbar kits are available as accessory for contactor mounting. The EF460 and EF750 have ATEX and IECEx certification (1).

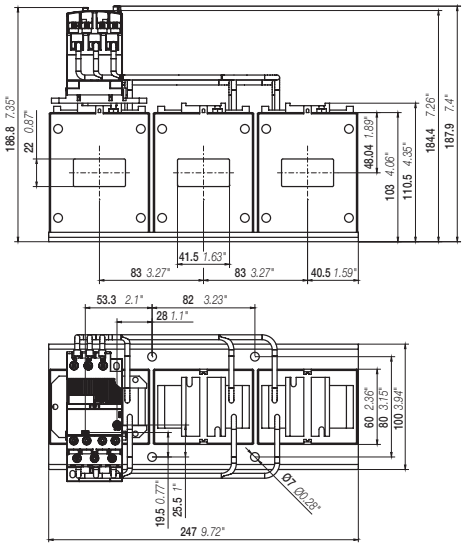
| Setting range A | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---|---|---|---|---|---|
| **EF460 electronic overload relay, suitable for AF400, AF460 (1)** | | | | | |
| 150 ... 500 | 690 V: 630 A, Type gG<br>1000 V: 1600 A, Type gG | 10E, 20E, 30E | EF460-500 | 1SAX721001R1101 | 1.170 |
| **EF750 electronic overload relay, suitable for AF580, AF750 (1)** | | | | | |
| 250 ... 800 | 690 V: 800 A, Type gG<br>1000 V: 1600 A, Type gG | 10E, 20E, 30E | EF750-800 | 1SAX821001R1101 | 3.905 |
| **EF1250DU electronic overload relay, suitable for AF1350, AF1650, AF2050** | | | | | |
| 375 ... 1250 | 500 V: 1600 A, Type gG | 10E, 20E, 30E | EF1250DU-1250 | 1SFA739001R1001 | |



Main dimensions mm, inches




EF460-500




EF750-800

# EF460, EF750, EF1250DU electronic overload relays – 150 to 1250 A

## Ordering details




1SFC151224F0002

KPR-101L



2CDC211002V0017

DRS-F

(1) ATEX is valid for products produced from week 42, 2014. IECEx is valid for products produced from week 15, 2017.

### Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce) kg |
|---|---|---|---|---|
| Reset push button | E16, EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.027 |
| Terminal shroud | EF460 | LT460EF | 1SAX701904R0002 | 0.320 |
| Terminal shroud | EF750 | LT750EF | 1SAX801904R0002 | 0.440 |
| DT500/AF460-S Mounting Kit short for mounting of EF460DU on AF460 | EF460 | DT500/AF460-S | 1SAX701902R1011 | 0.635 |
| DT500/AF460-L Mounting Kit long for mounting of EF460DU on AF460 | EF460 | DT500/AF460-L | 1SAX701902R1001 | 0.740 |
| DT800/AF750-S Mounting Kit short for mounting of EF750DU on AF750 | EF750 | DT800/AF750-S | 1SAX801902R1011 | 1.000 |
| DT800/AF750-L Mounting Kit long for mounting of EF750DU on AF750 | EF750 | DT800/AF750-L | 1SAX801902R1001 | 1.475 |
| Remote reset coil 24-30 V DC | EF19, EF45, EF65, EF96, EF146, EF205, EF370, EF460, EF750 | DRS-F-01 | 1SAX101911R1001 | 0.076 |
| Remote reset coil 48-60 V DC | | DRS-F-02 | 1SAX101911R1002 | 0.077 |
| Remote reset coil 110-127 V DC | | DRS-F-03 | 1SAX101911R1003 | 0.078 |
| Remote reset coil 220-240 V DC | | DRS-F-04 | 1SAX101911R1004 | 0.076 |
| Remote stop coil 24-30 V AC/DC | | DRS-F-EF-01 | 1SAX101911R1011 | 0.075 |
| Remote stop coil 48-60 V AC/DC | | DRS-F-EF-02 | 1SAX101911R1012 | 0.076 |
| Remote stop coil 110-127 V AC/DC | | DRS-F-EF-03 | 1SAX101911R1013 | 0.076 |
| Remote stop coil 220-240 V AC/DC | | DRS-F-EF-04 | 1SAX101911R1014 | 0.074 |

# EF460, EF750, EF1250DU electronic overload relays – 150 to 1250 A
Technical data

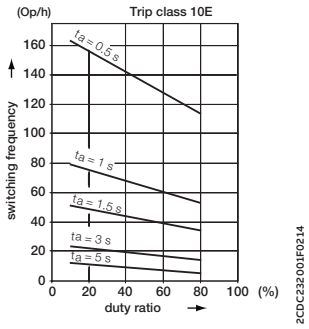
## Main circuit – Utilization characteristics according to IEC/EN

| Type | EF460 | EF750 | EF1250DU |
|---|---|---|---|
| Standards | IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1 | | |
| Rated operational voltage Ue | 1000 V AC | | |
| Rated frequency | 50/60 Hz – not suitable for DC applications | | |
| Trip class | 10E, 20E, 30E, selectable | | |
| Number of poles | 3 | | |
| Duty time | 100% | | |
| Operating frequency without early tripping | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" | | |
| Rated impulse withstand voltage Uimp | 8 kV | | |
| Rated insulation voltage Ui | 1000 V AC | | |

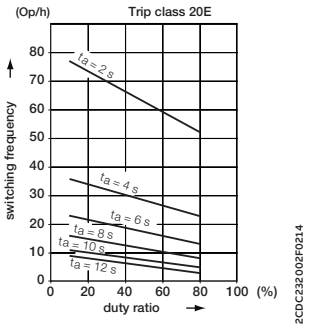
## Auxiliary circuit according to IEC/EN

| Type | | EF460 | EF750 | EF1250DU |
|---|---|---|---|---|
| Rated operational voltage Ue | | 600 V AC / DC | | |
| Conventional free air thermal current Ith | | 6 A | | |
| Rated frequency | | DC, 50/60 Hz | | |
| Number of poles | | 1 N.C. + 1 N.O. | | |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | | | | |
| 110-120 V | 50/60 Hz | 3.00 A | | |
| 220-230-240 V | 50/60 Hz | 3.00 A | | |
| 400 V | 50/60 Hz | 1.10 A | | |
| 480-500 V | 50/60 Hz | 0.75 A | | |
| Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | | | | |
| 24 V | | 1.50 A | | |
| 60 V | | 0.55 A | | |
| 110-120-125 V | | 0.55 A | | |
| 250 V | | 0.27 A | | |
| Minimum switching capacity | | 12 V / 3 mA | | |
| Short-circuit protective device | | 6 A, fuse type gG | | |
| Rated impulse withstand voltage Uimp | | 6 kV | | |
| Rated insulation voltage Ui | | 690 V | | |

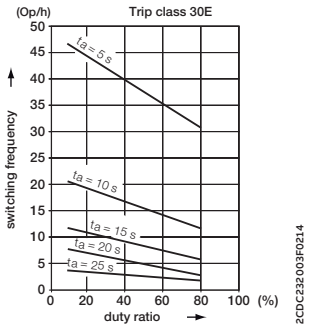
## Technical diagram – Intermittent periodic duty




Trip class 10E




Trip class 20E




Trip class 30E

# EF460, EF750, EF1250DU electronic overload relays – 150 to 1250 A
Technical data



## Main circuit – Utilization characteristics according to UL/CSA

| Type | EF460 | EF750 | EF1250DU |
|---|---|---|---|
| Standards | UL60947-1, UL60947-4-1 | | |
| Maximum operational voltage | 600 V AC | | |
| Trip rating | 125% of FLA | | |

## Auxiliary circuit according to UL/CSA

| Type | | EF460 | EF750 | EF1250DU |
|---|---|---|---|---|
| Contact rating | N.C., 95-96 | B600, Q600 | | |
| | N.O., 97-98 | B600, Q600 | | |
| Conventional thermal current | | 5 A | | |

## General data

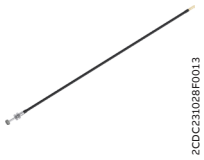
| Type | | EF460 | EF750 | EF1250DU |
|---|---|---|---|---|
| Pollution degree | | 3 | | |
| Phase loss sensitive | | Yes | | |
| Ambient air temperature | | | | |
| Operation | Open - compensated | -25 ... +70 °C | | |
| Storage | | -50 ... +85 °C | | |
| Ambient air temperature compensation | | Acc. to IEC/EN60947-4-1 | | |
| Maximum operating altitude permissible | | 2000 m | | |
| Resistance to shock acc. to IEC 60068-2-27 | | 25g / 11 ms | | |
| Resistance to vibrations acc. to IEC 60068-2-6 | | 5g / 3 ... 150 Hz | | |
| Degree of protection | Housing | IP20 | | |
| | Main circuit terminals | IP00 | | |

## Electrical connection

**Auxiliary circuit**

| Type | | EF460 | EF750 | EF1250DU |
|---|---|---|---|---|
| Connecting capacity | | | | |
| Rigid | 1 or 2 x | 1 ... 4 mm² | | |
| Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm² | | |
| Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 2.5 mm² | | |
| Flexible | 1 or 2 x | 0.75 ... 2.5 mm² | | |
| Stranded acc. to UL/CSA | 1 or 2 x | AWG 18-10 | | |
| Flexible acc. to UL/CSA | 1 or 2 x | AWG 18-10 | | |
| Stripping length | | 9 mm | | |
| Tightening torque | | 0.8 ... 1.2 Nm / 7 ... 11 lb.in | | |
| Recommended screw driver | | M3.5 (Pozidriv 2) | | |

# Thermal and electronic overload relays
## General accessories




WRB-400



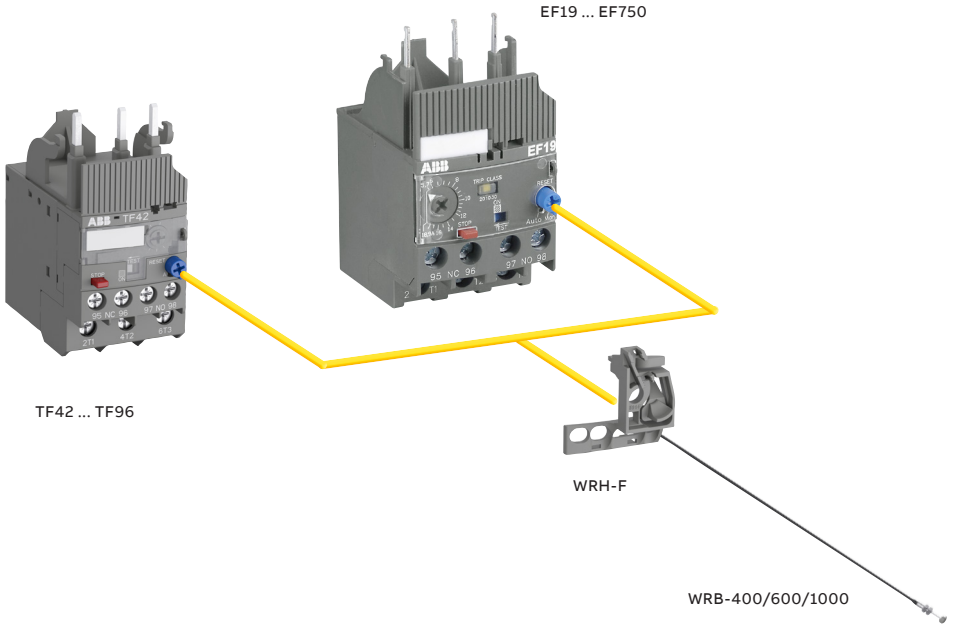

WRH-F

The wire reset is a general accessory for thermal and electronic overloads relays. In installations which are difficult to access, like a motor control centre or compact cubical, the accessory allows the user to remotely reset the overload relays.

The wire reset consists of two parts, the bowden wire with actuator and the holder. The actuator should be mounted into a door of a panel. The holder will be mounted on the overload relay. The actuator and holder are connected via the bowden wire.

| Suitable for | Description | Length<br>mm | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|
| **Holder** | | | | | |
| TF42, TF65, TF96, EF19, EF45, EF65, EF96, EF146, EF205, EF370, EF460, EF750 | Holder for tool less direct mounting | | WRH-F | 1SAZ701903R1001 | 0.006 |
| **Bowden wire with actuator** | | | | | |
| WRH-F | Bowden wire with actuator, hole diameter: 7.3 mm, maximum panel thickness: 12 mm | 400 | WRB-400 | 1SAZ701903R1011 | 0.030 |
| | | 600 | WRB-600 | 1SAZ701903R1012 | 0.040 |
| | | 1000 | WRB-1000 | 1SAZ701903R1013 | 0.060 |
| **IP54 gasket** | | | | | |
| WRB-400<br>WRB-600<br>WRB-1000 | IP54 Panel seal gasket | | WRBG | 1SAZ701903R1030 | 0.037 |

### Overload relays with accessory wire reset (WRH, WRB)



**For direct product details information, use product type or order code, ex:**

new.abb.com/products/1SVR740720R1400

# Thermistor motor protection relays


**7/**2 **Benefits and advantages**

**7/**3 **Applications**

**7/**4 **Operating controls**

**7/**5 **Selection table CM-MSx range**

**7/**6 **Ordering details**

**7/**7 **Ordering details - PTC temperature sensors C011**

**7/**8 **Technical data - CM-MSS**

**7/**11 **Technical data - CM-MSE**

**7/**13 **Connection diagrams**

**7/**14 **Circuit diagram**

# Thermistor motor protection relays

## Benefits and advantages

The thermistor motor protection relays of the CM-MSx range protect motors with PTC sensors against high temperature. These sensors are incorporated in the motor windings thus measuring the motor heat directly.







**Continuous operation**
By using thermistor motor protection relays from ABB, the down and commissioning time can be reduced. The relay is continuously monitoring the sensor circuit to detect short-circuit or interrupted i.e. wire faults, thus contributing to maintenance and time saving in case of faults. In addition, the clear error messages of the front LEDs makes it possible to distinguish between the various fault causes.



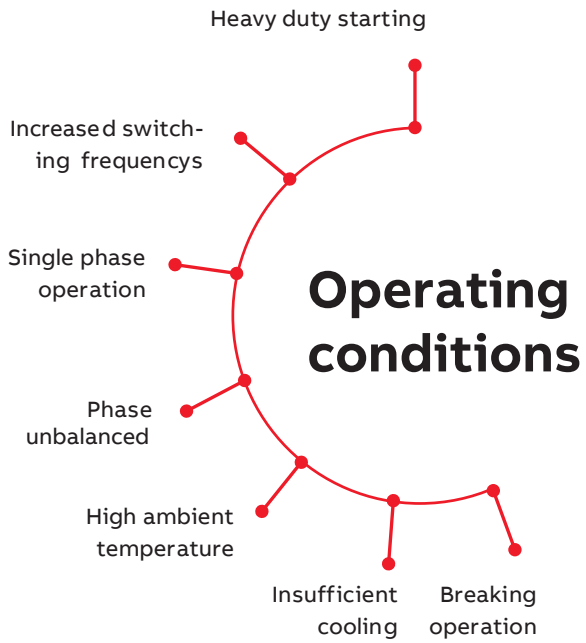
**Reliable in harsh conditions**
Direct motor protection through temperature monitoring of the motor winding offers 100 % motor protection, even under the most difficult ambient conditions. The ABB thermistor motor protection relays give you access to worldwide markets and are approved by local and international standards for many applications such as industry, renewable energies, the marine sector and dangerous and explosive environments. To prove that, the CM-MSS thermistor motor protection relays are certified according to ATEX Ex II (2) G and D for environments with explosive gas or dust loads.



**Easy installation**
Due to the compliance with the latest standards, there is no need to make any adjustments on the device. All relays come with two different connection possibilities - screw or push-in - to make any adjustments on the installation a breeze. Thanks to direct measurement of the motor temperature, dimensioning of the thermistor motor protection relay, considering the size of the motor, is not necessary.

# Thermistor motor protection relays
## Applications

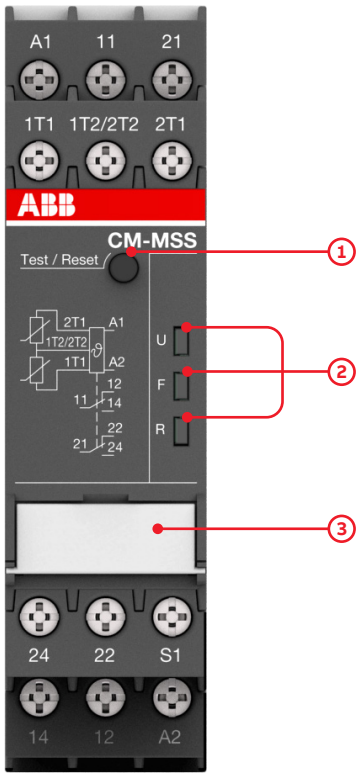
**Direct temperature monitoring**
Generally, motor damage caused by overload or overheating situations can be prevented in different ways. Compared to the indirect temperature measuring which monitors the motor current, the temperature inside the motor can be measured by direct temperature measuring. This enables direct control and evaluation of different operating conditions. Therefore, the consequences from overheating, such as abrasion as well as electrical failures, can be prevented. The direct measuring principle is carried out by a combination of the thermistor motor protection relay and three PTC sensors which are installed directly in the motor by the manufacturer. Those 3 PTC sensors are placed directly at the thermal hotspots, the motor windings.




**Motor protection using current- and temperature-dependent protective devices**
IEC 60204 stipulates that motors must be protected from overheating at a rating of 0.5 kW and higher. The protection can be provided or executed by overload protection, overtemperature protection or current limiting. For motors with frequent starting and braking, and in environments where cooling may be impaired (e.g. by dust), it is recommended to use the overtemperature protection option in the form of a protective device coordinated with this mode of operation. On rotor-critical motors, overtemperature detection in the stator windings can lead to delayed and hence inadequate protection. In this case, the standards stipulate additional protection, e.g. by means of an overload relay. This combination of thermistor motor protection and an overload relay is recommended for full motor protection in case of frequent starting and braking of motors, irregular intermittent duty or excessive switching frequency.

**Operating mode**
The thermistor motor protection relays are used to monitor the temperature of motors or generators equipped with PTC sensors type A according to the latest product standard IEC/EN 60947-8. The sensors are built-in into the motor windings, measuring the motor heating. In case of an increase of the temperature in the motor, the resistance of the PTC sensors increases as well. If the motor heats-up excessively (>2.83 kΩ), the output relay(s) de-energize(s) and the corresponding LED displays the overtemperature. A short circuit and an interrupted wire within the sensor circuit can also be detected. A reset is only possible after cooling down of the motor (<1.1 kΩ) or after a wire interruption, or a short circuit within the sensor circuit has been removed. A reset after tripping can be done manually with the Test / Reset button, externally with a push button between S1 and 1T2/2T2, or automatically by jumpering S1-1T2/2T2.

# Thermistor motor protection relays
## Operating controls




**1 Test / Reset button**
Test – only possible if/when the relay doesn't show any fault.
Reset – only possible if measured value < switch-on resistance

**2 Indication of operational states with LEDs**
U: green LED - Status indication of control supply voltage
Control supply voltage applied ⎍‾⎍
F: red LED - Fault message
R: yellow LED - Status indication of the output relay

**3 Marker label / DIP switches (depending on device) e.g.**
Single evaluation 2 x 1 c/o (SPDT) contact
Accumulative evaluation 1 x 2 c/o (SPDT) contacts
Short-circuit detection de-activated
Short-circuit detection activated
Non-volatile fault storage activated
Non-volatile fault storage de-activated
Remote Reset
Remote Test/Reset

### LEDs, status information and fault messages CM-MSS

| Operational state | U: green LED | F: red LED | R: yellow LED |
|---|---|---|---|
| Absence of control supply voltage | OFF | OFF | OFF |
| Internal fault (2) | OFF | ⎍⎍⎍ | ⎍⎍⎍ |
| Internal fault (2) | ⎍⎍⎍ | ⎍⎍⎍ | ⎍⎍⎍ |
| Control supply voltage not within the tolerance range | ⎍⎍⎍ | ⎍‾⎍ | OFF |
| Short circuit | ⎍‾⎍ | ⎍⎍⎍ | OFF |
| Interrupted wire | ⎍‾⎍ | ⎍⎍⎍ | OFF |
| Measuring circuit 2: Overtemperature | ⎍‾⎍ | ⎍⎍⎍ | OFF |
| Measuring circuit 1: Overtemperature | ⎍‾⎍ | ⎍‾⎍ | OFF |
| Fault rectified but not confirmed | ⎍‾⎍ | -- (1) | ⎍⎍⎍ |
| Test function | ⎍⎍⎍ | OFF | OFF |
| Change of configuration not confirmed | ⎍‾⎍ | OFF | ⎍⎍⎍ |
| No fault | ⎍‾⎍ | OFF | ⎍‾⎍ |

(1) Depending on the fault with the highest priority
(2) Restart the device. If after restart the same fault is indicated, replace the device.



2CDC 253 001 F0015

# Thermistor motor protection relays

## Selection table CM-MSx range

| | **Order code** | 1SVR550805R9300 | 1SVR550800R9300 | 1SVR550801R9300 | 1SVR740720R1400 | 1SVR730720R1400 | 1SVR740700R0100 | 1SVR730700R0100 | 1SVR740700R2100 | 1SVR730700R2100 | 1SVR740722R1400 | 1SVR730722R1400 | 1SVR740700R0200 | 1SVR730700R0200 | 1SVR740700R2200 | 1SVR730700R2200 | 1SVR740712R1400 | 1SVR730712R1400 | 1SVR740712R0200 | 1SVR730712R0200 | 1SVR740712R2200 | 1SVR730712R2200 | 1SVR740712R1200 | 1SVR730712R1200 | 1SVR740712R1300 | 1SVR730712R1300 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Type** | CM-MSE | CM-MSE | CM-MSE | CM-MSS.11P | CM-MSS.11S | CM-MSS.12P | CM-MSS.12S | CM-MSS.13P | CM-MSS.13S | CM-MSS.21P | CM-MSS.21S | CM-MSS.22P | CM-MSS.22S | CM-MSS.23P | CM-MSS.23S | CM-MSS.31P | CM-MSS.31S | CM-MSS.32P | CM-MSS.32S | CM-MSS.33P | CM-MSS.33S | CM-MSS.41P | CM-MSS.41S | CM-MSS.51P | CM-MSS.51S |
| **Characteristics** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ATEX approval | | | | | ■ | ■ | | | | | ■ | ■ | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Number of sensor circuits | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 |
| Single or accumulative evaluation | | | | | | | | | | | | | | | | | | | | | | | | | ■ | ■ |
| Number of LEDs | | | | | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| **Contacts** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 c/o (SPDT) contact | | | | | | | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | | | |
| 2 c/o (SPDT) contacts | | | | | | | | | | | | | ■ | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | | |
| 1 n/o | | ■ | ■ | ■ | | | | | | | | | | | | | | | | | | | | | | |
| 1 n/c and 1 n/o | | | | | ■ | ■ | | | | | ■ | ■ | | | | | ■ | ■ | | | | | | | | |
| 2 x 1 c/o or 1 x 2 c/o contacts, configurable | | | | | | | | | | | | | | | | | | | | | | | | | ■ | ■ |
| **Reset** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Manual | | | | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Remote | | | | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Auto | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ (1) | ■ (1) | ■ (1) | ■ (1) | ■ (1) | ■ (1) | ■ (1) | ■ (1) | ■ (1) | ■ (1) | ■ (1) | ■ (1) | ■ (2) | ■ (2) |
| Test button | | | | | | | | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| **Functions** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Short-circuit detection | | | | | | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | |
| Short-circuit detection, configurable | | | | | | | | | | | | | | | | | | | | | | | ■ | ■ | ■ | ■ |
| Dynamic interrupted wire detection | | | | | ■ | ■ | | | | | ■ | ■ | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Non-volatile fault storage | | | | | ■ | ■ | | | | | ■ | ■ | | | | | ■ | ■ | | | | | | | | |
| Non-volatile fault storage, configurable | | | | | | | | | | | | | | | | | | | | | | | ■ | ■ | ■ | ■ |
| **Rated control supply voltage $U_s$** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24 V AC | | ■ | | | | | | | | | | | | | | | | | | | | | | | | |
| 110-130 V AC | | | ■ | | | | | | | | | | | | | | | | | | | | | | | |
| 220-240 V AC | | | | ■ | | | | | | | | | | | | | | | | | | | | | | |
| 24-240 V AC/DC | | | | | ■ | ■ | | | | | ■ | ■ | | | | | ■ | ■ | | | | | ■ | ■ | ■ | ■ |
| 24 V AC/DC | | | | | | | ■ | ■ | | | | | ■ | ■ | | | | | ■ | ■ | | | | | | |
| 110-130 V AC, 220-240 V AC | | | | | | | | | ■ | ■ | | | | | ■ | ■ | | | | | ■ | ■ | | | | |
| **Connection type** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Push-in terminals | | | | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | |
| Double-chamber cage connection terminals | | | | | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ |
| Screw | | ■ | ■ | ■ | | | | | | | | | | | | | | | | | | | | | | |

(1) For automatic reset, connect terminals S1 to T2.
(2) For automatic reset, connect Terminals S1 to 1T2/2T2.

# Thermistor motor protection relays
## Ordering details


2CDC 251 004 V0014

CM-MSS.12S


2CDC 251 013 V0014

CM-MSS.41S


2CDC 251 014 V0014

CM-MSS.51S

The thermistor motor protection relay CM-MSS monitors the winding temperature and thus protects the motor from overheating, overload and insufficient cooling in accordance to the product standard IEC/EN 60947-8.

### CM-MSx

| Characteristics | Type | Order code | Price 1 pce | Weight (1 pce) kg (lb) |
|---|---|---|---|---|
| See "Selection table CM-MSx range" on page 4. | CM-MSE | 1SVR550805R9300 | | 0.11 (0.24) |
| | CM-MSE | 1SVR550800R9300 | | 0.11 (0.24) |
| | CM-MSE | 1SVR550801R9300 | | 0.11 (0.24) |
| | CM-MSS.11P | 1SVR740720R1400 | | 0.119 (0.263) |
| | CM-MSS.11S | 1SVR730720R1400 | | 0.127 (0.280) |
| | CM-MSS.12P | 1SVR740700R0100 | | 0.105 (0.231) |
| | CM-MSS.12S | 1SVR730700R0100 | | 0.113 (0.249) |
| | CM-MSS.13P | 1SVR740700R2100 | | 0.147 (0.324) |
| | CM-MSS.13S | 1SVR730700R2100 | | 0.155 (0.342) |
| | CM-MSS.21P | 1SVR740722R1400 | | 0.118 (0.260) |
| | CM-MSS.21S | 1SVR730722R1400 | | 0.126 (0.278) |
| | CM-MSS.22P | 1SVR740700R0200 | | 0.121 (0.267) |
| | CM-MSS.22S | 1SVR730700R0200 | | 0.132 (0.291) |
| | CM-MSS.23P | 1SVR740700R2200 | | 0.163 (0.359) |
| | CM-MSS.23S | 1SVR730700R2200 | | 0.174 (0.384) |
| | CM-MSS.31P | 1SVR740712R1400 | | 0.120 (0.265) |
| | CM-MSS.31S | 1SVR730712R1400 | | 0.128 (0.282) |
| | CM-MSS.32P | 1SVR740712R0200 | | 0.120 (0.265) |
| | CM-MSS.32S | 1SVR730712R0200 | | 0.130 (0.287) |
| | CM-MSS.33P | 1SVR740712R2200 | | 0.162 (0.357) |
| | CM-MSS.33S | 1SVR730712R2200 | | 0.172 (0.379) |
| | CM-MSS.41P | 1SVR740712R1200 | | 0.130 (0.287) |
| | CM-MSS.41S | 1SVR730712R1200 | | 0.141 (0.311) |
| | CM-MSS.51P | 1SVR740712R1300 | | 0.135 (0.298) |
| | CM-MSS.51S | 1SVR730712R1300 | | 0.145 (0.320) |

**S**: screw connection
**P**: push-in connection

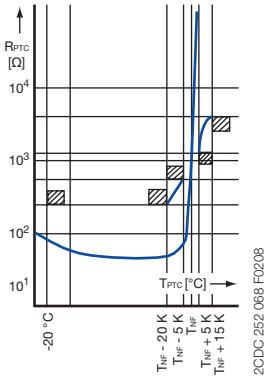
**Further documentation thermistor motor protection monitoring relays on www.abb.com**

# Thermistor motor protection relays

## Ordering details - PTC temperature sensors C011




Temperature sensor characteristics




The PTC temperature sensors (temperature-dependent with positive temperature coefficient) are selected by the manufacturer of the motor depending on:

- the motor insulation class according to IEC/EN 60034-11,
- the special characteristics of the motor, such as the conductor cross-section of the windings, the permissible overload factor etc.
- special conditions prescribed by the user, such as the permissible ambient temperature, risks resulting from locked rotor, extent of permitted overload etc.

One temperature sensor must be embedded in each phase winding. For instance, in case of three-phase squirrel cage motors, three sensors are embedded in the stator windings. For pole-changing motors with one winding (Dahlander connection), 3 sensors are also sufficient. Pole-changing motors with two windings, however, require 6 sensors. If an additional warning is required before the motor is switched off, separate sensors for a correspondingly lower temperature must be embedded in the winding. They have to be connected to a second control unit.

The sensors are suitable for embedding in motor windings with rated operating voltages of up to 600 V AC. Conductor length: 500 mm per sensor. A 14 V varistor can be connected in parallel to protect the sensors from overvoltage. Due to their characteristics, the thermistor motor protection relays can also be used with PTC temperature sensors of other manufacturers which comply with IEC/EN 60947-8.

### CM-MSS accessories

| Rated response temperature TNF | Color coding | Type | Order code | Price 1 pce | Weight (1 pce) kg (lb) |
|---|---|---|---|---|---|
| 70 °C | white-brown | C011-70 (1) | GHC0110003R0001 | | 0.02 (0.044) |
| 80 °C | white-white | C011-80 (1) | GHC0110003R0002 | | 0.02 (0.044) |
| 90 °C | green-green | C011-90 (1) | GHC0110003R0003 | | 0.02 (0.044) |
| 100 °C | red-red | C011-100 (1) | GHC0110003R0004 | | 0.02 (0.044) |
| 110 °C | brown-brown | C011-110 (1) | GHC0110003R0005 | | 0.02 (0.044) |
| 120 °C | gray-gray | C011-120 (1) | GHC0110003R0006 | | 0.02 (0.044) |
| 130 °C | blue-blue | C011-130 (1) | GHC0110003R0007 | | 0.02 (0.044) |
| 140 °C | white-blue | C011-140 (1) | GHC0110003R0011 | | 0.02 (0.044) |
| 150 °C | black-black | C011-150 (1) | GHC0110003R0008 | | 0.02 (0.044) |
| 160 °C | blue-red | C011-160 (1) | GHC0110003R0009 | | 0.02 (0.044) |
| 170 °C | white-green | C011-170 (1) | GHC0110003R0010 | | 0.02 (0.044) |
| 150 °C | black-black | C011-3-150 (2) | GHC0110033R0008 | | 0.05 (0.11) |

(1) Temperature sensor C011, standard version acc. to IEC/EN 60947-8
(2) Triple temperature sensor C011-3

### Technical data

| Characteristic data | Sensor type C011 |
|---|---|
| Cold-state resistance | 50 -100 at 25 °C |
| Warm-state resistance ± 5 up to 6 K of rated response temperature $T_{NF}$ | 10 000 q |
| Thermal time constant, sensor open (1) | < 5 s |
| Permitted ambient temperature | +180 °C |

| Rated response temperature w tolerance $T_{NF}$ w $iT_{NF}$ | PTC resistance R from -20 °C to $T_{NF}$ - 20 K | PTC resistance R2) at PTC temperatures of: | | |
|---|---|---|---|---|
| | | $T_{NF}$ - $iT_{NF}$ (UPTC m 2.5 V) | $T_{NF}$ + $iT_{NF}$ (UPTC m 2.5 V) | $T_{NF}$ + 15 K (UPTC m 7.5 V) |
| 70 w5 °C | m 100 q | m 570 q | M 570 q | - |
| 80 w5 °C | | | | |
| 90 w5 °C | | m 550 q | M 1330 q | M 4000 q |
| 100 w5 °C | | | | |
| 110 w5 °C | | | | |
| 120 w5 °C | | | | |
| 130 w5 °C | | | | |
| 140 w5 °C | | | | |
| 150 w5 °C | | | | |
| 160 w5 °C | | | | |
| 170 w7 °C | | m 570 q | M 570 q | - |

(1) Not embedded in windings.
(2) For triple temperature sensor take values x 3.

# Thermistor motor protection relays

## Technical data - CM-MSS

Data at $T_a$ = 25 °C and rated values, unless otherwise indicated

| **Supply circuit - Input circuit** | | **CM-MSS.x1** | **CM-MSS.x2** | **CM-MSS.x3** |
|---|---|---|---|---|
| Rated control supply voltage $U_s$ | A1-A2 | 24-240 V AC/DC | 24 V AC/DC | 220-240 V AC |
| | A2-A3 | - | - | 110-130 V AC |
| Rated control supply voltage $U_s$ tolerance | | -15...+10 % | | |
| Rated frequency | | 15-400 Hz | 50-60 Hz | |
| Electrical insulation between supply circuit and measuring circuit | | yes | no | yes |
| Power failure buffering time | | 20 ms | | |

| **Supply circuit - Measuring circuit / Sensor circuit** | | |
|---|---|---|
| Number of circuits | | 1 (CM-MSS.51: 2) |
| Sensor type | | PTC type A IEC/EN 60947-8 |
| Max. total resistance of sensors connected in series, cold state | | < 750 Ω |
| Overtemperature monitoring | switch-off resistance (relay de-energizes) | 2.83 kΩ w 1% (CM-MSS.12 /.13 /.22 /.23: 2.7 kΩ w 5%) |
| | switch-on resistance (relay energizes) | 1.1 kΩ w 1% (CM-MSS.12 /.13 /.22 /.23: 1.2 kΩ w 5%) |
| Maximum voltage in sensor circuit | 1.33 kΩ | 2.5 V |
| | 4 kΩ | 3.7 V |
| | y kΩ | 5.5 V |
| Maximum current in sensor circuit | | 3.7 mA |
| Maximum sensor cable length | | 2 x 100 m at 0.75 mm², 2 x 400 m at 2.5 mm² |
| Accuracy within the rated control supply voltage tolerance | | 0.50 % (CM-MSS.12 /.13 /.22 /.23: 5 %) |
| Accuracy within the temperature range | | 0.01 %/K (CM-MSS.12 /.13 /.22 /.23: 0.5 %/K) |
| Repeat accuracy (constant parameters) | | on request |
| Reaction time of the safety function | | < 100 ms |
| Hardware fault tolerance (HFT) | | 0 |

| **Control circuit** | |
|---|---|
| Control function | see "Selection table CM-MSx range" on page 5 |
| Maximum no-load voltage | 5.5 V |
| Max. current | 0.6 mA (CM-MSS.12 /.13 /.22 /.23: 1.2 mA) |
| Maximum cable length | 2 x 100 m at 0.75 mm², 2 x 400 m at 2.5 mm² |

| **Indication of operational states** | | |
|---|---|---|
| Control supply voltage | U | LED green |
| Relay status | R | LED yellow |
| Fault message | F | LED red |

| **Output circuit** | | |
|---|---|---|
| Kind of output | | see "Selection table CM-MSx range" on page 5 |
| Operating principle | | closed-circuit principle |
| Contact material | | AgNi alloy, Cd free |
| Rated operational voltage $U_e$ (IEC/EN 60947-1) | | 250 V AC |
| Minimum switching voltage / Minimum switching current | | 24 V / 10 mA |
| Maximum switching voltage / Maximum switching current | | see data sheet |
| Rated operating current $I_e$ (IEC/EN 60947-5-1) | AC-12 (resistive) at 230 V | 4 A |
| | AC-15 (inductive) at 230 V | 3 A |
| | DC-12 (resistive) at 24 V | 4 A |
| | DC-13 (inductive) at 24 V | 2 A |
| AC Rating (UL 508) | utilization category (Control Circuit Rating Code) | B 300 |
| | maximum rated operational voltage | 300 V AC |
| | maximum continuous thermal current at B 300 | 5 A |
| | maximum making/breaking apparent power at B 300 | 3600/360 VA |
| | general purpose rating | 250 V AC - 4 A |
| Mechanical lifetime | | 30 x $10^6$ switching cycles |
| Electrical lifetime | at AC12, 230 V AC, 4 A | 0.1 x $10^6$ switching cycles |
| Maximum fuse rating to achieve short-circuit protection | n/c contact | 10 A fast-acting (CM-MSS.12, CM-MSS.13, CM-MSS.51: 6 A) |
| | n/o contact | 10 A fast-acting |

# Thermistor motor protection relays

## Technical data - CM-MSS

| Type | | CM-MSS.x1 | CM-MSS.x2 | CM-MSS.x3 |
|---|---|---|---|---|
| **General data** | | | | |
| MTBF | | on request | | |
| Duty time | | 100 % | | |
| Dimensions (W x H x D) | product dimensions | 22.5 x 85.6 x 103.7 mm (0.89 x 3.37 x 4.08 in) | | |
| | packaging dimensions | 97 x 109 x 30 mm (3.82 x 4.29 x 1.18 in) | | |
| Weight | | see "Ordering details" on page 6 | | |
| Mounting | | DIN rail (IEC/EN 60715), snap-on mounting without any tool | | |
| Mounting position | | any | | |
| Minimum distance to other units | vertical | 10 mm (0.394 in) if switching current > 2 A | | |
| | horizontal | 10 mm (0.394 in) if switching current > 2 A | | |
| Material of housing | | UL 94 V-0 | | |
| Degree of protection | housing | IP50 | | |
| | terminals | IP20 | | |
| **Electrical connection** | | **Screw connection technology** | | **Easy Connect Technology (push-in)** |
| Connection capacity | fine-strand with(out) wire end ferrule | 1 x 0.5-2.5 mm² (1 x 18-14 AWG)<br>2 x 0.5-1.5 mm² (2 x 18-16 AWG) | | 2 x 0.5-1.5 mm² (2 x 18-16 AWG) |
| | rigid | 1 x 0.5-4 mm² (1 x 20-12 AWG)<br>2 x 0.5-2.5 mm² (2 x 20-14 AWG) | | 2 x 0.5-1.5 mm² (2 x 20-16 AWG) |
| Stripping length | | 8 mm (0.32 in) | | |
| Tightening torque | | 0.6-0.8 Nm (7.08 lb.in) | | - |
| **Environmental data** | | | | |
| Ambient temperature ranges | operation | -25...+60 °C (-13...+140 °F) | | |
| | storage | -40...+85 °C (-40...+185 °F) | | |
| Damp heat, cyclic (IEC/EN 60068-2-30) | | 6 x 24 h cycle, 55 °C, 95 % RH | | |
| Climatic class (IEC/EN 60721-3-3) | | 3K5 (no condensation, no ice formation) | | |
| Vibration, sinusoidal | | 5...13.2 Hz: ±1 mm; 13.2...100 Hz: 0.7 g | | |
| Shock | | Class 2 | | |
| **Isolation data** | | | | |
| Rated insulation voltage $U_i$ (IEC/EN 60947-1, IEC/EN 60664-1) | Supply circuit / Measuring circuit (1) | 300 V AC (CM-MSS.x2: n/a) | | |
| | Supply circuit / Output circuits | 300 V AC | | |
| | Measuring circuit (1) / Output circuits | 300 V AC | | |
| | Output circuit 1 / Output circuit 2 | 300 V AC | | |
| Rated impulse withstand voltage $U_{imp}$ (IEC/EN 60947-1, IEC/EN 60664-1) | Supply circuit / Measuring circuit (1) | 4 kV (CM-MSS.x2: n/a) | | |
| | Supply circuit / Output circuits | 4 kV | | |
| | Measuring circuit (1) / Output circuits | 4 kV | | |
| | Output circuit 1 / Output circuit 2 | 4 kV | | |
| Basic insulation (IEC/EN 60664-1) | Supply circuit / Measuring circuit (1) | 600 V AC (CM-MSS.x2: n/a) | | |
| | Supply circuit / Output circuits | 600 V AC | | |
| | Measuring circuit (1) / Output circuits | 600 V AC | | |
| | Output circuit 1 / Output circuit 2 | 300 V AC | | |
| Protective separation (IEC/EN 61140) | Supply circuit / Measuring circuit (1) | yes, up to 300 V | | |
| | Supply circuit / Output circuits | yes (CM-MSS.x2: n/a) | | |
| | Measuring circuit (1) / Output circuits | yes | | |
| | Output circuit 1 / Output circuit 2 | no | | |
| Pollution degree (IEC/EN 60664-1) | | 3 | | |
| Overvoltage category (IEC/EN 60664-1) | | III | | |

# Thermistor motor protection relays

## Technical data - CM-MSS

| Type | | CM-MSS.x1 | CM-MSS.x2 | CM-MSS.x3 |
|---|---|---|---|---|
| **Standards** | | | | |
| Product standard | | EN 60947-5-1, EN 60947-8 | | |
| Low Voltage Directive | | 2014/35/EC | | |
| EMC directive | | 2014/30/EC | | |
| ATEX directive | | 2014/34/EC (only ATEX variants "Selection table CM-MSx range" on page 5) | | |
| RoHS directive | | 2011/65/EC | | |
| **Electromagnetic compatibility** | | | | |
| Interference immunity to | | IEC/EN 61000-6-1, IEC/EN 61000-6-2 | | |
| electrostatic discharge | IEC/EN 61000-4-2 | Level 3, 6 kV contact discharge, 8 kV air discharge | | |
| radiated, radio-frequency, electromagnetic field | IEC/EN 61000-4-3 | Level 3, 10 V/m (1 GHz), 3 V/m (2 GHz), 1 V/m (2.7 GHz) | | |
| electrical fast transient / burst | IEC/EN 61000-4-4 | Level 3, 2 kV / 5 kHz | | |
| surge | IEC/EN 61000-4-5 | Level 3, Installation class 3, supply circuit and measuring circuit 1 kV L-L, 2 kV L-N | | |
| conducted disturbances, induced by radio-frequency fields | IEC/EN 61000-4-6 | Level 3, 0.15-80 MHz, 10 V, 80 % AM (1kHz) | | |
| voltage dips, short interruptions and voltage variations | IEC/EN 61000-4-11 | Class 3 | | |
| harmonics and interharmonics | IEC/EN 61000-4-13 | Class 3 | | |
| Additional interference immunity according to product standard EN 60255-1 (reference on EN 60255-26_2011) | | | | |
| radiated, radio-frequency, electromagnetic field | IEC/EN 61000-4-3 | 10 V/m (80 MHz - 3 GHz) | | |
| conducted disturbances, induced by radio-frequency fields | IEC/EN 61000-4-6 | 10 V at stated frequencies | | |
| damped oscillatory waves | IEC/EN 61000-4-18 | Signal lines, symmetric coupling: 1 kV peak voltage<br>Power supply, asymmetric coupling: 2.5 kV peak voltage | | |
| Interference emissions | | IEC/EN 61000-6-3, IEC/EN 61000-6-4 | | |
| high-frequency radiated | IEC/CISPR 22, EN 55022 | Class B | | |
| high-frequency conducted | IEC/CISPR 22, EN 55022 | Class B | | |
| high-frequency radiated | Germanischer Lloyd | increased requirements in the emergency call frequency band | | |

# Thermistor motor protection relays

## Technical data - CM-MSE

Data at $T_a$ = 25 °C and rated values, unless otherwise indicated

| Supply circuit - Input circuit | | CM-MSE |
|---|---|---|
| Rated control supply voltage $U_s$ power consumption | 1SVR550805R9300 | 24 V AC approx. 1.5 A |
| | 1SVR550800R9300 | 110-130 V AC approx. 1.5 A |
| | 1SVR550801R9300 | 220-240 V AC approx. 1.5 A |
| Rated control supply voltage $U_s$ tolerance | | -15...+10 % |
| Rated frequency | | 50-60 Hz |
| **Measuring circuit** | | |
| Monitoring function | T1-T2 | temperature monitoring by means of PTC sensors |
| Number of sensor circuits | | 1 |
| **Sensor circuit** | | |
| Sensor type | | PTC type A (IEC/EN 60947-8) |
| Max. total resistance of sensors connected in series, cold state | | ≤1.0 kΩ |
| Overtemperature monitoring | switch-off resistance (relay de-energizes) | 2.0-3.0 kΩ |
| | switch-on resistance (relay energizes) | 1.2-1.65 kΩ |
| Maximum voltage in sensor circuit | 4 kΩ | 5 V |
| | ∞ kΩ | 15 V |
| Maximum current in sensor circuit | | 2 mA |
| Maximum sensor cable length | | 2 x 100 m at 0.75 mm², 2 x 400 m at 2.5 mm² |
| Reaction time | | <100 ms |
| **Output circuit** | | |
| Kind of output | 13-14 | 1 n/o contact |
| Operational principle | | closed-circuit principle (output relay de-energizes if the measured value exceeds/drops below the adjusted threshold) |
| Maximum switching voltage | | 250 V |
| Rated operating voltage $U_e$ and rated operating current $I_e$ | AC-12 (resistive) at 230 V | 4 A |
| | AC-15 (inductive) at 230 V | 3 A |
| | DC-12 (resistive) at 24 V | 4 A |
| | DC-13 (inductive) at 24 V | 2 A |
| AC Rating (UL 508) | utilization category (Control Circuit Rating Code) | B 300 |
| | maximum rated operational voltage | 300 V AC |
| | maximum continuous thermal current at B 300 | 5 A |
| | maximum making/breaking apparent power at B 300 | 3600/360 VA |
| | general purpose rating | 250 V AC - 4 A |
| Mechanical lifetime | | 30 x $10^6$ switching cycles |
| Electrical lifetime | at AC12, 230 V AC, 4 A | 0.1 x $10^6$ switching cycles |
| Maximum fuse rating to achieve short-circuit protection | n/c contact | 10 A fast-acting |
| | n/o contact | 10 A fast-acting |
| **General data** | | |
| Dimensions | | 22.5 x 78 x 78.5 mm (0.89 x 3.07 x 3.09 in) |
| Duty cycle | | 100 % |
| Mounting | | DIN rail (IEC/EN 60715) |
| Mounting position | | any |
| Degree of protection | housing / terminals | IP50 / IP20 |
| **Electrical connection** | | |
| Connecting capacity | fine strand with wire end ferrule | 2 x 1.5 mm² (2 x 16 AWG) |
| | fine strand without wire end ferrule | 2 x 0.75-1.5 mm² (2 x 18-16 AWG) |
| | rigid | 2 x 1-1.5 mm² (2 x 18-16 AWG) |
| Stripping length | | 2 x 0.75-1.5 mm² (2 x 18-16 AWG) |
| Tightening torque | | 0.6-0.8 Nm (5.31-7.08 lb.in) |
| **Environmental data** | | |
| Ambient temperature ranges | Operation | -20...+60 °C |
| | Storage | -40...+85 °C |
| Damp heat | IEC/EN 60068-2-30 | +40 °C, 93 % RH, 4 days |
| Vibration withstand | IEC/EN 60062-2-6 | 10-57 Hz: 0.075 mm; 57-150 Hz: 1 g |
| **Isolation data** | | |
| Rated insulation voltage $U_i$ | | 250 V |
| Rated impulse withstand voltage $U_{imp}$ | | 4 kV / 1.2 - 50 µs |
| Pollution degree | | 3 |
| Overvoltage category | | III |

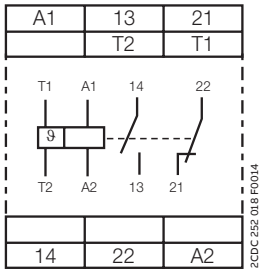
# Thermistor motor protection relays

## Technical data - CM-MSE

| Type | | CM-MSE |
|---|---|---|
| **Standards/Directives** | | |
| Standards | | IEC/EN 60947-5-1, IEC/EN 60947-8 |
| Low Voltage Directive | | 2014/35/EU |
| EMC Directive | | 2014/30/E |
| RoHS Directive | | 2011/65/EU |
| **Electromagnetic compatibility** | | |
| Interference immunity to | | IEC/EN 61000-6-2, IEC/EN 60947-8 |
| electrostatic discharge | IEC/EN 61000-4-2 | Level 3, 6 kV contact discharge, 8 kV air discharge |
| radiated, radio-frequency, electromagnetic field | IEC/EN 61000-4-3 | Level 3, 10 V/m (1 GHz), 3 V/m (2 GHz), 1 V/m (2.7 GHz) |
| electrical fast transient /burst | IEC/EN 61000-4-4 | Level 3, 2 kV / 5 kHz |
| surge | IEC/EN 61000-4-5 | Level 3, installation class 3, supply circuit and measuring circuit 1 kV L-L, 2 kV L-N |
| conducted disturbances, induced by radio-frequency fields | IEC/EN 61000-4-6 | Level 3, 0.15-80 MHz, 10 V, 80 % AM (1kHz) |
| Interference emission | | 6 g |
| high-frequency radiated | IEC/CISPR 22, EN 55022 | Class B |
| high-frequency conducted | IEC/CISPR 22, EN 55022 | Class B |

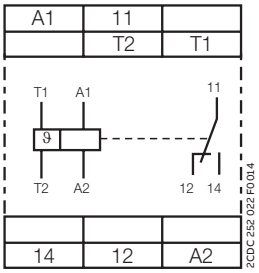
# Thermistor motor protection relays
## Connection diagrams

**CM-MSS.11, CM-MSS.21**



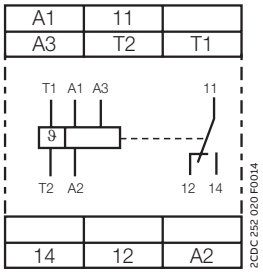

| | |
|---|---|
| A1 – A2 | Control supply voltage |
| 13 – 14 | n/o contact |
| 21 – 22 | n/c contact |
| T1 – T2 | Measuring circuit |

**CM-MSS.12**



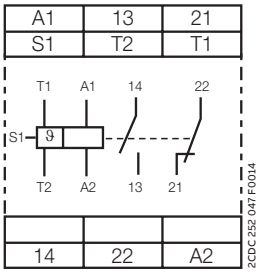

| | |
|---|---|
| A1 – A2 | Control supply voltage |
| 11 – 12/14 | c/o contact |
| T1 – T2 | Measuring circuit |

**CM-MSS.13**



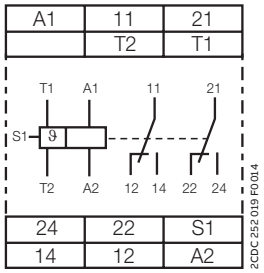

| | |
|---|---|
| A1 – A2 | Control supply voltage 220-240 V AC |
| A2 – A3 | Control supply voltage 110-130 V AC |
| 11 – 12/14 | c/o contact |
| T1 – T2 | Measuring circuit |

**CM-MSS.31**



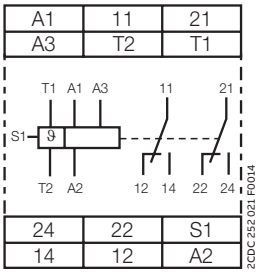

| | |
|---|---|
| A1 – A2 | Control supply voltage |
| 13 – 14 | n/o contact |
| 21 – 22 | n/c contact |
| S1 – T2 | Automatic reset (jumpered) |
| T1 – T2 | Measuring circuit |

**CM-MSS.22, CM-MSS.32, CM-MSS.41**



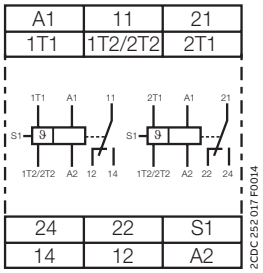

| | |
|---|---|
| A1 – A2 | Control supply voltage 24 V AC/DC |
| 11 – 12/14 | 1st c/o (SPDT) contact |
| 21 – 22/24 | 2nd c/o (SPDT) contact |
| S1 – T2 | Automatic reset (jumpered) |
| T1 – T2 | Measuring circuit |

**CM-MSS.23, CM-MSS.33**



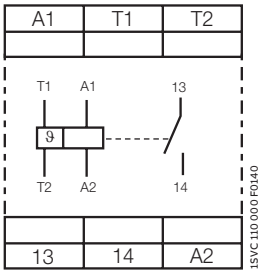

| | |
|---|---|
| A1 – A2 | Control supply voltage 220-240 V AC |
| A2 – A3 | Control supply voltage 110-130 V AC |
| 11 – 12/14 | 1st c/o (SPDT) contact |
| 21 – 22/24 | 2nd c/o (SPDT) contact |
| S1 – T2 | Automatic reset (jumpered) |
| T1 – T2 | Measuring circuit |

**CM-MSS.51**




| | |
|---|---|
| A1 – A2 | Control supply voltage 220-240 V AC |
| 11 – 12/14 | 1st c/o (SPDT) contact |
| 21 – 22/24 | 2nd c/o (SPDT) contact |
| S1 – 1T2/2T2 | Automatic reset (jumpered) |
| 1T1 – 1T2/2T2 | Measuring circuit 1 |
| 2T1 – 1T2/2T2 | Measuring circuit 2 |

**CM-MSE**

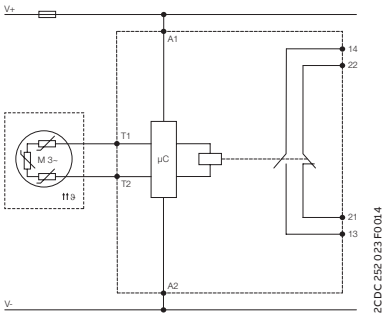



| | |
|---|---|
| A1 – A2 | Control supply voltage 24 V AC |
| T1-T2 | Sensor circuit |
| 13-14 | Output contact - Closed circuit principle |

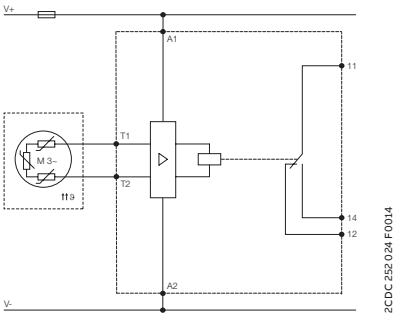
# Thermistor motor protection relays

## Circuit diagram

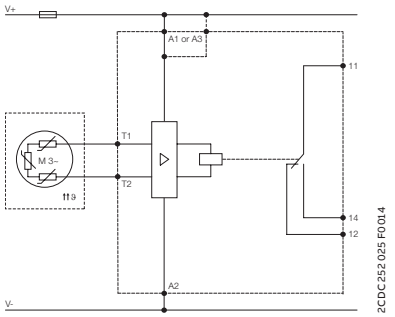
**CM-MSS.11, CM-MSS.21**



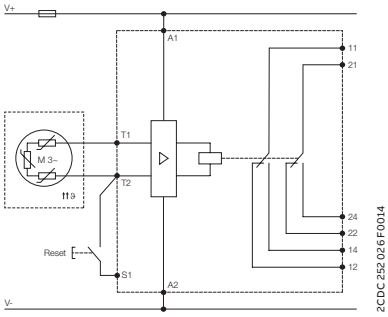

**CM-MSS.12**



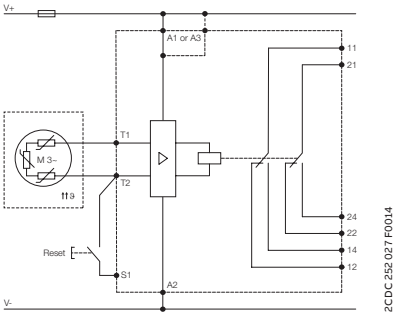

**CM-MSS.13**



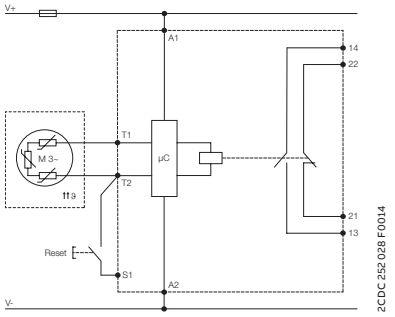

**CM-MSS.22**



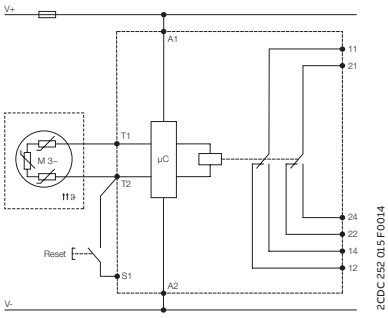

**CM-MSS.23**



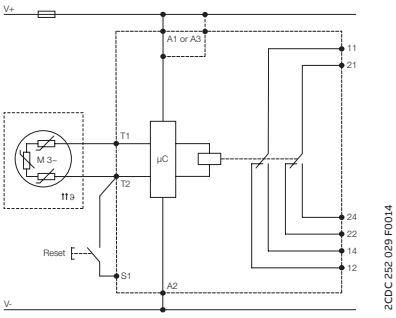

**CM-MSS.31**



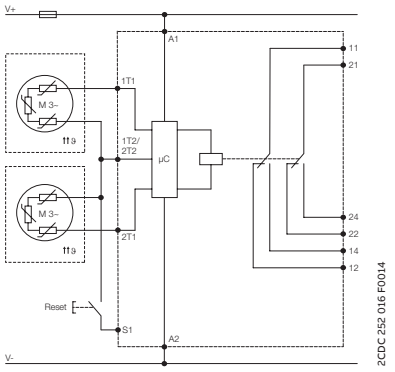

**CM-MSS.32, CM-MSS.41**



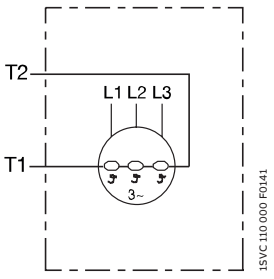

**CM-MSS.33**




**CM-MSS.51**

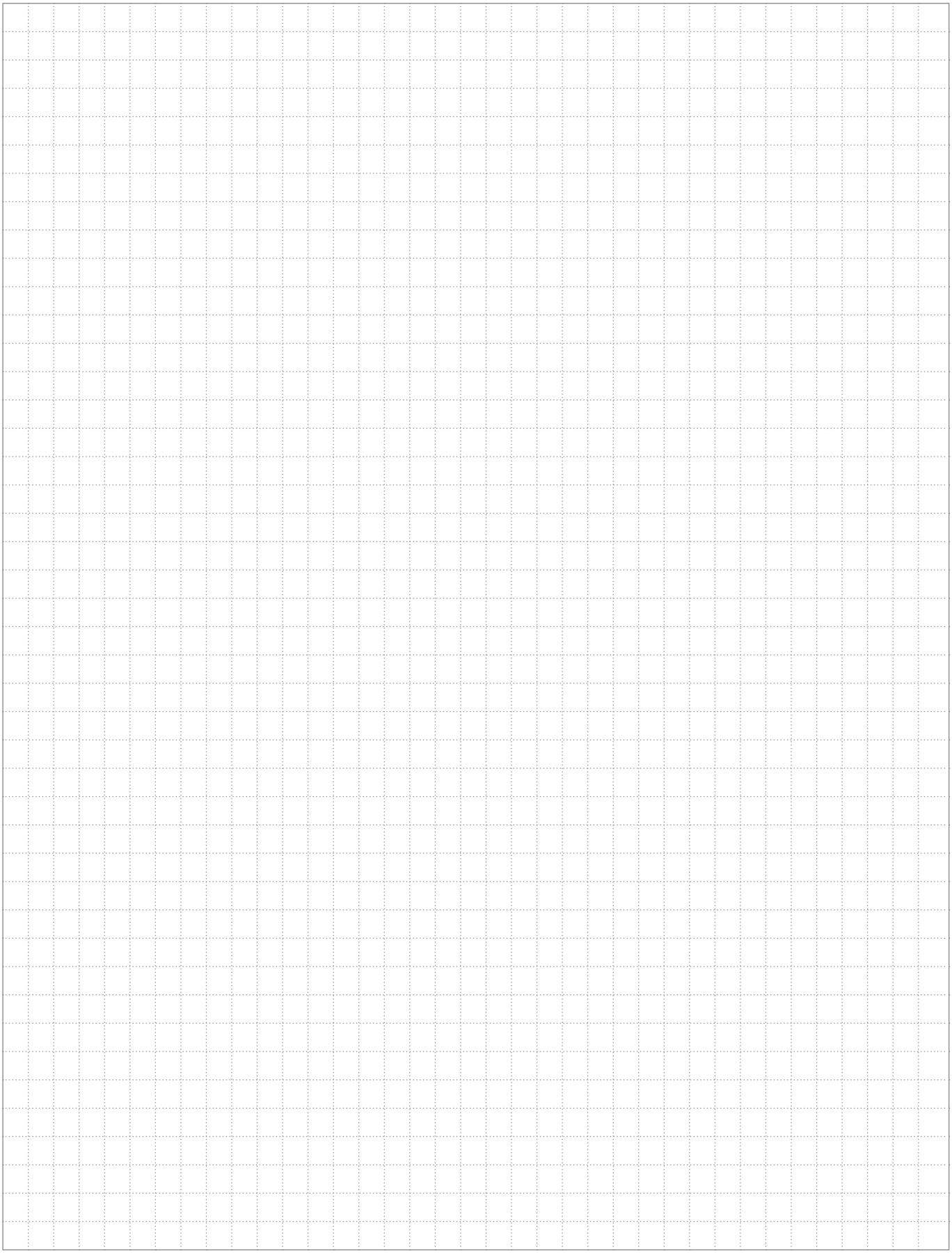



**CM-MSE**




07

# Notes



**Set up these innovative temperature monitoring relays exactly as you need, either via a back-lit LCD or smartphone app. Parametrization and configuration are just one touch away with the ABB EPiC app – even in a non-powered state – reducing installation time by 80%.**

**Just one relay covers a wide range of applications, enables you to monitor their condition and provides thermal protection. Increased uptime and safety makes ABB's Smart monitoring relays a true game changer.**



**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**1SVR750740R0110**

# Smart monitoring relays


**8/**2 **Features and benefits**

**8/**4 **Built-in connectivity**

**8/**5 **Applications**

**8/**8 **Ordering details**

**8/**9 **Technical data**

**8/**13 **Technical diagrams**

# One look, one touch – one device
## Features and benefits




Set up these innovative temperature monitoring relays exactly as you need, either via a back-lit LCD or smartphone app. Parametrization and configuration are just one touch away with the ABB EPiC app – even in a non-powered state – reducing installation time by 80%. And with just one relay covering a wide range of application, stocks can be reduced significantly, making ABB's Smart monitoring relays a true game changer.

**Easy to install**

**One look - back-lit LCD for easy reading and parametrization**
Everything you need at a glance: the LCD at the front of the relay shows the currently measured values and maintenance data. And with just one push, the symbol-based menu structure can be accessed via the push-rotate button. Simply set the thresholds and parameters with the help of an intuitive and future-ready interface.

**Optimum interface**

**One touch - NFC parametrization via smartphone app**
One touch is all that is needed for fast, easy and intuitive configuration with the ABB EPiC smartphone app. Simply touch the relay with your mobile phone: Parameter settings can be edited and stored in the app and then copied to different devices, even if they are not in the powered state. Available in a range of different languages, installation and configuration have never been so easy.

**Continuous operation**

**One device - for thermal protection and condition monitoring**
Smart temperature monitoring relays ensure that your application remains operational by detecting potential failures in advance. They protect the life of your assets by providing early detection of unacceptable temperature rises and the need for maintenance. The relay is configurable over a wide range of settings and can be adjusted flexibly. Set a pre-alarm and alarm thresholds according to application needs. Increase personal safety by monitoring temperature remotely with Modbus RTU or ABB Ability™ Energy and Asset Manager.

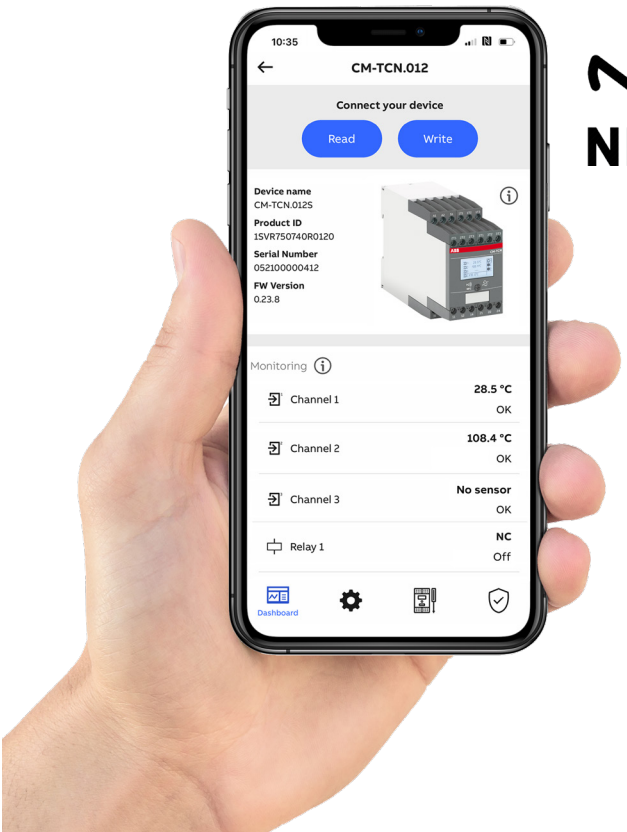
# Smart temperature monitoring relays
## Setup via display or smartphone app

CM-TCN temperature monitoring relays can measure temperatures of solids, liquids and gaseous media in up to three sensor circuits using various types of sensors.

# One...




**look** **to have the information needed**
the display shows the measured values and relay status at a glance. The symbol-based menu structure and presettings make parametrization simple.



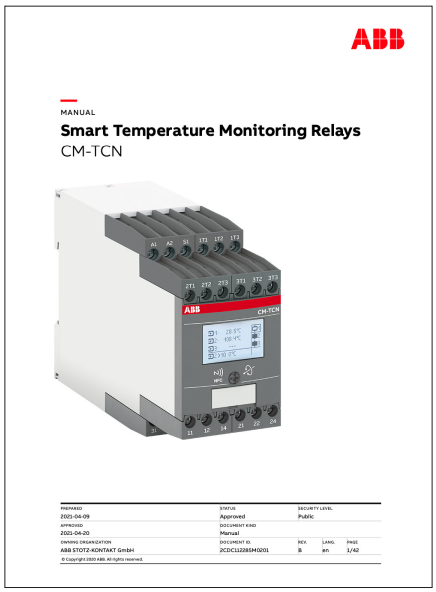

NFC

**touch** **for up to 80% faster setup**
for easy parametrization and copying of settings between multiple devices via NFC with the ABB EPiC smartphone app – even if the relay is not powered.

**device** **for thermal protection and condition monitoring**
Just one relay to cover many different applications, monitor their condition, increase safety and ensure uptime.

# Built-in connectivity
## Communication via embedded Modbus RTU

The smart temperature monitoring relay CM-TCN.012 supports the data transfer using the Modbus RTU communication protocol. The communication interface RS-485 is embedded in the relay and does not require installation of any accessories.




**CM-TCN manual**
Modbus communication map and information about the device configuration can be found in the CM-TCN user manual

**The communication interface makes it possible to:**

Read the temperature measurements, relays state and temperature sensors status.

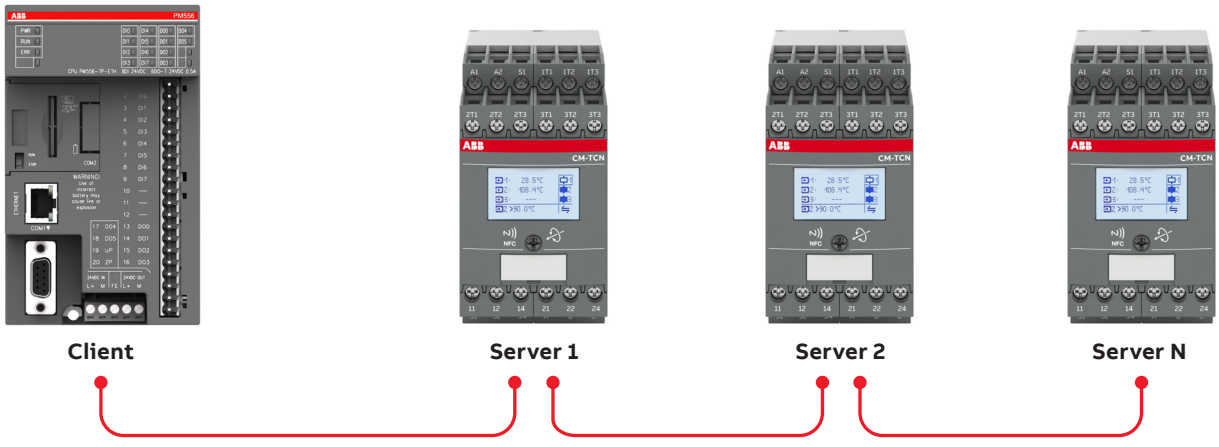
Reset the history and settings (trip counter, event history, etc)

Access the condition monitoring data such as event history, operating hours counter, maintenance counter, statistics.

Read system information (serial number, firmware version)

Configure the smart monitoring relay remotely.

Control output relays and trigger them in case of the communication bus error



# Cloud integration with ABB Ability™

## Real-time data monitoring and temperature trends

Providing full remote visibility of asset and electrical-system behavior, ABB Ability™ Energy and Asset Manager (EAM) provides insights that help you minimize costs, risks and maximize performance as well as safety across your operations.

The CM-TCN.012 smart monitoring relay is enabled in ABB Ability™ Energy and Asset Manager. Thus, allowing access to the real-time data monitoring and temperature trends from the cloud solution.

The data received from CM-TCN.012 is organized in plain widgets for the remote condition monitoring of assets such as a machine, motor, transformer or switchboard. The temperature trends can be compared between different measuring sensors giving you valuable insights about temperature behavior of your assets at the place of the sensors´ installation.

Additionally, the customer can set up SMS or E-mail alerts to notify key personnel in case of the temperature relay tripping or sensors error. The periodic report with temperature values can also be scheduled.

CM-TCN.012 can be connected to the cloud-computing platform via Modbus RS-485 communication interface. The interface is embedded in the device and does not require any accessories.

The smart relay can share the data with the platform using an external solution with the ABB Ability™ Edge Industrial Gateway.

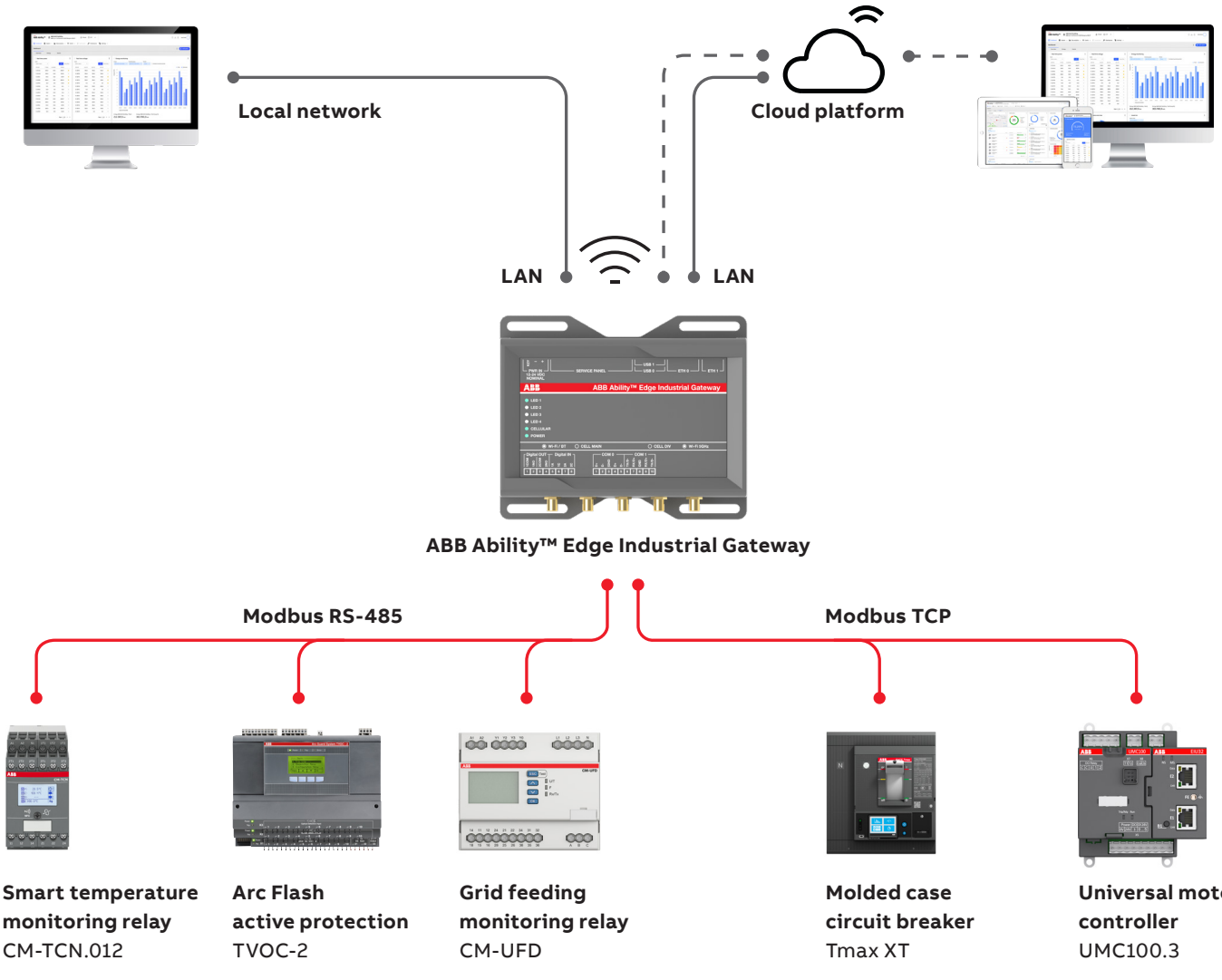
**ABB Ability™ Energy and Asset Manager**



# Example communication architecture
## CM-TCN.012 ABB Ability™ enabled relay

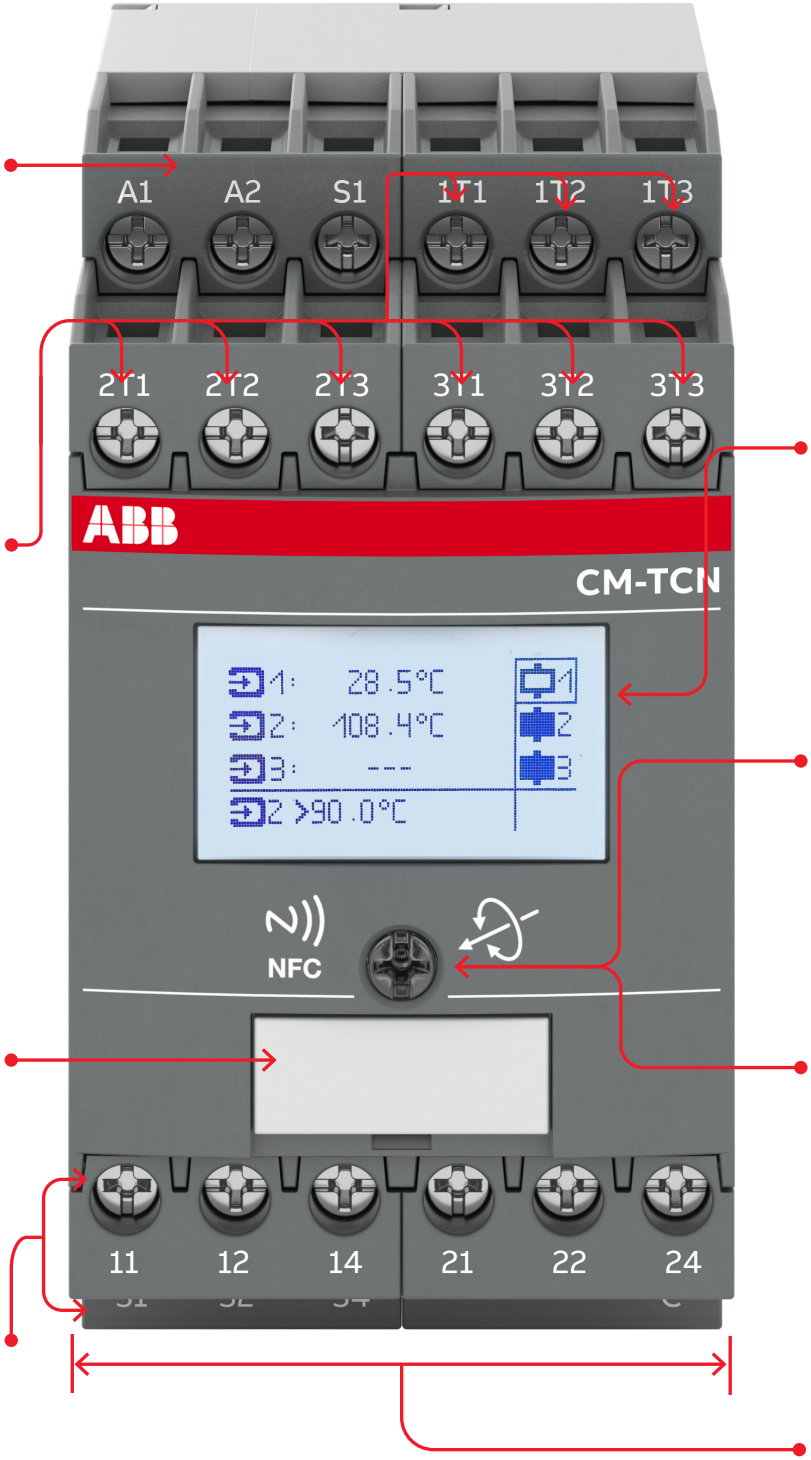
ABB Ability™ Energy and Asset Manager is a state-of-the-art cloud solution that integrates energy and asset management in a single intuitive dashboard.

**Architecture with ABB Ability™ Edge Industrial Gateway**




Integrate a range of devices like circuit breakers, motor controllers and the new CM-TCN.012 monitoring relay into the ABB Ability™ Energy and Asset Manager. It is a state-of-the-art cloud solution that integrates energy and asset management in a single intuitive dashboard. Providing full remote visibility of asset and electrical-system behavior, ABB Ability™ Energy and Asset Manager (EAM) provides insights that help you minimize cost and risk and maximize performance and safety across your operations.

# Operating controls




**Push-in and screw terminals**

**3 measuring inputs**
PT100, PT1000, PTC, NTC

**Marker label**

**Connection terminals**
Wide terminal spacing allows connection of wires:
2 x 1.5 mm² (2 x 16 AWG) with wire end ferrules or
2 x 2.5 mm² (2 x 14 AWG) without ferrules.

**Back-lit LCD**
Symbol-based menu structure

**Push-rotate button**
Intuitive operation with just one button

**LED status indication**
Red: Failure
Yellow: NFC ready for pairing
Green: Control supply voltage applied; no failure

**Width 45 mm**

# Smart monitoring relays
## Ordering details




CM-TCN

### Description
The temperature monitoring relays CM-TCN are able to measure temperatures of solids, liquids and gaseous media within up to three sensor circuits using different types of sensors, such as PT100, PT1000, PTC or NTC within the same time. Different types of sensors, e.g. PT100 and PTC sensors, can be monitored simultaneously.
The temperature is obtained by the sensors in the medium, evaluated by the device and monitored to determine whether it is within an operating range (range monitoring function) or has exceeded or fallen below a threshold. Depending on the parametrization, up to three output relays signalize the changes in the measuring circuits.






**CM-TCN catalog**
Further details about features and benefits of the smart monitoring relays can be found in the dedicated catalog

### Smart temperature monitoring relays CM-TCN

| Rated control supply voltage | Terminal type | Display & NFC | Modbus RTU | Temperature sensor | Width mm | Type | Order code | Weight (1 pc) kg (lb) |
|---|---|---|---|---|---|---|---|---|
| 24-240 V AC/DC | Screw | yes | no | PT100, PTC, PT1000, NTC | 45 | CM-TCN.011S | 1SVR750740R0110 | 0.293 (0.646) |
| | Push-in | yes | no | | | CM-TCN.011P | 1SVR760740R0110 | 0.293 (0.646) |
| | Screw | yes | yes | | | CM-TCN.012S | 1SVR750740R0120 | 0.299 (0.659) |
| | Push-in | yes | yes | | | CM-TCN.012P | 1SVR760740R0120 | 0.299 (0.659) |

* CM-TCN.011: supply voltage 24-240 V AC/DC for revision G or later and supply voltage 24 V AC/DC for revision F or earlier.

### Accessories

| Description | for type | Width mm | Type | Order code | Pkg qty | Weight (1 pc) kg (lb) |
|---|---|---|---|---|---|---|
| Adapter for screw mounting | CM-N.S/P | 45 | ADP.02 | 1SVR440029R0100 | 1 | 36.7 (1.30) |
| Marker label | CM-S.S/P CM-N.S/P | | MAR.01 | 1SVR366017R0100 | 10 | 0.19 (0.007) |
| Sealable transparent cover | CM-N.S/P | 45 | COV.12 | 1SVR750005R0100 | 1 | 7 (0.247) |

# Smart monitoring relays
## Technical data

Data at Ta = 25 °C and rated values, unless otherwise indicated

| **Type** | | **CM-TCN.011** | **CM-TCN.012** |
|---|---|---|---|
| **Input circuit** | | **A1-A2** | |
| Rated control supply voltage $U_s$ | | 24-240 V AC/DC* | |
| Rated control supply voltage $U_s$ tolerance | | -15 ... +10 % | |
| Rated frequency | AC | 50 - 60 Hz | |
| Frequency range | AC | 45 - 66 Hz | |
| Typical current consumption | 24 V AC/DC | typ. 30 mA / max. 40 mA | |
| | 115 V AC | typ. 16 mA / max. 20 mA | |
| | 230 V AC | typ. 13 mA / max. 15 mA | |
| Power failure buffering time | | min. 20 ms | |
| **Measuring circuits** | | **xT1, xT2, xT3** | |
| Sensor type | | PT100, PT1000**, PTC, NTC, bi-metal switch | |
| Connection of the sensor | 2-wire | yes, jumper xT2 - xT3 | |
| | 3-wire | yes, use terminal xT1, xT2, xT3 | |
| Interrupted wire detection | | yes | |
| Short-circuit detection | | yes | |
| Measuring ranges | PT100 | -200 °C ... +850 °C / -328 °F ... +1562 °F | |
| | PT1000 | -200 °C ... +850 °C / -328 °F ... +1562 °F** | |
| | NTC | +80 °C ... +155 °C / +176 °F ... +311 °F | |
| | PTC | max. total resistance of connected resistors in cold state <750 Ohm | |
| Monitoring functions | | undertemperature, overtemperature, window monitoring | |
| Measuring input range | | -200 ... +850 °C / -328 ... +1562 °F | |
| Hysteresis related to the threshold values | | 1 ... 99.9 °C / 1.8 ... 179.8 °F | |
| Measuring principle | | continuous current | |
| Typical current in the sensor circuit | PT100 | 0.5 mA | |
| | PT1000 | 0.5 mA | |
| Maximum current in sensor circuit | | 0.5 mA | |
| Measuring accuracy | | ± 0.5 K (-50 ... +200 °C / -58 ... +392 °F)<br>± 1 K (< -50 °C / -58 °F and > 200 °C / 392 °F) | |
| Accuracy within the rated control supply voltage tolerance | | < 0.05 % full scale/1 V | |
| Accuracy within the temperature range | | < 0.05 % full scale/1 K | |
| Repeat accuracy (constant parameters) | | ± 0.07 % full scale | |
| Maximum measuring cycle | | < 2 s | |
| Maximum cable length | | 500 m / 1 $mm^2$ (shielded cable) | |
| **Control circuits** | | | |
| Type of triggering | | volt-free triggering | |
| Control function | S1 | remote reset | |
| Maximum input current | | < 1.5 mA | |
| Maximum no-load voltage at the control inputs | | < 15 V | |
| Minimum control pulse length | | 150 ms | |
| Maximum cable length at the control inputs | | 100 m - 100 pF/m | |

* CM-TCN.011: supply voltage 24-240 V AC/DC for revision G or later and supply voltage 24 V AC/DC for revision F or earlier.
** When CM-TCN is used with PT1000 sensors, a bridge must be installed between terminals xT2 and xT3 of unused measuring circuits. The bridge must also be installed between open terminals xT2 and xT3 when CM-TCN is used with one or two PT1000 in combination with PTC or NTC or bimetal switch.

# Smart monitoring relays
## Technical data

| Type | | CM-TCN.011 | CM-TCN.012 |
|---|---|---|---|
| **Timing functions** | | | |
| Power-on delay | | 2-999.9 s | |
| ON-delay R1, R2, R3 * | | 0-6553.5 s | |
| OFF-delay R1, R2, R3 * | | 0-6553.5 s | |
| Cyclic switching function | On time | 1 min - 1 day | |
| | cycle time | 10 min - 1 year | |
| **Indication of operational states** | | | |
| Control supply voltage applied | | LED green | |
| Cyclic switching function running | | LED orange | |
| Internal fault | | LED red on | |
| Short circuit | | LED red: ⎍⎍⎍ | |
| Wire break | | LED red: ⎍⎍⎍ | |
| Overtemperature / Measurement value exceeds high limit | | LED red: ⎍⎍ | |
| Undertemperature / Measurement value exceeds low limit | | LED red: ⎍⎍⎍ | |
| Parameter error | | Orange and red LEDs alternate | |
| NFC pairing | | LED orange: ⎍⎍ | |
| For details see the message on the display | | | |
| **Display** | | | |
| Technology | | LCD | |
| Backlight | on | press button | |
| | off | switch-off delay adjustable, 10 s -1 h (default 10 s) | |
| Resolution | | 128 x 64 pixel | |
| Display size | | 25.58 x 12.78 mm | |
| **Operating controls** | | | |
| Push-rotate button | | Operable with screw driver: PZ1<br>DIN ISO 8764-1 | |
| **Near field communication (NFC)** | | | |
| Standards | | ISO/IEC 14443 Part 2+3<br>NFC Forum Type 2 tag compliant | |
| **Communication interface** | | | |
| Communication protocol | | - | Modbus RTU |
| Physical interface | | - | two-wire RS-485 |
| Integrated termination resistors | | - | no |
| Possible bus addresses | | - | 1 ... 247 |
| Baud rates | | - | 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 B/s |
| Typical response time | | - | < 30 ms |
| Bus master supervision time / Timeout | | - | adjustable 1 … 255 s in steps of 1 s |
| Frame | | - | 8 data, Even, 1 stop<br>8 data, Odd, 1 stop<br>8 data, None, 2 stop<br>8 data, None, 1 stop |

* If the selected ON-delay or OFF-delay is less than 2 s, the maximum measuring cycle should be taken into account.

# Smart monitoring relays
## Technical data

| Type | | | CM-TCN.011 | CM-TCN.012 |
|---|---|---|---|---|
| **Output circuits** | | | | |
| Kind of outputs | | 11-12/14 | relay R1, c/o (SPDT) contact | |
| | | 21-22/24 | relay R2, c/o (SPDT) contact | |
| | | 31-32/34 | relay R3, c/o (SPDT) contact | |
| Operating principle | | open- or closed circuit principle | configurable; default: closed-circuit principle* | |
| Contact material | | | AgNi alloy, Cd-free | |
| Maximum switching voltage / maximum switching current | | | see "Load limit curves" | |
| Rated operational voltage $U_e$ and rated operational current $I_e$ | | AC-12 (resistive) at 230 V | 4 A | |
| | | AC-15 (inductive) at 230 V | 3 A | |
| | | DC-12 (resistive) at 24 V | 4 A | |
| | | DC-13 (inductive) at 24 V | 2 A | |
| Mechanical lifetime | | | 30 x $10^6$ switching cycles | |
| Electrical lifetime | | at AC-12, 230 V AC, 4 A | 0.1 x $10^6$ switching cycles | |
| Maximum fuse rating to achieve short-circuit protection | | n/c contact | 6 A fast-acting | |
| | | n/o contact | 10 A fast-acting | |
| Conventional thermal current $I_{th}$ | | | 4 A | |
| **General data** | | | | |
| MTBF | | | on request | |
| Duty cycle | | | 100 % | |
| Dimensions | | | see "Dimensional drawing" | |
| Mounting | | | DIN rail (IEC/EN 60715) TH 35-7.5 and TH 35-15, snap-on mounting without any tool | |
| Mounting position | | | any | |
| Minimum distance to other units | | horizontal | not necessary | |
| Material of housing | | | UL 94 V-0 | |
| Degree of protection | | terminals | IP20 | |
| **Electrical connection** | | | **CM-TCN.011S, CM-TCN.012S** | **CM-TCN.011P, CM-TCN.012P** |
| Connecting capacity | fine-strand with/ without wire end ferrule | A1, A2, R1, R2, R3, S1, C | 1x 0.5-2.5 mm² (1x18-14 AWG) 2 x 0.5-1.5 mm² (2x18-16 AWG) | 2x0.5-1.5 mm² (2x18-16 AWG) |
| | | xT1, xT2, xT3, A, B, C | 1x 0.2-2.5 mm² (1x24-14 AWG) 2 x 0.2-1.5 mm² (2x24-16 AWG) | 2x0.2-1.5 mm² (2x24-16 AWG) |
| | rigid | A1, A2, R1, R2, R3, S1, C | 1x 0.5-4 mm² (1x20-12 AWG) 2 x 0.5-2.5 mm² (2x20-14 AWG) | 2x0.5-1.5 mm² (2x20-16 AWG) |
| | | xT1, xT2, xT3, A, B, C | 1x 0.2-4 mm² (1x24-12 AWG) 2 x 0.2-2.5 mm² (2x24-14 AWG) | 2x0.2-1.5 mm² (2x24-16 AWG) |
| Stripping length | | | 8 mm (0.32 in) | |
| Tightening torque | | < 0.5 mm² | 0.5 Nm (4.43 lb.in) | - |
| | | ≥ 0.5 mm² | 0.6 - 0.8 Nm (7.08 lb.in) | - |

* Closed-circuit principle: Output relay de-energizes if a fault is occurring
Open-circuit principle: Output relay energizes if a fault is occurring

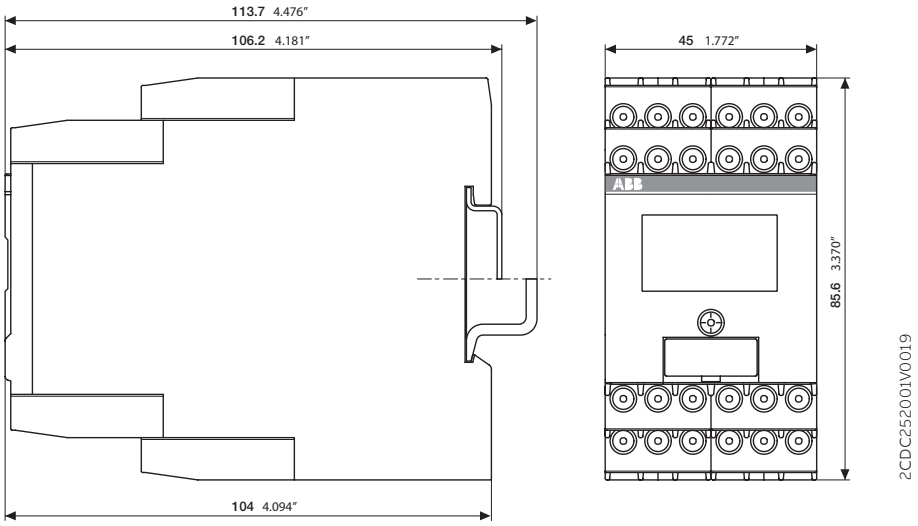
# Smart monitoring relays

## Technical data

| Type | | CM-TCN.011 | CM-TCN.012 |
|---|---|---|---|
| **Environmental data** | | | |
| Ambient temperature ranges | operation | -25 °C...+60 °C (-13...+140 °F) | |
| | storage | -40 °C...+85 °C (-40...+185 °F) | |
| Damp heat, cyclic | IEC/EN 60068-2-30 | 6 x 24 h cycle, 55 °C, 95 % RH | |
| Climatic class | IEC/EN 60721-3-3 | 3K5 (no condensation, no ice formation) | |
| Vibration, sinusoidal | | class 1 | |
| Shock | | class 1 | |
| **Isolation data** | | | |
| Rated impulse withstand voltage ($U_{imp}$) EN/IEC60664-1 | supply circuit / measuring circuit and modbus / output circuits (relay) | 6 kV | |
| | output circuit 1 / output circuit 2 / output circuit 3 | 4 kV | |
| Rated insulation voltage $U_i$ Basic insulation | supply circuit / measuring circuit and modbus / output circuits (relay) | 600 V | |
| | output circuit 1 / output circuit 2 / output circuit 3 | 300 V | |
| Protective separation IEC/EN 61140 | supply circuit / measuring circuit and modbus / output circuits (relay) | 300 V | |
| | output circuit 1 / output circuit 2 / output circuit 3 | 150 V | |
| Pollution degree | | 3 | |
| Overvoltage category | | III | |
| **Standards/Directives** | | | |
| Standards | | IEC/EN 60947-5-1 | |
| Low Voltage Directive | | 2014/35/EU | |
| EMC Directive | | 2014/30/EU | |
| RoHS Directive | | 2011/65/EU incl. 2015/863/EU | |
| WEEE Directive | | 2012/19/EU | |
| RED Directive | | 2014/53/EU | |
| **Electromagnetic compatibility** | | | |
| Interference immunity to | | IEC/EN 60947-5-1 | |
| electrostatic discharge | IEC/EN 61000-4-2 | level 2, 4 kV contact discharge, 8 kV air discharge | |
| radiated, radio-frequency, electromagnetic field | IEC/EN 61000-4-3 | level 3, 10 V/m | |
| electrical fast transient / burst | IEC/EN 61000-4-4 | level 3 / 2 kV, 5 kHz | |
| surge | IEC/EN 61000-4-5 | supply circuit: level 3; L-L 1 kV, L-PE 2 kV<br>relay circuit: level 3; L-PE 2 kV<br>measuring circuit, remote S1: level 2; L-PE 1 kV | |
| conducted disturbances, induced by radio-frequency fields | IEC/EN 61000-4-6 | level 3, 10 V | |
| voltage dips, short interruptions and voltage variations | IEC/EN 61000-4-11 | class 3 | |
| Interference emission | | IEC/EN 60947-5-1 | |
| high-frequency radiated | | fulfilled (environment B) | |
| high-frequency conducted | | fulfilled (environment A and B) | |

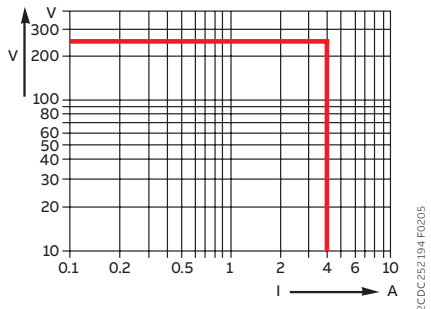
# Smart monitoring relays
## Technical diagrams

### Dimensional drawings
in **mm** and inches

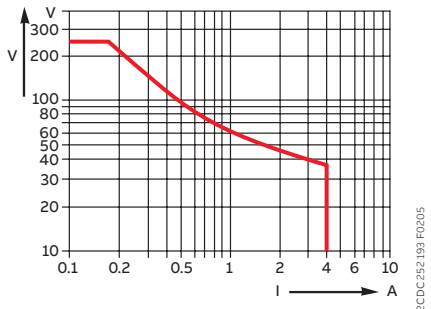



CM-TCN.01x

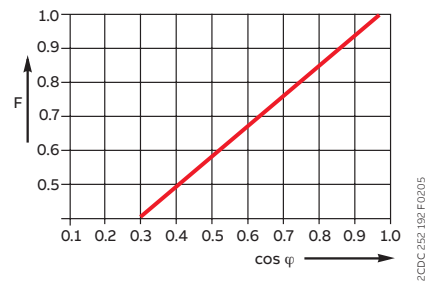
### Load limit curves



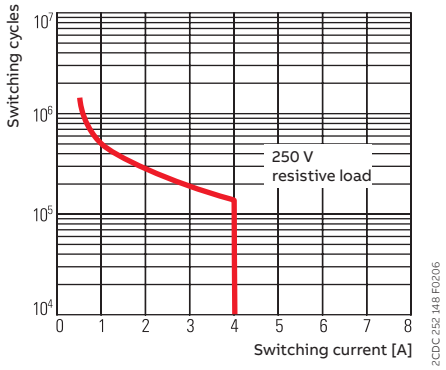

AC load (resistive)




DC load (resistive)




Derating factor F for inductive AC load




Contact lifetime



**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**2CCS801901R0539**

# Self resetting current limiting module

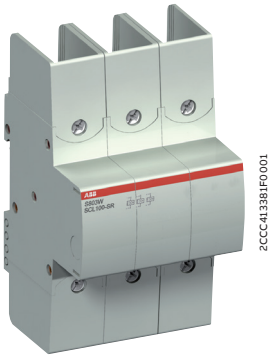
**S800-SCL-SR**
**9/**2 Ordering details
**9/**3 Technical data

# S800-SCL-SR

## Self-resetting current limiting module




S800S-SCL-SR



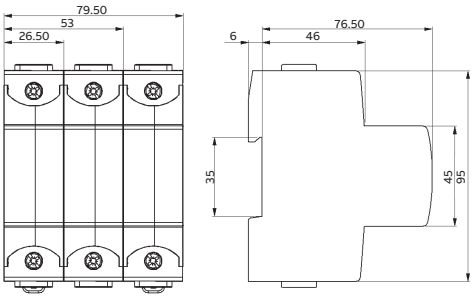

S803W-SCL-SR

S800-SCL-SR is ABB's innovative self-resetting current limiting module which considerably increases the short-circuit breaking capacity of downstream manual motor starters and high performance MCBs. S800-SCL-SR is a self resetting current limiting module based on the S800 technology.

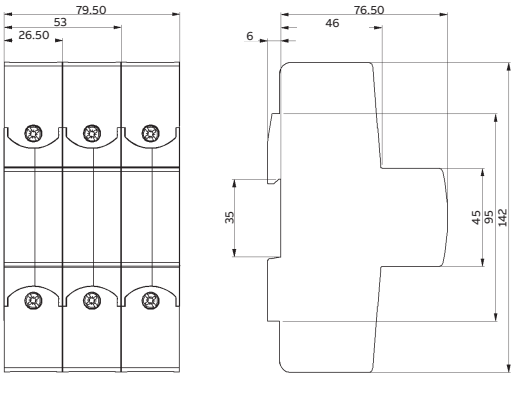
It limits the short-circuit current until the downstream means of protection trips. Its current continuity makes it as the ideal solution for group protection: All parallel branches remain operative. This leads to an Expanded application range of the low voltage switchgear whose short-circuit capabilities are usually limited. S800-SCL-SR can be combined with S800S high performance MCB or with manual motor starters. S800-SCL-SR can also back up a single circuit breaker or a group of circuit breakers or motor starters (group protection). Terminals and outside dimensions are identical to the S800 range.

| Self-resetting short-circuit limiter IEC version A | Type designation | Product number | EAN number 7612271 | Weight kg | Pack. unit |
|---|---|---|---|---|---|
| **1-pole** | | | | | |
| 32 | S801S-SCL32-SR | 2CCS801901R0539 | 412012 | 0.25 | 1 |
| 63 | S801S-SCL63-SR | 2CCS801901R0599 | 412036 | 0.25 | 1 |
| 100 | S801S-SCL100-SR | 2CCS801901R0639 | 411992 | 0.25 | 1 |
| **2-pole** | | | | | |
| 32 | S802S-SCL32-SR | 2CCS802901R0539 | 412074 | 0.5 | 1 |
| 63 | S802S-SCL63-SR | 2CCS802901R0599 | 412098 | 0.5 | 1 |
| 100 | S802S-SCL100-SR | 2CCS802901R0639 | 412050 | 0.5 | 1 |
| **3-pole** | | | | | |
| 32 | S803S-SCL32-SR | 2CCS803901R0539 | 411930 | 0.75 | 1 |
| 63 | S803S-SCL63-SR | 2CCS803901R0599 | 411947 | 0.75 | 1 |
| 100 | S803S-SCL100-SR | 2CCS803901R0639 | 411954 | 0.75 | 1 |

| Self-resetting short-circuit limiter IEC/UL version A | Type designation | Product number | EAN number 7612271 | Weight kg | Pack. unit |
|---|---|---|---|---|---|
| **3-pole** | | | | | |
| 32 | S803W-SCL32-SR | 2CCS803917R0539 | 412319 | 0.75 | 1 |
| 63 | S803W-SCL63-SR | 2CCS803917R0599 | 412326 | 0.75 | 1 |
| 100 | S803W-SCL100-SR | 2CCS803917R0639 | 412302 | 0.75 | 1 |




S800S-SCL-SR




S803W-SCL-SR

Main dimensions mm, inches

# S800S-SCL-SR/S803W-SCL-SR

## Technical data

| | | | S800S-SCL-SR | S803W-SCL-SR |
|---|---|---|---|---|
| Rated operational current Ie | | [A] | 32, 63, 100 | 32, 63, 100 |
| Pole | | | 1, 2, 3 | 3 |
| Rated operational voltage Ue (AC) according to IEC 60947-2 | 50/60 Hz | [V] | 400/690 | 690 |
| (AC) according to UL 508 | 50/60 Hz | [V] | | 600 |
| Rated insulation voltage Ui | | [V] | 690 | 690 |
| Rated impulse withstand voltage Uimp | | [kV] | 8 | 8 |
| Rated ultimate short-circuit breaking capacity | | | | |
| **Icu = Ics according to IEC 60947-2*** | | | | |
| (AC) 50/60 Hz 240/415 V | | [kA] | 100 | 100 |
| (AC) 50/60 Hz 254/440 V | | [kA] | 100 | 100 |
| (AC) 50/60 Hz 277/480 V | | [kA] | 65 | 65 |
| (AC) 50/60 Hz 289/500 V | | [kA] | 65 | 65 |
| (AC) 50/60 Hz 346/600 V | | [kA] | 65 | 65 |
| (AC) 50/60 Hz 400/690 V | | [kA] | 50 | 50 |
| **Short-circuit rating according to UL 508, CSA 22.2*** | | | | |
| (AC) 50/60 Hz 480 V | | [kA] | 65 | 65 |
| (AC) 50/60 Hz 600 V | | [kA] | 65 | 65 |

* Valid only for approved combinations

| | | | | |
|---|---|---|---|---|
| Rated frequency | | [Hz] | 50/60 | 50/60 |
| Mounting position | | | any | any |
| Connections Cu | | | | |
| | | [mm²] | 1 ... 50 rigid (solid/stranded) | 1 ... 50 rigid (solid/stranded) |
| | | [mm²] | 1 ... 70 flexible | 1 ... 70 flexible |
| | | | | 14–1 AWG |
| Tightening torque | | | | |
| | | [Nm] | min. 3 / max. 4 | min. 3 / max. 4 |
| | | [in. lbs.] | | min. 26.5 / max. 25 |
| Feeding | | | optional | optional |
| Mouting on DIN top hat rail | | | EN 60715 | EN 60715 |
| Ambient air temperature | | [°C] | –40 ... +70 | –40 ... +70 |
| Storage temperature | | [°C] | –40 ... +85 | –40 ... +85 |
| Degree of protection | | | IP20 | IP20 |
| Classification acc. to NF F 16-101, NF F 16-102 | | | I3, F2 | I3, F2 |
| Damp Heat | | | IEC 60068-2-30, 55 °C / 95% r.h. | IEC 60068-2-30, 55 °C / 95% r.h. |
| Vibration | | | IEC 60068-2-6, 5–10 Hz / 3 mm and 10–500 Hz / 2 g at 0.5 x $I_e$ | IEC 60068-2-6, 5–10 Hz / 3 mm and 10–500 Hz / 2 g at 0.5 x $I_e$ |
| Random Vibration | | | IEC 60068-2-64, 5–500 Hz / 2 g at 0.5 x $I_e$ | IEC 60068-2-64, 5–500 Hz / 2 g at 0.5 x $I_e$ |
| Resistance to climatic conditions | | | IEC 60068-2-1 /-2-2 /-2-30 | IEC 60068-2-1 /-2-2 /-2-30 |
| Standard | | | IEC 60947-2<br>IEC 60947-4-1 | IEC 60947-2<br>IEC 60947-4-1<br>UL 508, CSA 22.2 No. 14 |

### Internal resistance at 25°C ambient temperature and nominal power losses

| **Rated current In**<br>A | **Internal resistance Ri**<br>mΩ/pole | **Power losses Pvn**<br>W/pole |
|---|---|---|
| 32 | 2.8 | 3.6 |
| 63 | 1.3 | 5.7 |
| 100 | 0.7 | 7.8 |

### Influence of ambient temperature – single mounted devices

| **Rated current In**<br>A | **10°C** | **15°C** | **20°C** | **25°C** | **30°C** | **35°C** | **40°C** | **45°C** | **50°C** | **55°C** | **60°C** | **65°C** | **70°C** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 32 | 38.2 | 37.2 | 35.8 | 35.2 | 34.2 | 33.3 | 32 | 30.7 | 29.8 | 28.8 | 27.8 | 26.5 | 25.1 |
| 63 | 75.3 | 73.2 | 70.6 | 69.3 | 67.4 | 65.5 | 63 | 60.5 | 58.6 | 56.7 | 54.8 | 52.3 | 49.8 |
| 100 | 119.5 | 116.2 | 112 | 110 | 107 | 104 | 100 | 96 | 93 | 90 | 87 | 84 | 80 |

# S800-SCL-SR
Technical data

## Short circuit breaking capacity

| | | S800S-SCL-SR | S803W-SCL-SR |
|---|---|---|---|
| Rated ultimate short-circuit breaking capacity | | | |
| **Icu = Ics according to IEC 60947-2** | | | |
| (AC) 50/60 Hz 240/415 V | [kA] | 100 | 100 |
| (AC) 50/60 Hz 254/440 V | [kA] | 100 | 100 |
| (AC) 50/60 Hz 277/480 V | [kA] | 65 | 65 |
| (AC) 50/60 Hz 289/500 V | [kA] | 65 | 65 |
| (AC) 50/60 Hz 346/600 V | [kA] | 65 | 65 |
| (AC) 50/60 Hz 400/690 V | [kA] | 50 | 50 |
| **Short-circuit rating according to UL 508, CSA 22.2** | | | |
| (AC) 50/60 Hz 480 V | [kA] | | 65 |
| (AC) 50/60 Hz 600 V | [kA] | | 65 |

## Coordination

| Type | 230 V AC | | | | | | 400 V AC | | | | | | 440 V AC | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Fuse | | Current Limiter | | | | Fuse | | Current Limiter | | | | Fuse | | Current Limiter | |
| | $I_{cs}$ kA | $I_{cu}$ kA | gG, kA | aM A | S803x-SCL-SR kA | A | $I_{cs}$ kA | $I_{cu}$ kA | gG, kA | aM A | S803x-SCL-SR kA | A | $I_{cs}$ kA | $I_{cu}$ kA | gG, kA | aM A | S803x-SCL-SR kA | A |
| MS132-0.16 | | | | | | | | | | | | | | | | | | |
| MS132-0.25 | | | | | | | | | | | | | | | | | | |
| MS132-0.4 | | | | | | | | | | | | | | | | | | |
| MS132-0.63 | | | | | | | | | | | | | | | | | | |
| MS132-1.0 | No back-up required | | | | | | No back-up required | | | | | | No back-up required | | | | | |
| MS132-1.6 | | | | | | | | | | | | | | | | | | |
| MS132-2.5 | | | | | | | | | | | | | | | | | | |
| MS132-4.0 | | | | | | | | | | | | | 20 | 20 | 100 | 63 | 100 | 32,63,100 |
| MS132-6.3 | | | | | | | | | | | | | 20 | 20 | 100 | 100 | 100 | 32,63,100 |
| MS132-10 | | | | | | | | | | | | | 20 | 20 | 100 | 100 | 100 | 32,63,100 |
| MS132-12 | | | | | | | | | | | | | 20 | 20 | 100 | 125 | 100 | 32,63,100 |
| MS132-16 | | | | | | | | | | | | | 20 | 20 | 100 | 125 | 100 | 32,63,100 |
| MS132-20 | | | | | | | | | | | | | 20 | 20 | 100 | 125 | 100 | 32,63,100 |
| MS132-25 | 50 | 50 | 100 | 125 | 100 | 63,100 | 50 | 50 | 100 | 125 | 100 | 63,100 | 20 | 20 | 100 | 125 | 100 | 63,100 |
| MS132-32 | 25 | 50 | 100 | 125 | 100 | 63,100 | 25 | 50 | 100 | 125 | 100 | 63,100 | 20 | 20 | 100 | 125 | 100 | 63,100 |

| Type | 500 V AC | | | | | | 690 V AC | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Fuse | | Current Limiter | | | | Fuse | | Current Limiter | |
| | $I_{cs}$ kA | $I_{cu}$ kA | gG, kA | aM A | S803x-SCL-SR kA | A | $I_{cs}$ kA | $I_{cu}$ kA | gG, kA | aM A | S803x-SCL-SR kA | A |
| MS132-0.16 | | | | | | | | | | | | |
| MS132-0.25 | | | | | | | | | | | | |
| MS132-0.4 | | | | | | | | | | | | |
| MS132-0.63 | | | | | | | | | | | | |
| MS132-1.0 | No back-up required | | | | | | No back-up required | | | | | |
| MS132-1.6 | | | | | | | | | | | | |
| MS132-2.5 | 20 | 20 | 100 | 35 | 65* | 32, 63,100 | 3 | 3 | 80 | 35 | 50** | 32, 63,100 |
| MS132-4.0 | 20 | 20 | 100 | 63 | 65* | 32, 63,100 | 3 | 3 | 80 | 63 | 50** | 32, 63,100 |
| MS132-6.3 | 20 | 20 | 100 | 100 | 65* | 32, 63,100 | 3 | 3 | 80 | 100 | 50** | 32, 63,100 |
| MS132-10 | 20 | 20 | 100 | 100 | 65* | 32, 63,100 | 3 | 3 | 80 | 100 | 50** | 32, 63,100 |
| MS132-12 | 20 | 20 | 100 | 125 | 65* | 32, 63,100 | 3 | 3 | 80 | 125 | 50** | 32, 63,100 |
| MS132-16 | 20 | 20 | 100 | 125 | 65* | 32, 63,100 | 3 | 3 | 80 | 125 | 50** | 32, 63,100 |
| MS132-20 | 20 | 20 | 100 | 125 | 65* | 32, 63,100 | 3 | 3 | 80 | 125 | 50** | 32, 63,100 |
| MS132-25 | 10 | 10 | 100 | 125 | 65* | 63,100 | 3 | 3 | 80 | 125 | 50** | 63,100 |
| MS132-32 | 10 | 10 | 100 | 125 | 65* | 63,100 | 3 | 3 | 80 | 125 | 50** | 63,100 |

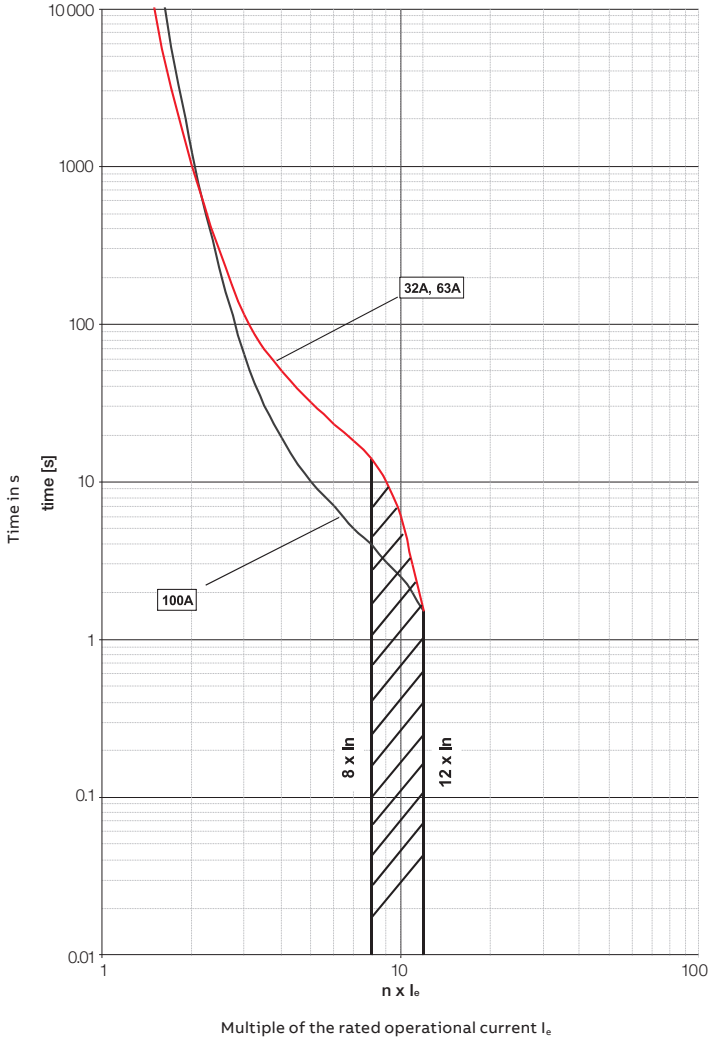
* 100 kA when two current limiters are used in series.
** 80 kA when two current limiters are used in series.

# S800-SCL-SR
## Technical data

### Installation requirements

The total sum of the rated currents of all downstream motor starters or circuit breakers shall not exceed the rated current of the S800-SCL-SR (valid also for HV version). Furthermore the sum of all load currents including inrush currents shall not exceed the maximum permissible load of the S800-SCL-SR (valid also for HV version).

### Maximum load




Multiple of the rated operational current $I_e$



**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**1SBK104235R2000**

# DRAS and DRAF enclosed starters


**DRAS enclosed starter**

**10/**2 Ordering details
**10/**3 Control supply wiring versions
**10/**3 Wiring diagram
**10/**3 Main dimensions
**10/**4 Voltage code table

**DRAF enclosed starter**

**10/**6 Experience reliable and easy to install motor starting
**10/**8 Ordering details
**10/**10 Control supply wiring versions
**10/**10 Wiring diagram
**10/**10 Main dimensions

# DRAS09 ... DRAS16 enclosed direct-on-line starters

## 4 to 7.5 kW, protected by thermal overload relays

## AC or DC operated




DRAS
+ T16 to be ordered separately

Enclosed direct-on-line (DOL) starters are used for controlling 3-phase asynchronous motors up to 690 V AC.

Each starter is delivered assembled and wired. It contains:

- IP65 compact plastic enclosure with double insulation, equipped with:
  - 1 green flush "I" ON button and 1 red protruding "O" OFF/RESET button
  - 2 quarter-turn, quick fastening screws and a base with 6 cable inlets and outlets via knockouts.
- 1 AS or ASL 3-pole contactor with holding contact
- 1 PE and 1 neutral terminal.

3 versions of control supply wiring are available: phase-to-phase, separate supply or phase-to-neutral.

T16 thermal overload relay has to be ordered separately and choses according to motor's nominal current (see table below).

### DRAS, DRASL enclosed DOL starters

| IEC - AC-3 | | | | Rated control circuit voltage Uc Other control voltages see AS voltage code table | | Control supply wiring | Type | Order code | Weight Pkg (1 pce) |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power 220 V 230 V 240 V | 400 V | 500 V | max. current θ ≤ 40 °C Ue=400 V | | | | | | |
| kW | kW | kW | A | V 50/60 Hz | V DC | | | | kg |
| **AC operated with AS 3-pole contactors** | | | | | | | | | |
| 2.2 | 4 | 4 | 9 | 24 | - | Separate supply | DRAS09-20S | 1SBK104235R2000 | 0.650 |
| | | | | 220 | - | Phase-to-neutral | DRAS09-25N | 1SBK104135R2500 | 0.650 |
| | | | | 230 | - | Phase-to-neutral | DRAS09-26N | 1SBK104135R2600 | 0.650 |
| 3 | 5.5 | 5.5 | 12 | 24 | - | Separate supply | DRAS12-20S | 1SBK114235R2000 | 0.650 |
| | | | | 220 | - | Phase-to-neutral | DRAS12-25N | 1SBK114135R2500 | 0.650 |
| | | | | 230 | - | Phase-to-neutral | DRAS12-26N | 1SBK114135R2600 | 0.650 |
| 4 | 7.5 | 7.5 | 15.5 | 24 | - | Separate supply | DRAS16-20S | 1SBK124235R2000 | 0.650 |
| | | | | 220 | - | Phase-to-phase | DRAS16-25N | 1SBK124135R2500 | 0.650 |
| | | | | 230 | - | Phase-to-neutral | DRAS16-26N | 1SBK124135R2600 | 0.650 |
| **DC operated with ASL 3-pole contactors** | | | | | | | | | |
| 2.2 | 4 | 4 | 9 | - | 24 | Separate supply | DRASL09-81S | 1SBK104335R8100 | 0.700 |
| 3 | 5.5 | 5.5 | 12 | - | 24 | Separate supply | DRASL12-81S | 1SBK114335R8100 | 0.700 |
| 4 | 7.5 | 7.5 | 15.5 | - | 24 | Separate supply | DRASL16-81S | 1SBK124335R8100 | 0.700 |




T16

### T16 thermal overload relays to be ordered separately

| Setting range A | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---|---|---|---|---|---|
| 0.10...0.13 | 0.5 A, Fuse type T | 10 | T16-0.13 | 1SAZ711201R1005 | 0.100 |
| 0.13...0.17 | 1.0 A, Fuse type T | | T16-0.17 | 1SAZ711201R1008 | 0.100 |
| 0.17...0.23 | | | T16-0.23 | 1SAZ711201R1009 | 0.100 |
| 0.23...0.31 | | | T16-0.31 | 1SAZ711201R1013 | 0.100 |
| 0.31...0.41 | 2.0 A, Fuse type gG | | T16-0.41 | 1SAZ711201R1014 | 0.100 |
| 0.41...0.55 | | | T16-0.55 | 1SAZ711201R1017 | 0.100 |
| 0.55...0.74 | 4.0 A, Fuse type gG | | T16-0.74 | 1SAZ711201R1021 | 0.100 |
| 0.74...1.00 | 6.0 A, Fuse type gG | | T16-1.0 | 1SAZ711201R1023 | 0.100 |
| 1.00...1.30 | | | T16-1.3 | 1SAZ711201R1025 | 0.100 |
| 1.30...1.70 | 10.0 A, Fuse type gG | | T16-1.7 | 1SAZ711201R1028 | 0.100 |
| 1.70...2.30 | | | T16-2.3 | 1SAZ711201R1031 | 0.100 |
| 2.30...3.10 | | | T16-3.1 | 1SAZ711201R1033 | 0.100 |
| 3.10...4.20 | 20.0 A, Fuse type gG | | T16-4.2 | 1SAZ711201R1035 | 0.100 |
| 4.20...5.70 | | | T16-5.7 | 1SAZ711201R1038 | 0.100 |
| 5.70...7.60 | 35.0 A, Fuse type gG | | T16-7.6 | 1SAZ711201R1040 | 0.100 |
| 7.60...10.0 | | | T16-10 | 1SAZ711201R1043 | 0.104 |
| 10.0...13.0 | 40.0 A, Fuse type gG | | T16-13 | 1SAZ711201R1045 | 0.104 |
| 13.0...16.0 | | | T16-16 | 1SAZ711201R1047 | 0.104 |

### Empty enclosure with push-button

| | | | | | |
|---|---|---|---|---|---|
| - | - | - | FR16AS-12VARS | 1SBN101035R1000 | 0.394 |

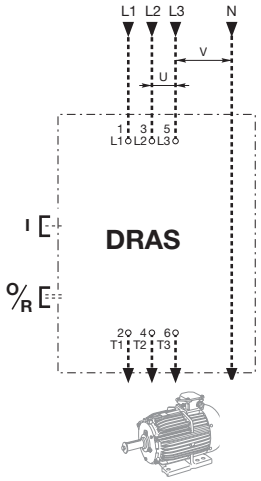
To be completed with AS or ASL contactor, T16 thermal overload relay and MCB-10B (1SFA611610R2001) contact block.




Empty enclosure
with push-button

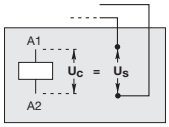
# DRAS09 ... DRAS16 and DRASL09 ... DRASL16 enclosed direct-on-line starters

## Control supply wiring versions



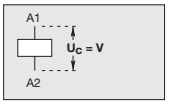

**DRAS..S, DRASL..S**

Separate supply



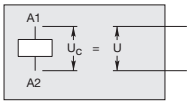

**DRAS..N**

Phase-to-neutral

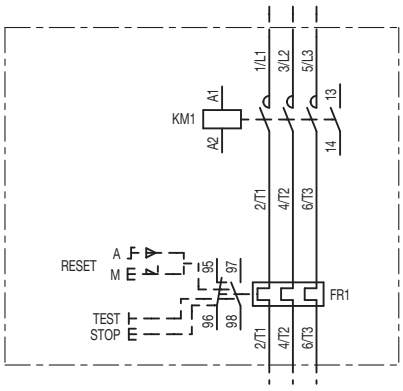



**DRAS..P**

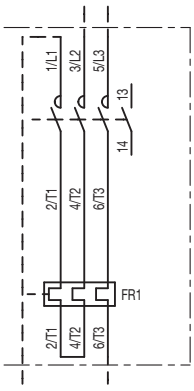
Phase-to-phase



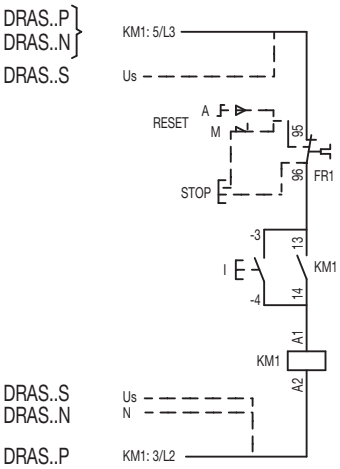

## Wiring diagram



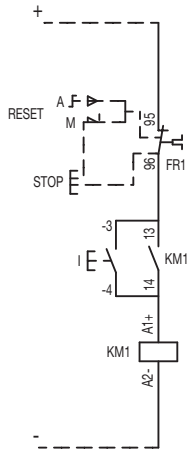

Power circuit



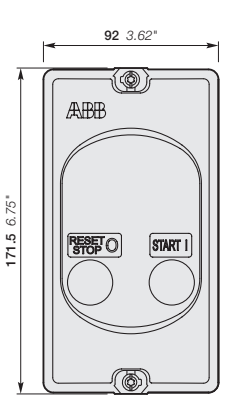

1-phase

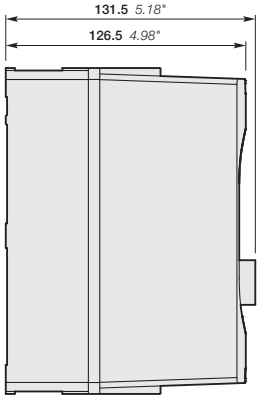


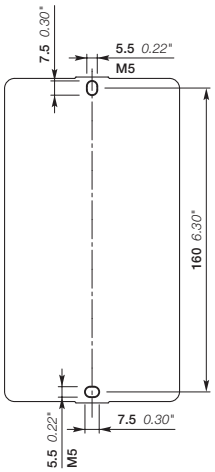

AC local control
DRAS09 ... DRAS16 + T16




DC local control
DRASL09 ... DRASL16..S + T16




DRAS09, DRAS12, DRAS16
DRASL09, DRASL12, DRASL16

Main dimensions mm, inches

| Cable inlets | | Cable outlet |
|---|---|---|
| **Enclosure top** | **Enclosure back** | **Enclosure bottom** |
| 2 x ø 20.5/25.5 mm | 2 x ø 20.5 mm | 2 x ø 20.5/25.5 mm |
| 2 x ø 0.81/1.00" | 2 x ø 0.81" | 2 x ø 0.81/1.00" |

ø 20.5mm - ø 0.81" for ISO M20
ø 25.5mm - ø 1.00" for ISO M25

# Voltage code table

## DRAS09 ... DRAS16 and DRASL09 ... DRASL16 enclosed DOL starters

**Type**

**DR** **AS16** - **26N**

**Contactor type**

| | |
|---|---|
| AS | AC operated |
| ASL | DC operated |

**AS contactors**
**AC coil code**

| | | 50 Hz | 60 Hz |
|---|---|---|---|
| 20 | S | 24 V | 24 V |
| 21 | S | 42 V | 42 V |
| 22 | S | 48 V | 48 V |
| 16 | N | - | 120 V |
| 23 | N | 110 V | 110 V |
| 24 | N | 115 V | 115 V |
| 25 | N | 220 V | 220 V |
| **26** | **N** | **230 V** | **230 V** |
| 27 | N | 240 V | 240 V |
| 13 | P | 380 V | 380 V |
| 17 | P | - | 277 V |
| 28 | P | 400 V | 400 V |
| 29 | P | 415 V | 415 V |

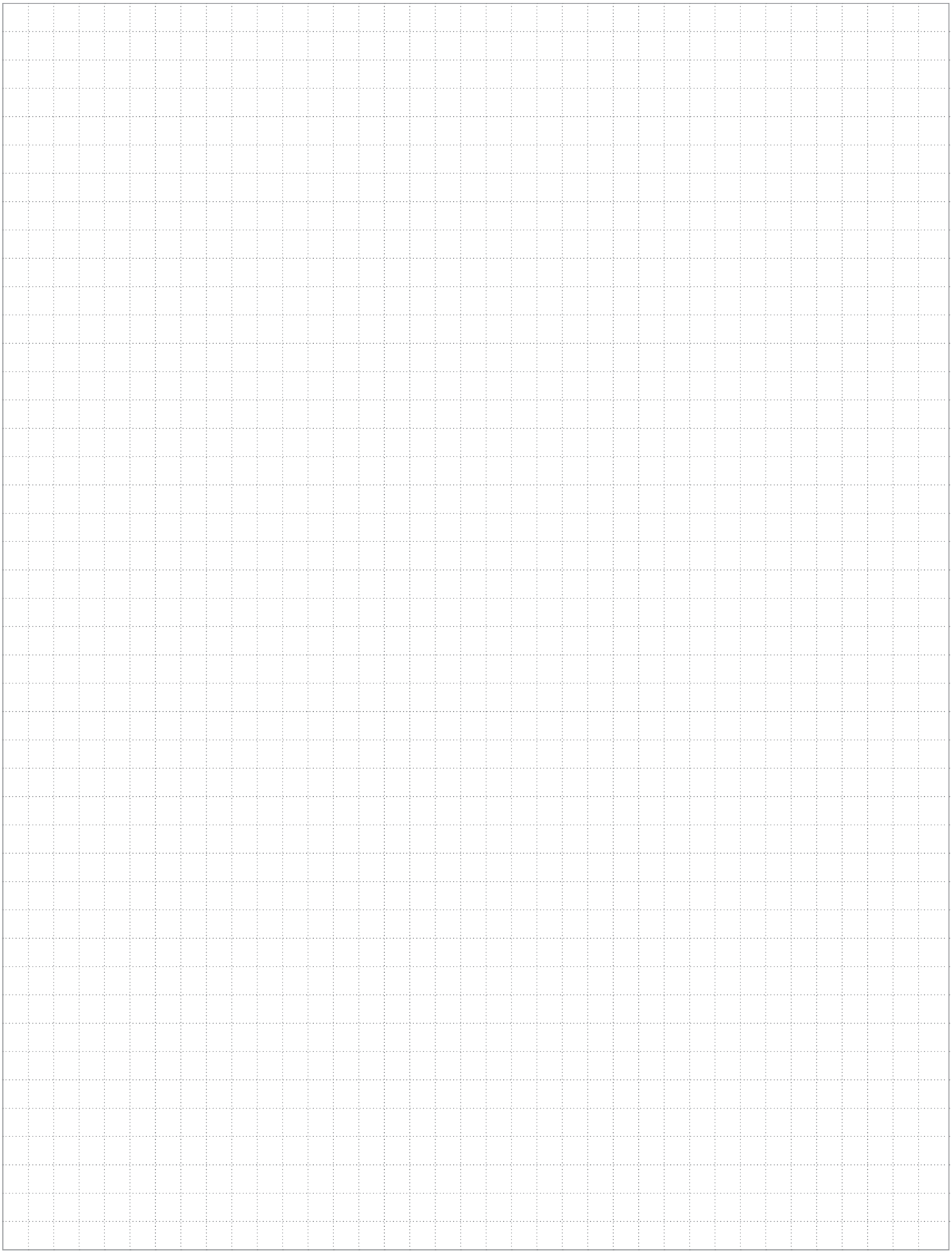
**ASL contactors**
**DC coil code**

| | | |
|---|---|---|
| 81 | S | 24 V |
| 83 | S | 48 V |

**Control supply wiring**

| | |
|---|---|
| S | Separate supply |
| N | Phase-to-neutral |
| P | Phase-to-phase |

# Notes



# DRAF enclosed direct-on-line starters

Experience reliable and easy to install motor starting

## Improve installation efficiency

- Easy to connect and to operate
- Pre-wired control circuit and easy to follow wiring instructions
- Coil energy consumption down by 80%.

## Reliable in harsh condition

- High number of electrical and mechanical operations
- Robust IP66 and type 4X enclosure
- Double electrical insulation.

## Continuous operation

- AF contactors manage voltage fluctuation, chattering free
- Protected motor with thermal overload relay
- Safety through coordinated product.



## For machine or wall mounting

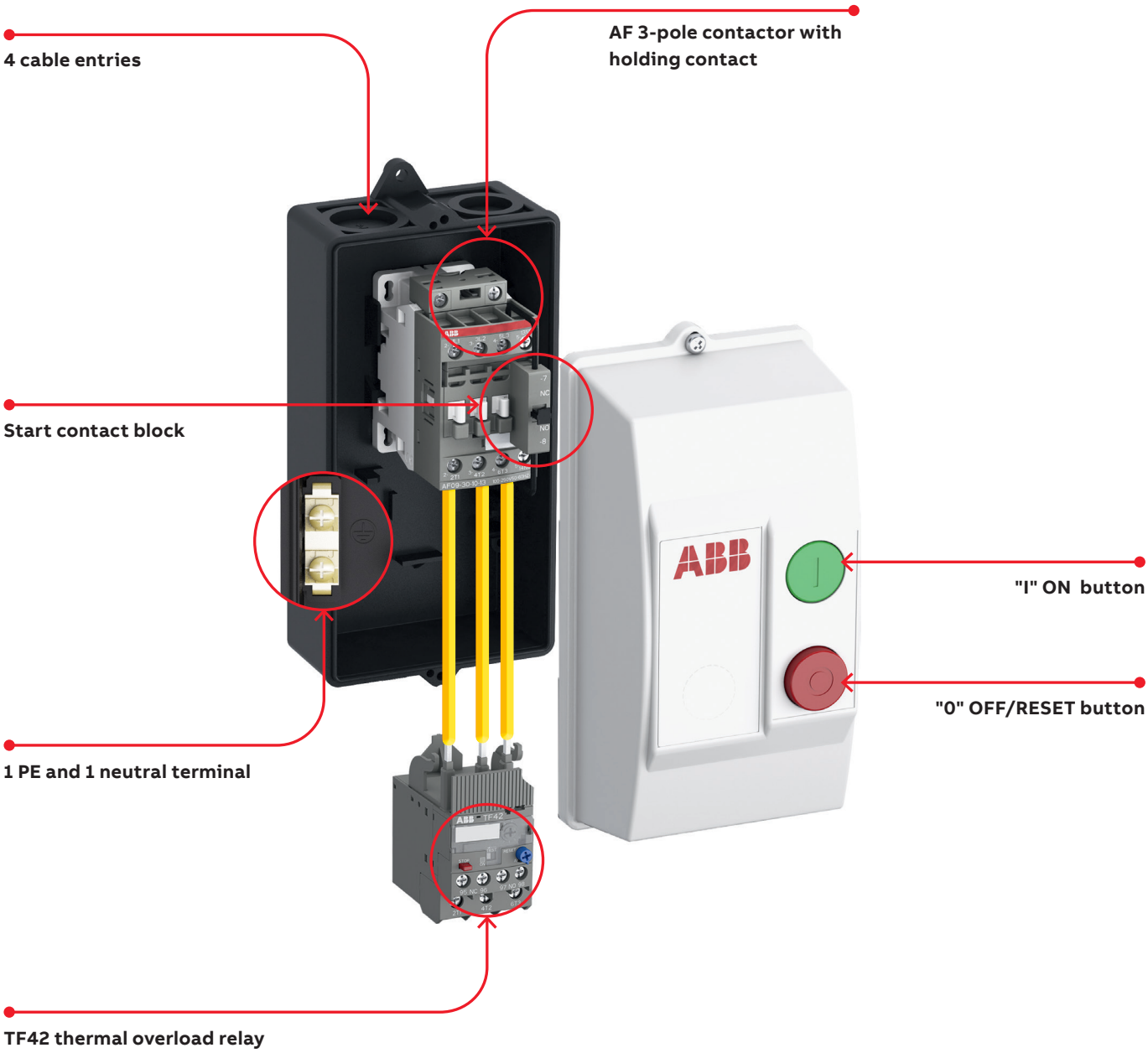
**Main applications**

Control of stand alone motors like for heat pumps, air conditioning units, small machine tools, compressors, pumping, irrigation...



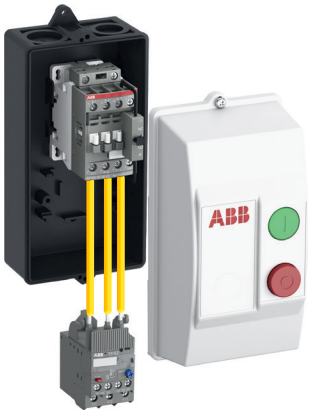


# Motor starting solutions up to 7.5 kW and 10 hp



# DRAF09 ... DRAF16 enclosed direct-on-line starters

## Up to 7.5 kW and 10 hp, protected by thermal overload relays
## AC operated




1SBC133005V0014

DRAF
+ TF42 to be ordered separately

Enclosed direct-on-line (DOL) starters are used for controlling 3-phase asynchronous motors up to 690 V AC.

Each starter is delivered assembled and wired. It contains:

- IP66 and type 4X plastic enclosure with double insulation, equiped with:
  - 1 green flush "I" ON button and 1 red protruding "O" OFF/RESET button
  - 4 cable inlets and outlets via knockouts.
- 1 AF 3-pole contactor with holding contact
- 1 CB5-10 start contact block
- 1 PE and 1 neutral terminal.

**Control supply wiring:**
IEC starters type: phase-to-phase, separate supply or phase-to-neutral.
UL starters type: separate supply.

TF42 thermal overload relay to be ordered separately and choses according to motor's nominal current (see table in the next page).

### DRAF enclosed DOL starters

| IEC - AC-3 | | | | | Control supply wiring | Rated control circuit voltage Uc min ... Uc max (1) | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Rated operational power | | | | max. current θ ≤ 40 °C Ue=400 V | | | | | Pkg (1 pce) |
| 220 V 230 V 240 V | 380 V 400 V | 500 V | 690 V | | | | | | |
| kW | kW | kW | kW | A | | V 50/60 Hz | | | kg |
| **IEC starters type** | | | | | | | | | |
| 2.2 | 4 | 5.5 | 5.5 | 9 | Separate supply | 24...60 | DRAF09-11S | 1SBK134237R1100 | 0.820 |
| | | | | | Phase-to-neutral | 100...250 | DRAF09-13N | 1SBK134137R1300 | 0.820 |
| | | | | | Phase-to-phase | 250...500 | DRAF09-14P | 1SBK134037R1400 | 0.820 |
| 3 | 5.5 | 7.5 | 7.5 | 12 | Separate supply | 24...60 | DRAF12-11S | 1SBK154237R1100 | 0.820 |
| | | | | | Phase-to-neutral | 100...250 | DRAF12-13N | 1SBK154137R1300 | 0.820 |
| | | | | | Phase-to-phase | 250...500 | DRAF12-14P | 1SBK154037R1400 | 0.820 |
| 4 | 7.5 | 9 | 9 | 18 | Separate supply | 24...60 | DRAF16-11S | 1SBK174237R1100 | 0.820 |
| | | | | | Phase-to-neutral | 100...250 | DRAF16-13N | 1SBK174137R1300 | 0.820 |
| | | | | | Phase-to-phase | 250...500 | DRAF16-14P | 1SBK174037R1400 | 0.820 |

(1) Select DRAF..S with separate supply for 24...60 V DC control circuit voltage (change A2 - Us wire to blue color acc. to IEC 60947-4-1).

### UL starter type with separate control supply wiring

| UL / CSA | | | | | | Rated control circuit voltage Uc min ... Uc max | Type | Order code | Weight |
|---|---|---|---|---|---|---|---|---|---|
| Horse power ratings | | | | | | | | | Pkg (1 pce) |
| Single phase motor | | Three phase motor | | | | | | | |
| 120 V | 240 V | 200 V 208 V | 220 V 240 V | 440 V 480 V | 550 V 600 V | | | | |
| hp | hp | hp | hp | hp | hp | V 50/60 Hz | | | kg |
| **UL starters type** | | | | | | | | | |
| 0.75 | 1.5 | 2 | 2 | 5 | 7.5 | 24...60 | DRAF09-11U | 1SBK134238R1100 | 0.820 |
| | | | | | | 100...250 | DRAF09-13U | 1SBK134238R1300 | 0.820 |
| | | | | | | 250...500 | DRAF09-14U | 1SBK134238R1400 | 0.820 |
| 1 | 2 | 3 | 3 | 7.5 | 10 | 24...60 | DRAF12-11U | 1SBK154238R1100 | 0.820 |
| | | | | | | 100...250 | DRAF12-13U | 1SBK154238R1300 | 0.820 |
| | | | | | | 250...500 | DRAF12-14U | 1SBK154238R1400 | 0.820 |
| 1.5 | 3 | 5 | 5 | 10 | 15 | 24...60 | DRAF16-11U | 1SBK174238R1100 | 0.820 |
| | | | | | | 100...250 | DRAF16-13U | 1SBK174238R1300 | 0.820 |
| | | | | | | 250...500 | DRAF16-14U | 1SBK174238R1400 | 0.820 |

# DRAF09 ... DRAF16 enclosed direct-on-line starters

Up to 7.5 kW and 10 hp, protected by thermal overload relays
AC operated




TF42




Empty enclosure
with push-button

## TF42 thermal overload relays to be ordered separately

| Setting range<br>A | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|
| 0.10 ... 0.13 | 0.5 A, Fuse type T | 10 | TF42-0.13 | 1SAZ721201R1005 | 0.130 |
| 0.13 ... 0.17 | 1.0 A, Fuse type T | 10 | TF42-0.17 | 1SAZ721201R1008 | 0.130 |
| 0.17 ... 0.23 | 1.0 A, Fuse type T | 10 | TF42-0.23 | 1SAZ721201R1009 | 0.130 |
| 0.23 ... 0.31 | 1.0 A, Fuse type T | 10 | TF42-0.31 | 1SAZ721201R1013 | 0.130 |
| 0.31 ... 0.41 | 2.0 A, Fuse type gG | 10 | TF42-0.41 | 1SAZ721201R1014 | 0.130 |
| 0.41 ... 0.55 | 2.0 A, Fuse type gG | 10 | TF42-0.55 | 1SAZ721201R1017 | 0.130 |
| 0.55 ... 0.74 | 4.0 A, Fuse type gG | 10 | TF42-0.74 | 1SAZ721201R1021 | 0.130 |
| 0.74 ... 1.00 | 6.0 A, Fuse type gG | 10 | TF42-1.0 | 1SAZ721201R1023 | 0.130 |
| 1.00 ... 1.30 | 6.0 A, Fuse type gG | 10 | TF42-1.3 | 1SAZ721201R1025 | 0.130 |
| 1.30 ... 1.70 | 10.0 A, Fuse type gG | 10 | TF42-1.7 | 1SAZ721201R1028 | 0.130 |
| 1.70 ... 2.30 | 10.0 A, Fuse type gG | 10 | TF42-2.3 | 1SAZ721201R1031 | 0.130 |
| 2.30 ... 3.10 | 10.0 A, Fuse type gG | 10 | TF42-3.1 | 1SAZ721201R1033 | 0.130 |
| 3.10 ... 4.20 | 20.0 A, Fuse type gG | 10 | TF42-4.2 | 1SAZ721201R1035 | 0.130 |
| 4.20 ... 5.70 | 20.0 A, Fuse type gG | 10 | TF42-5.7 | 1SAZ721201R1038 | 0.130 |
| 5.70 ... 7.60 | 35.0 A, Fuse type gG | 10 | TF42-7.6 | 1SAZ721201R1040 | 0.130 |
| 7.60 ... 10.0 | 35.0 A, Fuse type gG | 10 | TF42-10 | 1SAZ721201R1043 | 0.130 |
| 10.0 ... 13.0 | 40.0 A, Fuse type gG | 10 | TF42-13 | 1SAZ721201R1045 | 0.130 |
| 13.0 ... 16.0 | 40.0 A, Fuse type gG | 10 | TF42-16 | 1SAZ721201R1047 | 0.130 |
| 16.0 ... 20.0 | 63.0 A, Fuse type gG | 10 | TF42-20 | 1SAZ721201R1049 | 0.145 |

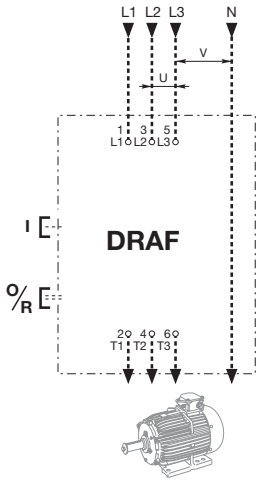
## Empty enclosure with push-button

| | | | | |
|---|---|---|---|---|
| mm cable inlet/outlet suitable for IEC starter types | – | FR16AF-12 | 1SBN101337R1000 | 0.53 |
| Inch cable inlet/outlet suitable for UL starter types | – | FR16AF-12U | 1SBN101338R1000 | 0.53 |

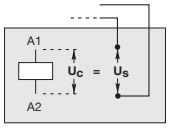
To be completed with AF contactor, TF42 thermal overload relay and CB5-10 (1SBN010013R1010) start contact block.

# DRAF09 ... DRAF16 enclosed direct-on-line starters

## Control supply wiring versions

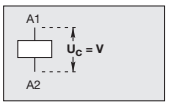



**DRAF..S**
**DRAF..U**
Separate supply



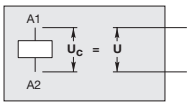

**DRAF..N**

Phase-to-neutral



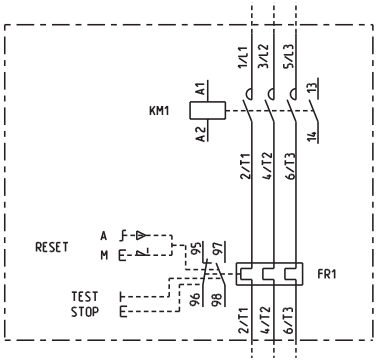

**DRAF..P**

Phase-to-phase

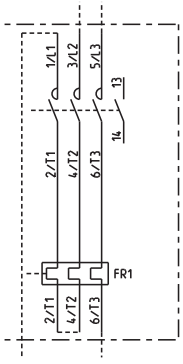



## Wiring diagram

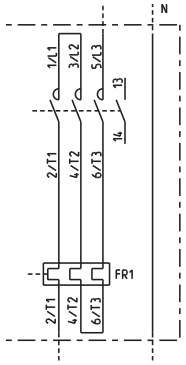
Power circuit




3-phase motor

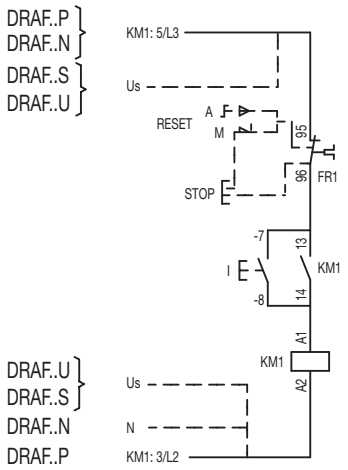


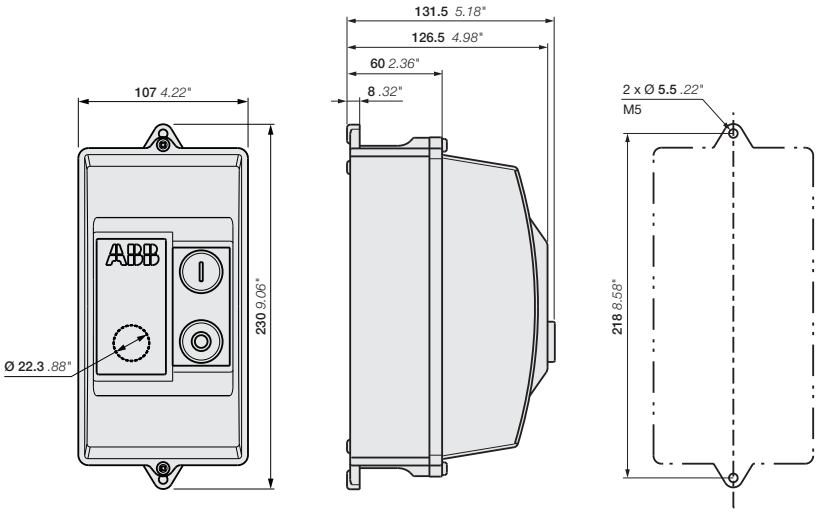

Phase-to-phase
Single phase motor




Phase-to-neutral
Single phase motor

AC local control




DRAF09, DRAF12, DRAF16

Main dimensions mm, inches

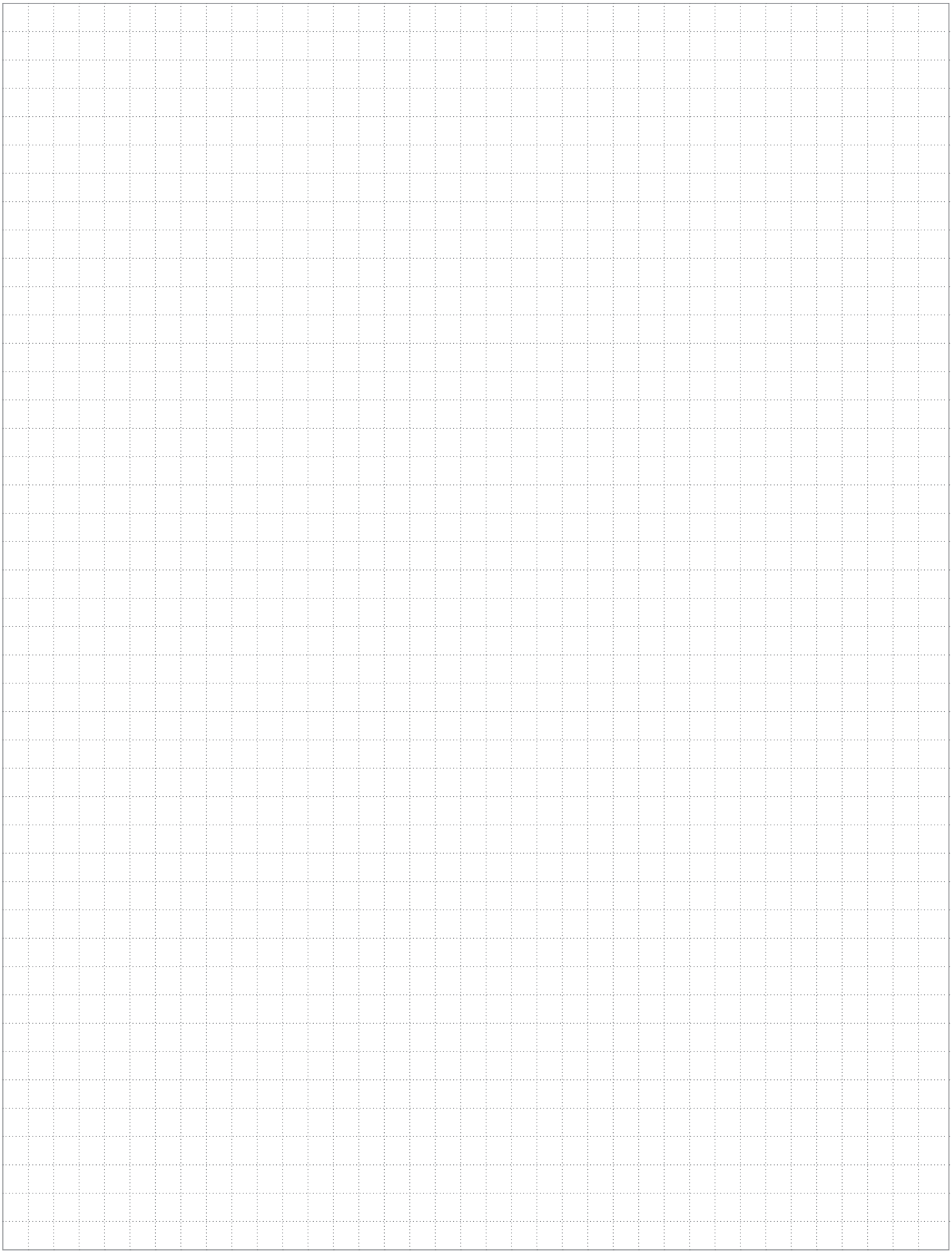
### IEC starter types - ISO M20

| Cable inlet | Cable outlet |
|---|---|
| Enclosure top | Enclosure bottom |
| 2 x ø 20 mm | 2 x ø 20 mm |
| 2 x ø 0.79" | 2 x ø 0.79" |

### UL starter types - NPT

| Cable inlet | Cable outlet |
|---|---|
| Enclosure top | Enclosure bottom |
| 1 x 3/4" | 1 x 3/4" |
| 1 x 1/2" | 1 x 1/2" |

# Notes





**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**1SAT112000R1011**

# Electronic compact starters: HF range


**11/**3 **Overview**

**HF0.6, HF2.4, HF9 electronic compact starters**

**11/**8 Direct-on-line starter

**11/**8 Direct-on-line starter with emergency stop

**11/**9 Reversing starter

**11/**9 Reversing starter with emergency stop

**11/**10 **Technical data**

**11/**15 **Technical diagrams**

# Electronic compact starters: HF range
## A compact solution with great functionality

ABB's electronic compact starter packs more functions into less space. The compact unit is just 22.5 mm wide and is suitable for three-phase motor loads up to 3 kW - 400 V AC. Direct-on-line and reversed starter with overload protection and emergency stop versions are available, making the range a perfect fit for high frequent and reliable long life switching of e.g. paper machines, conveyors, pumps, compressors and machine tools.





### Saving space
**Up to 90% less space required**
ABB's electronic compact starter saves cabinet space, and is especially effective for group mounting. The starter is just 22.5 mm wide and yet still provides motor starting functionalities with motor protection and safety embedded.

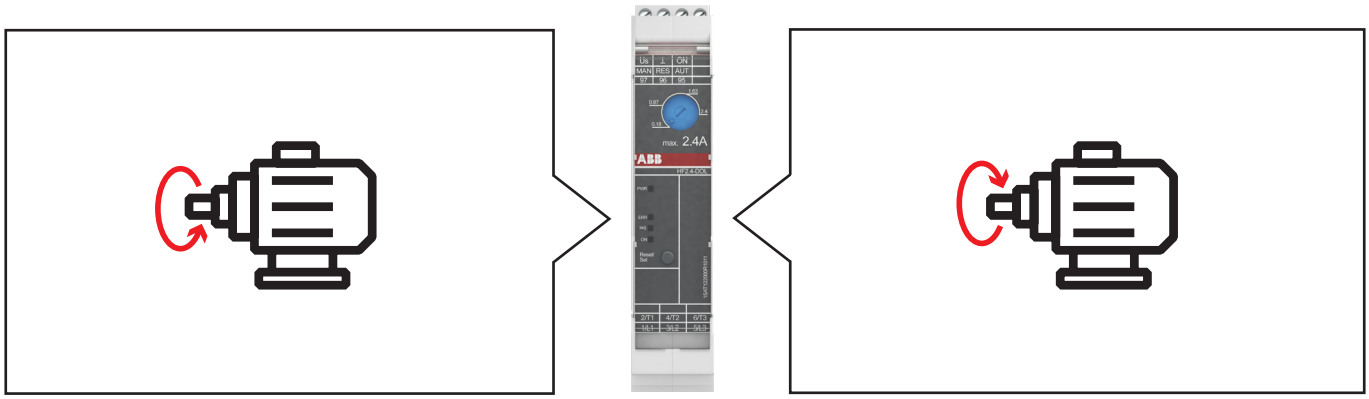
### Safety and protection
**Integrated safety function**
Protect your people with an emergency stop version that complies with SIL 3, PL e safety standards.
Extend the life of your equipment and reduce maintenance costs with service lives that are ten times higher than electromechanical solutions.

### Easy to install
**Up to 75% reduced time in wiring**
Wiring time during installation is cut to a minimum with motor protection, reversing function and emergency stop already integrated in the product. With just one component to install, the risk of wiring errors is lower. Separate overload protection is no longer needed.

# Electronic compact starters
## All-in-one: four functions in one starter

**Direct-on-line**
Start the motor in a forward direction covering most of the strand applications in only 22,5 mm width.

**Reversing capability**
This function allows to start the motor in both directions. This results in avoiding wiring faults and additionally saving time and space.



Direct-on-line and reversing function in only one product

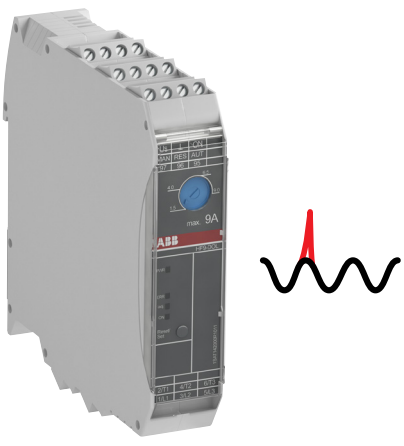


**Emergency stop**

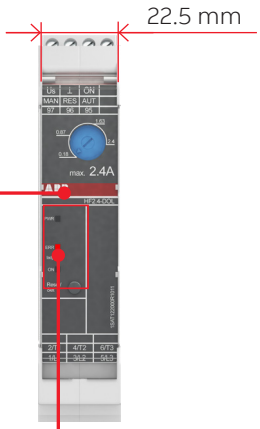
ABB's HF safety range supports safety applications complying to SIL3 and PL e safety level in combination with modular safety relays such as ABB's Sentry SSR10.

**Overload protection**
ABB offers three variants with wide setting ranges, using an electronic relay to protect the motor from overload. Protection against phase asymmetry and phase failure is also integrated.



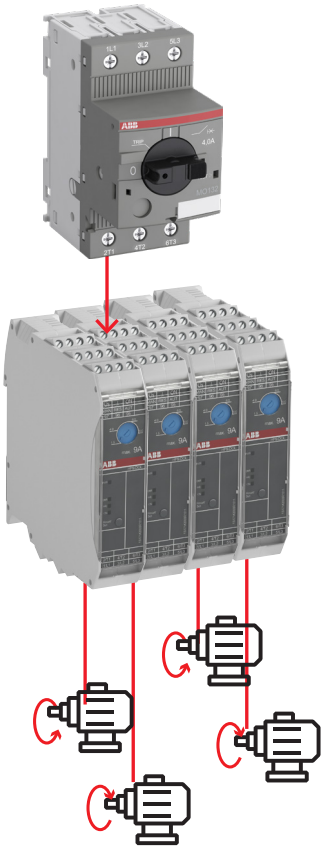
# Electronic compact starters
## Features and benefits




**Space-saving**
Using an HF electronic compact starter saves space, especially when group-mounting units. With a width of just 22.5 mm and high function density, the unit fits any control cabinet. Smaller footprints for more compact systems are also possible.

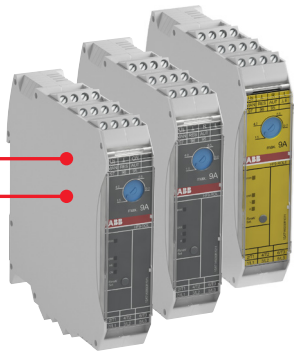
**Reset function**
After the overload function has tripped, the electronic compact starter can be reset automatically, manually or remotely. The LEDs on the device are visualizing that an error has occurred. Additionally, a feedback relay will be activated.



**Group mounting and protection ability**
Combine the HF-Starter with a MO132. Protection against overload is realized with the HF-Starter and the MO132 protects against short-circuit. Maximum space saving for group mounting is guaranteed.

**Less wiring**
The control circuit is placed on the upper side of the device with the main circuit on the underside. The all-in-one functionality reduces wiring, saving time and money – and reducing faults.

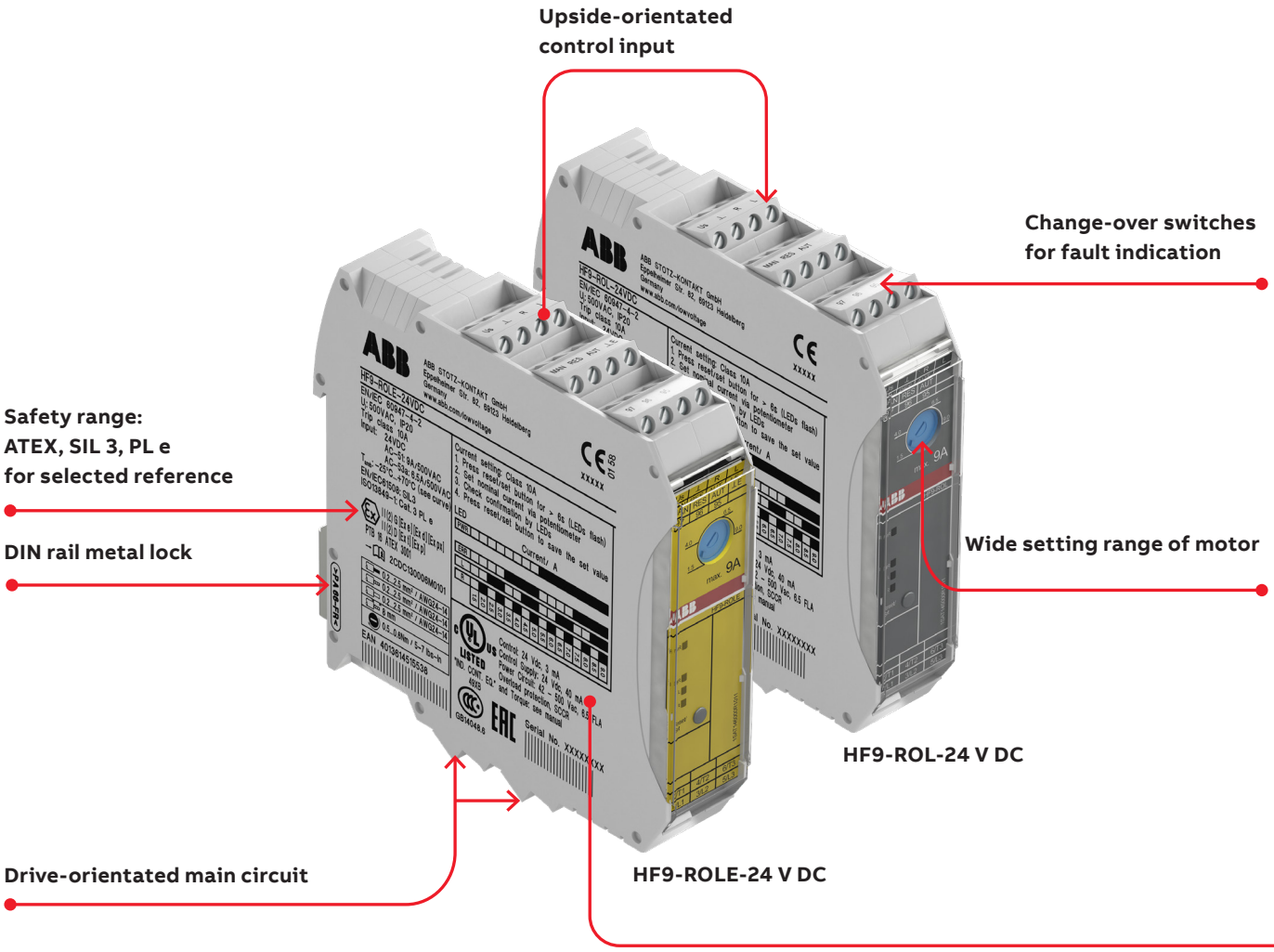


**Longer working life**
ABB's hybrid technology improves durability and reduces power losses. Semiconductors switch on and off the unit and the bypass relays remain active while the motor is running. With a lifespan of 30 million cycles now achievable, maintenance costs are reduced.

## Electronic compact starters

Hybrid technology

Hybrid technology – efficient, durable and compact – is the key feature of this range. Smart use of semiconductors with a bypass relay eliminates the wearing of contact materials. A microcontroller ensures the precise interaction of the components, providing the smoother switching that helps extend its long lifespan.



# Electronic compact starters - HF range

## Hybrid technology

Thanks to laser labeling and fewer connection points compared to conventional solutions, hybrid technology makes wiring easy. The screw connections for both the control and the main circuit have an optimized angle to provide access.

**Only one component for up to four functions leads to shorter wiring time**

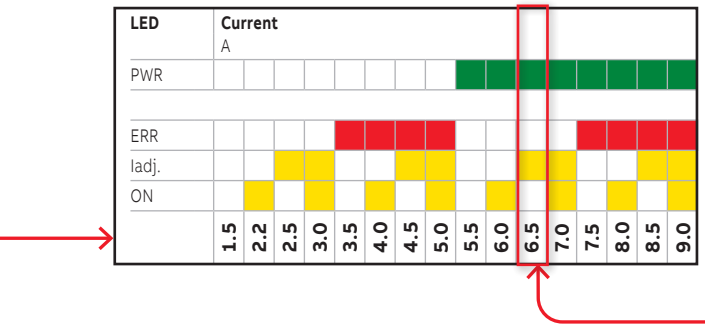
**22.5 mm**

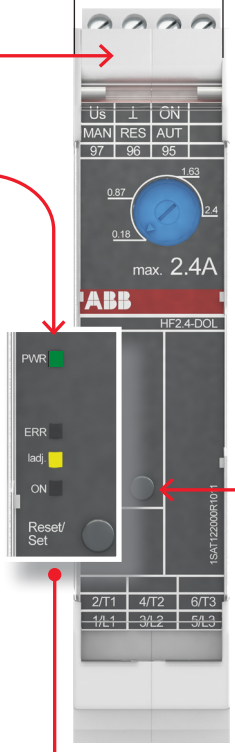
**Group mounting in confined spaces is no problem**

**Easy-to-read starter status with LED indicators: Precise current setting with LED confirmation Users can easily adjust the current and get visual feedback via the LEDs.**

**Reset: direct manual reset of device with button, convenient remote or automatic reset after thermal trip**

**For example, if 6.5 A is set, the LED's on the front side confirm the selection:**




HF2.4-DOL-24 V DC

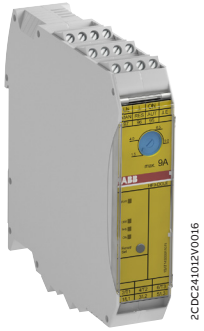
Note: PWR: Control supply voltage, ERR : Error/Message, Iadj.: Current setting, ON: Motor is running

# HF0.6, HF2.4, HF9 electronic compact starters

## Direct-on-line starter




HF9-DOL-24VDC



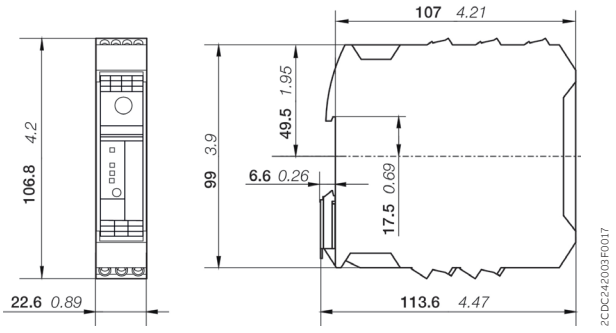

HF9-DOLE-24VDC

The HF-DOL-range is used for the direct-on-line start of motors and the switching of non-resistive loads. With contactor and overload relay functionalities integrated into one device, the results are faster wiring times and fewer faults. The range covers 0.6 A, 2.4 A and up to 9 A - for motors up to 3 kW – 400 V AC. The integrated electronic overload protection with tripping class 10A has a wide setting range that enables just three models to cover all requirements. The control supply voltage is 24 V DC. For the control and main connection points ABB offers screw connections.

ABB also offers a HF-DOLE safety range with emergency stop function. This offers Safety Integrity Level 3, in accordance with functional safety standard IEC 61508-1 and Performance Level 'e' in accordance with ISO 13849-1 all in combination with a safety relay like ABB's Sentry SSR10. The safety range is ATEX-certified.

| Rated operational current AC-53a<br>A | Rated operational power AC-53a<br>kW | Rated operational current AC-51<br>A | Setting range<br>A | Full load amps motor use<br>A | Type | Order code | Weight (1 pce)<br>kg |
|---|---|---|---|---|---|---|---|
| **Direct-on-line starter with overload protection** | | | | | | | |
| 0.6 | 0.18 (400V) | 0.6 | 0.075 ... 0.6 | 0.6 | HF0.6-DOL-24VDC | 1SAT112000R1011 | 0.205 |
| 2.4 | 0.75 (400V) | 2.4 | 0.18 ... 2.4 | 2.4 | HF2.4-DOL-24VDC | 1SAT122000R1011 | 0.218 |
| 6.5 | 3.00 (400V) | 9.0 | 1.5 ... 9.0 | 6.5 | HF9-DOL-24VDC | 1SAT142000R1011 | 0.206 |
| **Direct-on-line starter with overload protection and emergency stop** | | | | | | | |
| 0.6 | 0.18 (400V) | 0.6 | 0.075 ... 0.6 | 0.6 | HF0.6-DOLE-24VDC | 1SAT113000R1011 | 0.205 |
| 2.4 | 0.75 (400V) | 2.4 | 0.18 ... 2.4 | 2.4 | HF2.4-DOLE-24VDC | 1SAT123000R1011 | 0.218 |
| 6.5 | 3.00 (400V) | 9.0 | 1.5 ... 9.0 | 6.5 | HF9-DOLE-24VDC | 1SAT143000R1011 | 0.206 |

### Main dimensions mm, inches




HF0.6, HF2.4, HF9

# HF0.6, HF2.4, HF9 electronic compact starters

## Reversing starter




HF9-ROL-24VDC



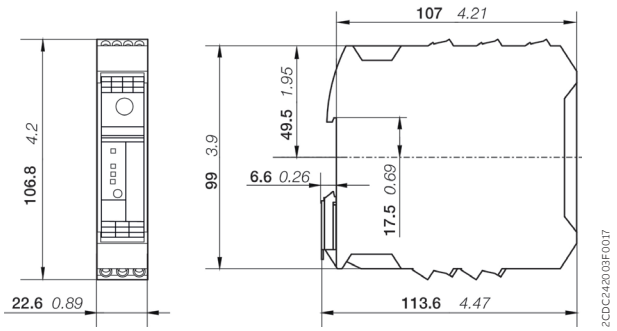

HF9-ROLE-24VDC

The HF-ROL-range is used for forward and reverse running motors, as well as for switching non resistive loads. With contactor and overload relay functionalities integrated into one device, the results are faster wiring times and fewer faults. The range covers 0.6 A, 2.4 A and up to 9 A - for motors up to 3 kW – 400 V AC. The integrated electronic overload protection with tripping class 10A has a wide setting range that enables just three models to cover all requirements. The control supply voltage is 24 V DC. For the control and main connection points ABB offers screw connections.

ABB also offers a HF-ROLE safety range with emergency stop function. This offers Safety Integrity Level 3, in accordance with functional safety standard IEC 61508-1 and Performance Level 'e' in accordance with ISO 13849-1 all in combination with a safety relay like ABB's Sentry SSR10. The safety range is ATEX-certified.

| Rated operational current AC-53a | Rated operational power AC-53a | Rated operational current AC-51 | Setting range | Full load amps motor use | Type | Order code | Weight (1 pce) |
|---|---|---|---|---|---|---|---|
| A | kW | A | A | A | | | kg |
| **Reversing starter with overload protection** | | | | | | | |
| 0.6 | 0.18 (400V) | 0.6 | 0.075 ... 0.6 | 0.6 | HF0.6-ROL-24VDC | 1SAT115000R1011 | 0.217 |
| 2.4 | 0.75 (400V) | 2.4 | 0.18 ... 2.4 | 2.4 | HF2.4-ROL-24VDC | 1SAT125000R1011 | 0.219 |
| 6.5 | 3.00 (400V) | 9.0 | 1.5 ... 9.0 | 6.5 | HF9-ROL-24VDC | 1SAT145000R1011 | 0.218 |
| **Reversing starter with overload protection and emergency stop** | | | | | | | |
| 0.6 | 0.18 (400V) | 0.6 | 0.075 ... 0.6 | 0.6 | HF0.6-ROLE-24VDC | 1SAT116000R1011 | 0.218 |
| 2.4 | 0.75 (400V) | 2.4 | 0.18 ... 2.4 | 2.4 | HF2.4-ROLE-24VDC | 1SAT126000R1011 | 0.270 |
| 6.5 | 3.00 (400V) | 9.0 | 1.5 ... 9.0 | 6.5 | HF9-ROLE-24VDC | 1SAT146000R1011 | 0.289 |

### Main dimensions mm, inches




HF0.6, HF2.4, HF9

# HF0.6, HF2.4, HF9 electronic compact starters

## Technical data

### Main circuit – Utilization characteristics according to IEC/EN

| Type | | HF-DOL/ROL | HF-DOLE/ROLE |
|---|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-2 | IEC/EN 60947-1, IEC/EN 60947-4-2, IEC/EN 61508, IS0 13849 |
| Rated operational voltage Ue | | 500 V AC | |
| Operational voltage | Minimum | 42 V AC, | |
| | Maximum | 550 V AC | |
| Setting range | | see ordering details | |
| Rated frequency | | 50/60 Hz | |
| Trip class | | 10A | |
| Number of poles | | 3 | |
| Number of protected poles | | 3 | |
| Mechanical durability | | 10000 cycles | |
| Electrical durability | | 30 Mio. cycles | |
| Rated impulse withstand voltage Uimp | | 6 kV | |
| Rated insulation voltage Ui | | 500 V | |
| Rated operational current Ie AC-51 | | see ordering details | |
| Rated operational current Ie AC-53a | | see ordering details | |
| Rated uninterrupted current Iu | | see ordering details, Rated operational current Ie | |
| Overvoltage category | | III | |
| Delay time | Off, minimum, switched off with pushbutton | 1 s | 1 s |
| | Off, maximum, switched off with pushbutton | 3 s | 3 s |
| | Off, typical, switched off via control input voltage | 30 ms | 30 ms |
| | Off, maximum, switched off via control input voltage | - | HF0.6, HF2.4: 60 ms<br>HF9: 80 ms |
| | Off, typical, switched off via supply voltage | 25 ms | 25 ms |
| | Off, maximum, switched off via supply voltage | - | 500 ms |
| Switch off time | By phase failure | 1.8 s | 1.8 s |
| | By phase asymmetry at 33% | 120 s | 120 s |
| | By phase asymmetry at 67% | 1.8 s | 1.8 s |
| Overspeed tripping | Operating threshold | HF9-DOL/ROL/DOLE/ROLE: >45 A | |
| | Response time | HF9-DOL/ROL/DOLE/ROLE: 2 s | |
| Power loss | Minimum | 1.1 W | |
| | Maximum | HF0.6: 1.5 W<br>HF2.4: 3.3 W<br>HF9: 14.6 W | |
| Switching frequency | | ≤ 2 Hz; 120 starts/min; 7200 starts/h | |
| Overvoltage category | | III | |

### Short circuit protection with MO132 for single mounting, IEC Type 1, 500 V AC, 35 kA, 50 Hz, AC-53a, EN/IEC 60947-4-2

| Rated motor power | Rated motor current | Starter Type | Protection type | HF-Starter | Current setting range of HF-Starter | Max. allowed setting current for AC-53a |
|---|---|---|---|---|---|---|
| kW | A | | | | A | A |
| 0.18 | 0.48 | DOL, ROL, DOLE, ROLE (1) | MO132-0.63 | HF0.6 | 0.075 - 0.6 | 0.6 |
| 1.1 | 2.2 | DOL, ROL, DOLE, ROLE (1) | MO132-2.5 | HF2.4 | 0.18 - 2.4 | 2.4 |
| 3.0 | 5.2 | DOL, ROL, DOLE, ROLE (1) | MO132-6.3 | HF9 | 1.5 - 9 (1) | 6.5 |

(1) HF9 is able to switch 9A in AC-51, 6.5A in AC-53a.

### Short circuit protection with MO132 for single mounting, IEC Type 1, 415 V AC, 70 kA, 50 Hz, AC-53a, EN/IEC 60947-4-2

| Rated motor power | Rated motor current | Starter Type | Protection type | HF-Starter | Current setting range of HF-Starter | Max. allowed setting current for AC-53a |
|---|---|---|---|---|---|---|
| kW | A | | | | A | A |
| 0.18 | 0.58 | DOL, ROL, DOLE, ROLE (1) | MO132-0.63 | HF0.6 | 0.075 - 0.6 | 0.6 |
| 0.75 | 1.8 | DOL, ROL, DOLE, ROLE (1) | MO132-2.5 | HF2.4 | 0.18 - 2.4 | 2.4 |
| 3.0 | 6.3 | DOL, ROL, DOLE, ROLE (1) | MO132-6.3 | HF9 | 1.5 - 9 (1) | 6.5 |

(1) HF9 is able to switch 9A in AC-51, 6.5A in AC-53a

# HF0.6, HF2.4, HF9 electronic compact starters

Technical data

### Short circuit protection with MO132 for group mounting, IEC Type 1, 500 V AC, EN/IEC 60947-4-2

| Max. sum of current of HF-Starter in group | Iq<br>kA | HF-Starter Type | SCPD<br>A |
|---|---|---|---|
| 6.5 | 35 | DOL, ROL, DOLE, ROLE (1) | MO132-6.3 |
| 10 | 3 | | MO132-10 |
| 12 | 3 | | MO132-12 |
| 16 | 3 | | MO132-16 |
| 20 | 3 | | MO132-20 |
| 25 | 3 | | MO132-25 |
| 32 | 3 | | MO132-32 |

(1) HF9 is able to switch 9A in AC-51, 6.5A in AC-53a

### Short circuit protection with MO132 for group mounting, IEC Type 1, 415 V AC, EN/IEC 60947-4-2

| Max. sum of current of HF-Starter in group | Iq<br>kA | HF-Starter Type | SCPD<br>A |
|---|---|---|---|
| 6.5 | 70 | DOL, ROL, DOLE, ROLE (1) | MO132-6.3 |
| 10 | 35 | | MO132-10 |
| 12 | 3 | | MO132-12 |
| 16 | 3 | | MO132-16 |
| 20 | 3 | | MO132-20 |
| 25 | 3 | | MO132-25 |
| 32 | 3 | | MO132-32 |

(1) HF9 is able to switch 9A in AC-51, 6.5A in AC-53a

### Single mounting fused design, IEC Type 1, 500 V AC, 35 kA, 50 Hz, AC-53a, EN/IEC 60947-4-2

| Rated motor power<br>kW | Rated motor current<br>A | Starter Type | Protection type | HF-Starter | Current setting range of HF-Starter<br>A | Max. allowed setting current for AC-53a<br>A |
|---|---|---|---|---|---|---|
| 0.18 | 0.48 | DOL, ROL, DOLE, ROLE (1) | Fuse 25A gG | HF0.6 | 0.075 - 0.6 | 0.6 |
| 1.1 | 2.2 | DOL, ROL, DOLE, ROLE (1) | Fuse 25A gG | HF2.4 | 0.18 - 2.4 | 2.4 |
| 3.0 | 5.2 | DOL, ROL, DOLE, ROLE, R (1) | Fuse 25A gG | HF9 | 1.5 - 91) | 6.5 |

(1) HF9 variants can switch 6.5A in utilization category AC-53a and 9A in AC-51.

### Single mounting fused design, IEC Type 1, 415 V AC, 50 kA, 50 Hz, AC-53a, EN/IEC 60947-4-2

| Rated motor power<br>kW | Rated motor current<br>A | Starter Type | Protection type | HF-Starter | Current setting range of HF-Starter<br>A | Max. allowed setting current for AC-53a<br>A |
|---|---|---|---|---|---|---|
| 0.18 | 0.58 | DOL, ROL, DOLE, ROLE (1) | Fuse 25A gG | HF0.6 | 0.075 - 0.6 | 0.6 |
| 0.75 | 1.8 | DOL, ROL, DOLE, ROLE (1) | Fuse 25A gG | HF2.4 | 0.18 - 2.4 | 2.4 |
| 3.0 | 6.3 | DOL, ROL, DOLE, ROLE (1) | Fuse 25A gG | HF9 | 1.5 - 91) | 6.5 |

(1) HF9 variants can switch 6.5A in utilization category AC-53a and 9A in AC-51.

### Group mounting fused design, IEC Type 1, 500 V AC, 35 kA, 50 Hz, AC-53a, EN/IEC 60947-4-2

| Iq<br>kA | SCPD | Max. sum of current of used devices<br>A | HF-Starter |
|---|---|---|---|
| 35 | Fuse 25A gG | 25 | HF0.6 |
| 35 | Fuse 25A gG | 25 | HF2.4 |
| 35 | Fuse 25A gG | 25 | HF9 |

### Group mounting fused design, IEC Type 1, 415 V AC, 50 kA, 50 Hz, AC-53a, EN/IEC 60947-4-2

| Iq<br>kA | SCPD | Max. sum of current of used devices<br>A | HF-Starter |
|---|---|---|---|
| 50 | Fuse 25A gG | 25 | HF0.6 |
| 50 | Fuse 25A gG | 25 | HF2.4 |
| 50 | Fuse 25A gG | 25 | HF9 |

# HF0.6, HF2.4, HF9 electronic compact starters
Technical data

### Main circuit – Utilization characteristics according to UL/CSA

| Type | | HF |
|---|---|---|
| Standards | | UL 60947-1; UL 60947-4-2 |
| Rated operational voltage | | 500 V AC |
| Operational voltage | Minimum | 42 V AC |
| | Maximum | 550 V AC |
| Ampere Rating UL/CSA | | see ordering details, Full load amps motor use |
| Horse power rating | Nominal switching performance full load (power factor = 0.4) | HF0.6: 0.4 hp<br>HF2.4: 1.2 hp<br>HF9: 3.0 hp |
| | Nominal switching performance full load (power factor = 0.8) | HF0.6: 0.6 hp<br>HF2.4: 2.2 hp<br>HF9: 6.1 hp |
| Full loads Amps (FLA) | | see ordering details |
| Short-circuit current rating (SCCR) (500 V AC, 30 A Class J or CC) | | 100 kA |

### General technical data

| Type | | HF |
|---|---|---|
| Utilization category | | AC51, AC53a |
| Pollution degree | | 2 |
| Phase loss sensitive | | Yes |
| Ambient air temperature | Operation | -25 ... + 70 °C |
| | Operation compensated | -40 ... + 80 °C |
| Mounting position | | Position 1, load side bottom |
| Mounting in DIN Rail | | TH35-15 (35 x 15 mm Mounting Rail) acc. to IEC 60715,<br>TH35-7.5 (35 x 7.5 mm Mounting Rail) acc. to IEC 60715 |
| Degree of protection | Housing | IP20 |
| | Main circuit terminals | IP20 |

### Control circuit

| Type | | HF |
|---|---|---|
| Rated control circuit voltage Uc | | 24 V DC |
| Input voltage Uin | Switching Threshold at Signal <0> | -3 ... 9.6 V |
| | Switching Threshold at Signal <1> | 19.2 ... 30 V |
| Input current Ic | | 3 mA |

### Supply circuit

| Type | HF |
|---|---|
| Rated control supply voltage Us | 24 V DC |
| Control supply voltage | 19.2 ... 30 V DC |
| Rated control supply current Is | 0.04 A |

### Single and group mounting HF-Starter, Type 1 coordination with fuse class J or CC according to UL60947-1/-4-1

| HF-Starter | FLA<br>A / V AC | Iq<br>kA | SCPD | Max. current<br>A | Max. Voltage<br>V AC |
|---|---|---|---|---|---|
| HF0.6 | 0.6 / 500 | 100 | Fuse class J or CC | 30 | 480 |
| HF2.4 | 2.4 / 500 | 100 | Fuse class J or CC | 30 | 480 |
| HF9 | 6.5 / 500 | 100 | Fuse class J or CC | 30 | 480 |

### Single and group mounting HF-Starter, Type 1 coordination with fuse RK 5 according to UL60947-1/-4-1

| HF-Starter | FLA<br>A / V AC | Iq<br>kA | SCPD | Max. current<br>A | Max. Voltage<br>V AC |
|---|---|---|---|---|---|
| HF0.6 | 0.6 / 500 | 5 | Fuse RK 5 | 20 | 480 |
| HF2.4 | 2.4 / 500 | 5 | Fuse RK 5 | 20 | 480 |
| HF9 | 6.5 / 500 | 5 | Fuse RK 5 | 20 | 480 |

# HF0.6, HF2.4, HF9 electronic compact starters
Technical data

## Safety related data

| Type | | **HF-DOLE/ROLE** |
|---|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-2, IEC/EN 61508, IS0 13849 |
| Safe shut down for ambient temperature 40°C ... 60°C | | |
| Safety integrity level acc. to IEC 61508-1 | | SIL 3 |
| Performance level | | Up to e |
| Mean time to failure (MTTF) acc. to IEC60050-191-12-07 | | DOLE: 43 years<br>ROLE: 39.3 years |
| Mean time to dangerous failure, motor protection | | 447 years |
| Mean time to dangerous failure, safe shutdown | | DOLE: 518 years<br>ROLE: 517 years |
| Failure in time | Safe, detectabled λsd | DOLE: 543 FIT<br>ROLE: 664 FIT |
| | Safe, undetectable λsu | DOLE: 852 FIT<br>ROLE: 968 FIT |
| | Dangerous, detectable λdd | 218 FIT |
| | Dangerous, undetectable λdu | DOLE: 2.4 FIT<br>ROLE: 2.67 FIT |
| Safe failure fraction (SFF) | | DOLE: 99.85%<br>ROLE: 99.86% |
| Diagnostic coverage (DC) | | DOLE: 98.91%<br>ROLE: 98.79% |
| Probability of dangerous failure per hour (PFH) | | DOLE: 2.4<br>ROLE: 2.67 |
| Motor overload protection for ambient temperature 40°C ... 60°C | | |
| Safety integrity level acc. to IEC 61508-1 | | SIL 3 |
| Performance level | | Up to e |
| Mean time to failure (MTTF) acc. to IEC60050-191-12-07 | | DOLE: 43 years<br>ROLE: 39.3 years |
| Mean time to dangerous failure, safe shutdown | | DOLE: 518 years<br>ROLE: 517 years |
| Failure in time | Safe, detectabled | DOLE: 517 FIT<br>ROLE: 637 FIT |
| | Safe, undetectable | DOLE: 809 FIT<br>ROLE: 870 FIT |
| | Dangerous, detectable | 239 FIT |
| | Dangerous, undetectable | 17 FIT |
| Safe failure fraction (SFF) | | DOLE: 98.92%<br>ROLE: 99.03% |
| Diagnostic coverage | | DOLE: 98.91%<br>ROLE: 98.79% |

# HF0.6, HF2.4, HF9 electronic compact starters
Technical data

## Connecting characteristics

### Main circuit

| Type | | | HF |
|---|---|---|---|
| Connecting capacity | | | |
| | Rigid | 1 x | 2 ... 2.5 mm² |
| | Flexible | 1 x | 2 ... 2.5 mm² |
| | Flexible with ferrule | 1 x | 2 ... 2.5 mm² |
| Connecting capacity acc. to UL/CSA | | | |
| | Rigid | 1 x | 24 ... 14 AWG |
| | Flexible | 1 x | 24 ... 14 AWG |
| | Flexible with ferrule | 1 x | 24 ... 14 AWG |
| Stripping length | | | 8 mm |
| Tightening torque | | | 0.5 ... 0.6 N·m |
| Tightening torque UL/CSA | | | 5 ... 7 in·lb |
| Terminal type | | | Screw terminals |
| Recommended screw driver | | | M3 |

### Control circuit

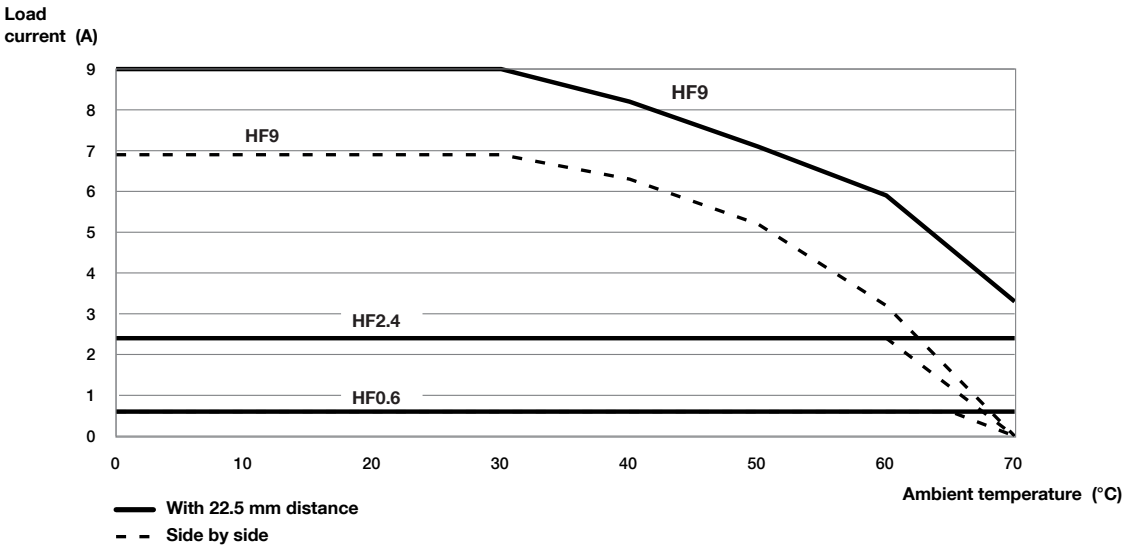
| Type | | | HF |
|---|---|---|---|
| Connecting capacity | | | |
| | Rigid | 1 x | 2 ... 2.5 mm² |
| | Flexible | 1 x | 2 ... 2.5 mm² |
| | Flexible with ferrule | 1 x | 2 ... 2.5 mm² |
| Connecting capacity acc. to UL/CSA | | | |
| | Rigid | 1 x | 24 ... 14 AWG |
| | Flexible | 1 x | 24 ... 14 AWG |
| | Flexible with ferrule | 1 x | 24 ... 14 AWG |
| Stripping length | | | 8 mm |
| Tightening torque | | | 0.5 ... 0.6 Nm |
| Tightening torque UL/CSA | | | 5 ... 7 in.lb |
| Terminal type | | | Screw terminals |
| Recommended screw driver | | | M3 |

# HF0.6, HF2.4, HF9 electronic compact starters

## Technical diagrams

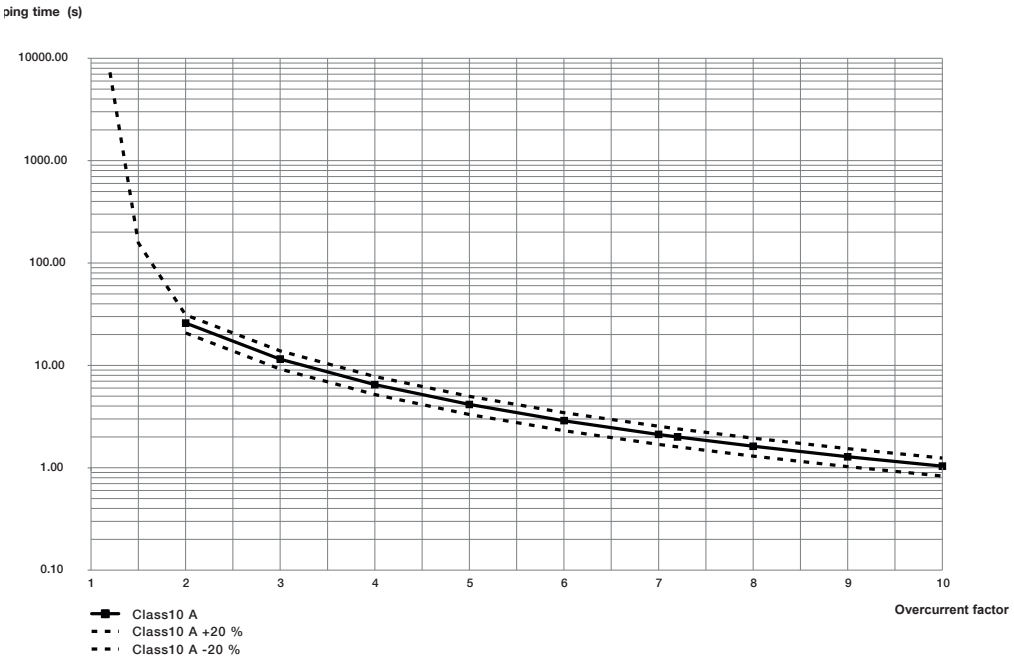
### Derating curve

Please consider the derating curves for group mounting with and without ≥22.5 mm distance and the overload protection for tripping class 10A.




Derating curve HF range - electronic compact starters

### Tripping characteristics




Tripping characteristics class 10A HF range - electronic compact starters

# The Universal Motor Controller UMC100.3 delivers all the reliability and protection you expect while driving an intelligent data hub for predictive applications, maintenance and asset management. Outstanding user experience for smooth running of your operations, paired with unrivalled communication options, simple configuration and market leading software.

# The UMC100.3 Motor Controller – future ready, and ready to take motor control to the next level.



**For direct product details information, use product type or order code, ex:**

new.abb.com/products/1SAJ530000R0100

# Universal Motor Controller


**12/**2 **Main benefits**

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# Safe and reliable

## Optimizes safe and reliable plant operations

Say hello to effortless motor control. Keep your plant running, with comprehensive protection and a modular design for simple expansion to suit your requirements.



**Safe & Reliable**

**Protection at all times**
With the UMC100.3, your motors are protected at all times, even if your control or communication system (Ethernet or Fieldbus) breaks down. Ideal for critical applications where any failure can incur substantial costs.

**Detect problems early**
Intelligent Motor Management Systems provide information about the motor and connected loads and its status. This information is transferred to the superior control system (DCS) and is directly available on the operator panel in the MCC. This allows you to detect upcoming problems and prevent plant standstills, as well as increase plant availability.

**Easy expansion for higher functionality**
Its modular design means that the UMC meets all motor management requirements, greatly simplifying planning, construction, and inventory. Easy-to-attach modules – such as digital expansion modules, analog and temperature modules, and voltage modules – give you complete flexibility and cover a wide range of applications.





# Integrated and future ready

## An intelligent data hub for predictive applications

UMC100.3 takes motor control to the next level. Delivering unrivalled communication, integration, and fault detection, you're prepared for any eventuality.





**Future ready**

**Wide range of communication protocols available**
The UMC100.3 is compatible with more communication protocols than any other motor controller. Serial communication reduces wiring and installation, and provides much more data. This allows you to have software that enables predictive maintenance and acts as an intelligent data hub. And the more data you have, the quicker you can identify errors.



**Integrated into distributed control systems (DCS)**
The UMC100.3 fits into ABB System 800xA, acting as a gateway for ABB Ability™. Due to the support of many communication systems it fits also quite well to other control systems and programmable logic controllers (PLC).

**Field Information Manager**
With its Field Information Manager software, the UMC100.3 is the only universal motor controller that follows the Field Device Integration (FDI) standard. This easy-to-use, market leading software enables you to configure and integrate a field device, test settings and monitor status and diagnostics.



**Unique local control**
The control panel offers many features. Easy modifications of settings, monitoring all status, diagnosis and fault info, operating the motor. And this all with full text in many languages instead of cryptic codes.

**Software configuration**
The UMC100.3 can be configured from the control system by an integrated fieldbus or network configurator using the software provided by the control system supplier. This means that communication modules for the UMC aren't a one-way street: they provide information to the control system but are also used to parametrize the UMC.



# Simple configuration

## Quality FDI software and operating panel

Configuration can be tricky. But not with the UMC100.3, which gives you simple synchronization and software configuration so that you're always in control.

**Software tool FIM UMC edition**
The FIM UMC Edition is the standard software that provides all the functionalities you need for effective use of the UMC100.3. Device parametrization, operating and monitoring modes allow a fast and easy configuration of UMC100.3, testing and online diagnosis. Project management is included for the handling of larger projects. And the localized software allows for multilingual use.

**Easy to install**

# Functions in detail
## UMC100.3



**Motor protection**
- The UMC provides comprehensive motor protection
- Overload protection for single- and three-phase AC motors according to EN/IEC 60947-4-1
- Rated motor currents from 0.24 to 63 A with integrated measuring system in a single version
- Rated motor currents up to 850 A with external current transformer CT4L / CT5L
- Selectable tripping classes 5E, 10E, 20E, 30E or 40E
- Locked rotor protection
- Phase failure, asymmetry and sequence protection
- Under-/overcurrent protection
- Thermistor motor protection
- Ground leakage detection – internally or using CEM11 sensor
- Limitation of motor starts per time
- Motor protection independent from bus communication

**In combination with voltage module VI150/ VI155-FBP.0**
- Undervoltage/overvoltage protection
- Power supervision
- Power factor supervision (cos j)
- Voltage-based detection of phase failure, asymmetry and sequence

**Motor control**
- Integration of the most important motor control functions as ready, easily parameterizable blocks
- Direct, reversing, star-delta starters
- Pole changing Dahlander / Actuator mode
- Inching / jog mode
- Adjustable restart strategy (load shedding)

**Extended motor control**
- Freely programmable for special, application-specific control functions
- Simple adaptation to specified control functions
- Comprehensive library
- Blocks for logic, counters, timing
- Access to all I/Os and internal signals



**Service data**
- Counter for motor operating and standstill hours
- Number of starts
- Number of overload trips
- Energy

**Diagnostic data**
- Comprehensive and detailed error messages and warnings
- Log for previous 16 errors
- Plain text display on the control panel

**Open communication**
The UMC is a basic device that can use various communication methods; the communication protocol is selected by plugging on the right fieldbus communication interface or connecting an Ethernet communication interface.

**Control stations and operation modes**
- Individual and flexible configuration
- Remote operation via DCS or PLC
- Local control via pushbuttons
- Local control via operatings panel UMC100-PAN
- Force local via input signal

**Motor status/communication**
Quick and comprehensive access to all data via control station, fieldbus, Ethernet and/or laptop

**Operating data**
- Motor status
- Motor current
- Thermal load
- Maximum starting current
- Run-up time
- Time to trip
- Remaining cool down time

**Operating data with voltage module VI150/ VI155-FBP.0**
- Phase voltages
- Active power
- Apparent power
- Power factor
- Energy

# Main areas of application

Smooth running is guaranteed with the UMC100.3, whatever application you use it for

—
01 Cement factories

—
02 The oil and gas industry, chemical industry

—
03 Pulp and paper plants

—
04 Mining

—
05 Water supply and treatment

—
06 others



—
01



—
02



—
03

**Cement factories**
- Robust and compact design
- Several inputs, e.g. for querying the position of the damper limit switches

**The oil and gas industry, chemical industry**
- Programmability
- Ground fault monitoring
- Undervoltage detection and configurable restart following voltage drops
- Protection of motors in hazardous environments (ATEX)
- Use in IT networks

**Pulp and paper plants**
- Modular design
- Flexible communication
- Versions with conformal coating available

**Mining**
- Rated motor voltage of up to 1000 V
- Can be used at altitudes of up to 5000 m
- Ground fault monitoring

**Water supply and treatment**
- Pump controls as required
- Underload detection with 2 x detection
- Own control logic e.g. for pump cleaning

**Others**
- Steel plants
- Ships




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04



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05



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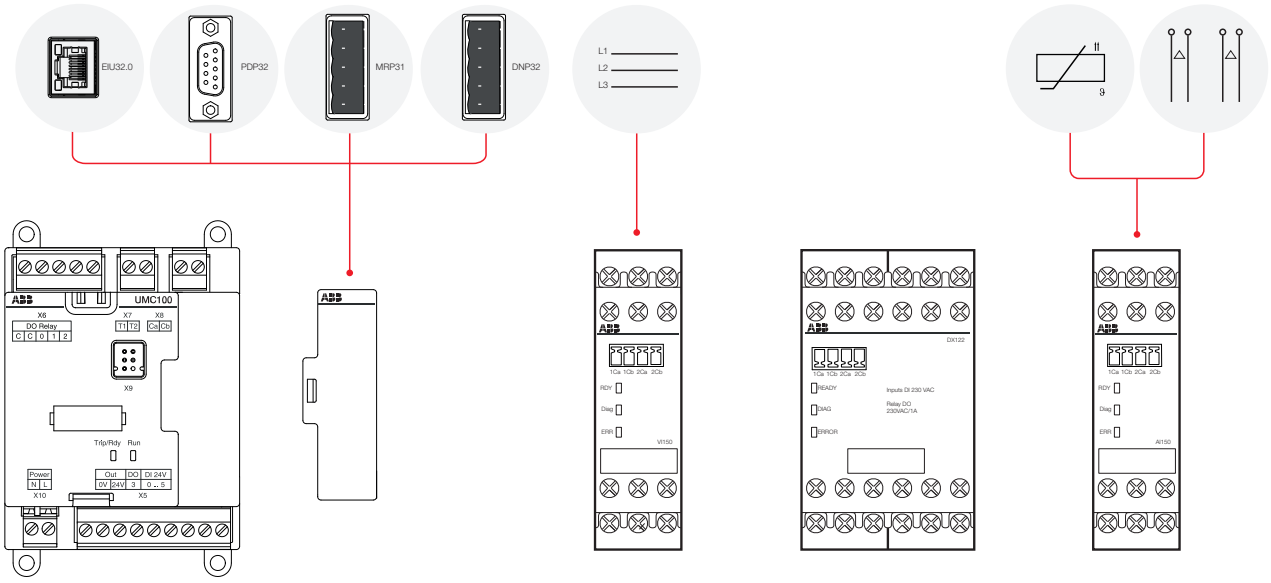
06

# Components

The basic device can be expanded with several modules. Digital expansion modules, analog and temperature modules, voltage modules and a range of communication interfaces guarantee full flexibility and cover a wide range of applications.

## MAIN COMPONENTS

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❶

**UNIVERSAL MOTOR CONTROLLER UMC100.3**
Basic device, expandable with different modules
- Voltage: max. 1000 V AC
- Tripping classes: 5E, 10E, 20E, 30E, 40E in accordance with IEC/EN 60947-4-1
- Built-in wide range measuring system, up to 63 A with one single version
- Supply voltages: 24 V DC, 110-240 V AC/DC
- Inputs: six digital inputs 24 V DC, one PTC input
- Outputs: four digital outputs



❷

**COMMUNICATION INTERFACES**
Directly connect a variety of communication interfaces to the UMC
- Fieldbus interfaces:
  PDP32.0: Profibus DP, DNP31.0: DeviceNet, MRP31.0: Modbus RTU
- Ethernet Interfaces:
  MTQ22-FBP.0: Modbus TCP, PNQ22-FBP.0: Profinet IO, EIU32.0: EtherNet/IP™, PNU32.0 Profinet Interface



❸

**VOLTAGE MODULES VI150/VI155-FBP.0**
Voltage modules for determining phase voltages, power factor (cos j), active power, apparent power, energy, harmonic content (THD)
- Supply voltage: 24 V DC
- 3-phase voltage measurement, up to 690 V in grounded and ungrounded networks
- Voltage dependent protection functions

A control panel with a backlit LDC display and choice of nine different languages ensures easy operation of the UMC, wherever you are. Sensors detect earth leakages and current transformers increase the current measuring range.



4

**DIGITAL MODULES DX111/DX122-FBP.0**
Compact modules that increase the number of digital inputs and outputs
- Supply voltage 24 V DC
- Inputs: DX111 eight digital inputs 24 V DC, DX122 eight digital inputs 110/230 V AC
- Outputs: four digital relay outputs, one configurable analog output



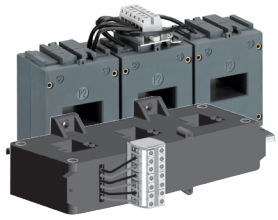
5

**ANALOG/TEMPERATURE MODULE AI111.0**
Expand the UMC with analog and temperature inputs
- Supply voltage: 24 V DC
- Three analog inputs
- Configurable for temperature sensors and standard signals
- Two modules AI111 can be connected to one UMC

## ACCESSORIES



**OPERATING PANEL UMC100-PAN**
Installation on the UMC or on the control cabinet door
- Graphics-enabled, backlit display with three LEDs for status indication
- Monitors all values, shows the status and diagnostic data
- Speaks your language - choice of nine menu languages
- USB-port for connection to a PC
- Up/download of parameters and custom application logic



**CURRENT TRANSFORMERS CT4L/CT5L**
Extend the integrated measuring system for larger motors
- For nominal motor currents > 63 A up to 850 A
- Linear transformer, 3-phase with terminal block, designed for connecting leads Cu 2.5 $mm^2$



**EARTH LEAKAGE SENSORS CEM11-FBP.XXX**
Summation current transformer for connecting to a digital input. Mounting with bracket on DIN busbar or wall
- Four versions available with diameters from 20 mm to 120 mm
- Simple residual current adjustment with rotary switch, including test position
- Direct connected to a digital input of the motor controller
- Flexible mounting

# Universal Motor Controller UMC100.3

## Ordering details




UMC100.3

**Description**

Intelligent motor management system for single and three-phase motors with $I_e$ = 0.24 - 63 A in a single device. Compact housing with integrated current transformer for cable cross sections up to 25 mm² (max. Ø with insulation 11 mm). Higher currents with additional external current transformer. Thermal overload protection according to EN/IEC 60947-4-1, selectable trip classes 5E, 10E, 20E, 30E, 40E. Some functions require an additional expansion module.

- Motor protection functions:
  Over-/underload, over-/undercurrent, over-/undervoltage, rotor blocking, phase failure/ imbalance/sequence
  Earth fault detection integrated or with external sensor CEM11-FBP.0
  Hot motor protection with thermistor
  or temperature measurement
- Motor control functions:
  Easily configurable motor control functions: direct, reverse, star-delta starter, pole-changing, overload relay, actuator mode, softstarter mode. Additionally free programmable application specific logic with function blocks
- Service and diagnostic data:
  Operating hours, number of motor starts and overload trips, energy, standstill and operation hours supervision, motor status, faults and warnings, fault history (16 events)
  Motor current, phase voltages, thermal load, power factor (cos φ), active power, apparent power, energy, total harmonic distortion (THD).
- Integrated I/Os: six digital inputs, one PTC input, four digital outputs. Maximum number of I/Os with expansion modules: 14 digital inputs, one PTC input, nine digital outputs, six analog inputs, one analog output
- Communication interfaces for fieldbuses and Ethernet networks, Interface for operator panel UMC100-PAN, bus interface for connection of expansion modules
- Versions for supply voltage 24 V DC and
  110 – 240 V AC/DC, with ATEX approval and with ATEX plus conformal coating for applications in aggressive atmosphere

| Description | Supply voltage | Type | Order code | | Pkg qty | Weight (1 pc.) kg |
|---|---|---|---|---|---|---|
| Universal Motor Controller | 24 V DC | UMC100.3 DC | 1SAJ530000R0100 | | 1 | 0.275 |
| Universal Motor Controller | 110-240 V AC/DC | UMC100.3 UC | 1SAJ530000R1100 | | 1 | 0.315 |
| Universal Motor Controller, ATEX | 24 V DC | UMC100.3 DC EX | 1SAJ530000R0200 | | 1 | 0.275 |
| Universal Motor Controller, ATEX | 110-240 V AC/DC | UMC100.3 UC EX | 1SAJ530000R1200 | | 1 | 0.315 |
| Universal Motor Controller, ATEX conformal coating | 24 V DC | UMC100.3 DC EX Coated | 1SAJ530000R0210 | | 1 | 0.275 |
| Universal Motor Controller, ATEX conformal coating | 110-240 V AC/DC | UMC100.3 UC EX Coated | 1SAJ530000R1210 | | 1 | 0.315 |

# Operating panel and cables

## Ordering details




UMC100-PAN

**Description**

Operating panel for Universal Motor Controller UMC100.3. Backlit graphical and multilingual full-text display, LEDs for status display. Assembly directly on UMC100.3 or on the control cabinet door via door mounting set (includes connection cable).

**Functions**

- Monitor: Shows motor status, diagnostics and maintenance data
- Operate: Start, stop, fault reset
- Parametrize: Setting and changing of all motor and fieldbus parameters (password protection possible); all settings are performed in the selected language
- Memory: Copy settings from one UMC100.3 to another
- USB port for up/download of parameters and logic from PC with PBDTM software




UMC100-PAN CAP

Supports nine languages: English, Finnish, French, German, Italian, Polish, Portuguese, Russian, Spanish

The protection cap UMC100-PAN increases the degree of protection for the operator panel from IP52 to IP54. It is made of transparent and flexible silicone material, making it easy to read text messages, check the LED status and use the buttons. It is removable to access the micro-USB port for parameter up/download.

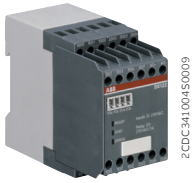
| Description | Type | Order code | | Pkg qty | Weight (1 pc.) kg |
|---|---|---|---|---|---|
| Operating panel | UMC100-PAN | 1SAJ590000R0103 | | 1 | 0.047 |
| 0.7 m ext. cable with door mounting set | UMCPAN-CAB.070 | 1SAJ510003R0002 | | 1 | 0.070 |
| 1.5 m ext. cable with door mounting set | UMCPAN-CAB.150 | 1SAJ510004R0002 | | 1 | 0.088 |
| 3 m ext. cable with door mounting set | UMCPAN-CAB.300 | 1SAJ510002R0002 | | 1 | 0.176 |
| Protection cap for operating panel | UMC100-PAN CAP | 1SAJ510005R0001 | | 10 | 0.013 |

# Expansion modules

## Ordering details




DX111-FBP.0




DX122-FBP.0




VI150-FBP.0




AI111.0

**Description**
Up to four expansion modules can be connected to one UMC100.3:

- One digital expansion module DX111-FBP.0 or DX122-FBP.0
- One voltage expansion module VI150-FBP.0 or VI155-FBP.0
- Two analog/temperature expansion modules AI111.0

The supply voltage is 24 V DC; the 110-240 V AC/DC version of the UMC100.3 provides the 24 V DC supply for expansion modules

**DX111-FBP.0**
I/O-expansion module with eight digital inputs 24 V DC, four relay outputs, one analog output 0/4-20 mA or 0…10 V

**DX122-FBP.0**
I/O-expansion module with eight digital inputs 110/230 V AC, four relay outputs, one analog output 0/4-0 mA or 0-10 V

**VI15x-FBP.0**
Voltage modules for the determination of phase voltages, power factor (cos φ), apparent power, energy, total harmonic distortion (THD). For use in grounded networks (VI150-FBP.0) or in all networks (VI155-FBP.0), 150-690 V AC

**AI111.0**
Analog/temperature expansion module, three inputs PT100, PT1000, KTY83, KTY84, NTC, 0–10 V, 0/4-20 mA one or two modules AI111.0 can be connected to an UMC100.3

| Description | Type | Order code | | Pkg qty | Weight (1 pc.) kg |
|---|---|---|---|---|---|
| I/O module for UMC100, 24 V DC digital input | DX111-FBP.0 | 1SAJ611000R0101 | | 1 | 0.220 |
| I/O module for UMC100, 110 - 230 V AC digital input | DX122-FBP.0 | 1SAJ622000R0101 | | 1 | 0.220 |
| 3-phase voltage module for grounded networks | VI150-FBP.0 | 1SAJ650000R0100 | | 1 | 0.110 |
| 3-phase voltage module for all networks | VI155-FBP.0 | 1SAJ655000R0100 | | 1 | 0.110 |
| Analog/temperature module 3 analog inputs | AI111.0 | 1SAJ613000R0101 | | 1 | 0.116 |
| Connection cable UMC100 - I/O module, length 0.3 m | UMCIO-CAB.030 | 1SAJ691000R0001 | | 1 | 0.011 |
| Connection cable IO-module - IO-module, length 0.3 m | IOIO-CAB.030 | 1SAJ692000R0001 | | 1 | 0.011 |
| Terminal set for UMC100.3 DC (spare parts) | UMCTB-FBP.0 | 1SAJ929160R0001 | | 1 | 0.043 |
| Terminal set for UMC100.3 UC (spare parts) | UMCTB.1 | 1SAJ929160R0002 | | 1 | 0.045 |

# Fieldbus interfaces
## Ordering details



PDP32.0



MRP31.0



DNP31.0



PDR31.0

**Description**
Fieldbus communication interfaces enable the UMC100.3 to communicate via fieldbus.
The interfaces can be used in two ways:
- Mounted directly on the UMC100.3 – the interface is supplied from the UMC100.3 and no additional accessory is required
- Mounted separately on an SMK3.0 adapter in the cable chamber of an MCC, the interface plugged on SMK3.0 requires a 24 V DC supply. Ready-made cables for applications in withdrawable systems are available, as well as terminal blocks for other cables:
  CDP18.150: Cable for use inside the CDP24.150 drawer: Cable from SMK3.0 to drawer outside

**PDP32.0**
- Communication interface for PROFIBUS DP; supports the protocols PROFIBUS DP/V0 and V1
- PNO-certified PROFIBUS slave
- Data transfer rate up to 12 Mbit/s
- Diagnostic LEDs
- Fieldbus connection via nine-pole Sub-D connector or terminal blocks
- GSD download from UMC100.3 webpage

**MRP31.0**
- Communication interface for Modbus RTU
- Data transfer rate up to 57.6 kbit/s
- Diagnostic LEDs
- Fieldbus connection via terminal blocks

**DNP31.0**
- Communication interface for DeviceNet
- ODVA-certified DeviceNet slave
- Data transfer rate up to 500 kbit/s
- Diagnostic LEDs
- Fieldbus connection via terminal blocks
- EDS download from UMC100.3 webpage

**PDR31.0**
- External active fieldbus termination for Profibus DP; the PDR31.0 needs to be mounted on a SMK3.0 adapter and supplied by 24 V DC

| Description | Type | Order code | | Pkg qty | Weight (1 pc.) kg |
|---|---|---|---|---|---|
| Profibus DP communication interface | PDP32.0 | 1SAJ242000R0001 | | 1 | 0.050 |
| Modbus RTU communication interface; terminal block for fieldbus connection included | MRP31.0 | 1SAJ251000R0001 | | 1 | 0.039 |
| DeviceNet communication interface; terminal block for fieldbus connection included | DNP31.0 | 1SAJ231000R0001 | | 1 | 0.039 |
| Profibus DP active bus termination | PDR31.0 | 1SAJ243000R0001 | | 1 | 0.030 |

# Adapter and accessories

## Ordering details




SMK3.0




CDP18.150



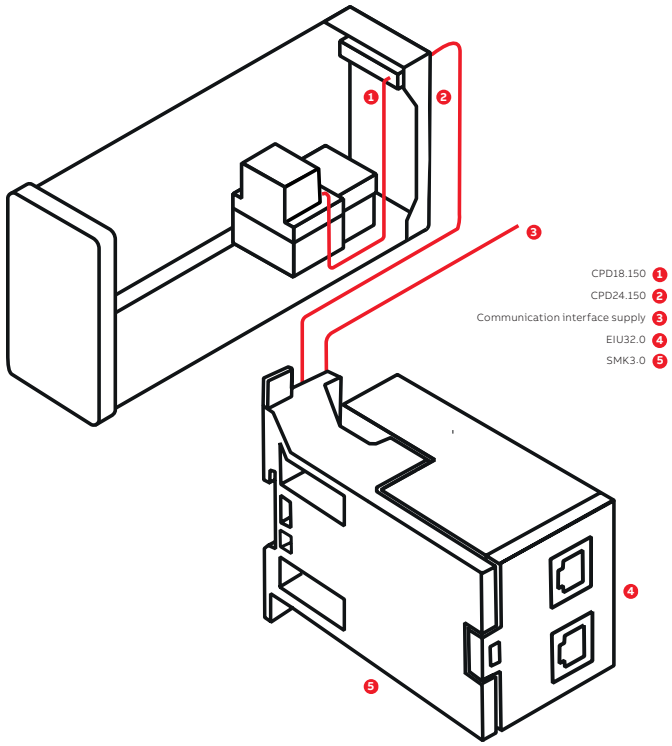

PDP32.0 on SMK3.0




EIU32.0 on SMK3.0

**Adapter and ready-made cables**

Adapter SMK3.0 for external mounting of a fieldbus or EtherNet/IP™ interface EIU32.0 outside a drawer. SMK3.0 can be mounted on a DIN-rail or fixed by screws. 24 V DC supply is required. Ready-made cables for inside and outside the drawer, including a terminal block on one side and open end on the other. Terminal blocks are also separately available for making own cables.




Separate wiring of the EtherNet/IP™ communication interface EIU32.0

| Description | Type | Order code | | Pkg qty | Weight (1 pc.) kg |
|---|---|---|---|---|---|
| Adapter for separate mounting of a communication interface; terminal block for 24 V DC supply included | SMK3.0 | 1SAJ929600R0001 | | 1 | 0.038 |
| Cable for use inside drawer, length 1.5 m | CDP18.150 | 1SAJ929180R0015 | | 1 | 0.060 |
| Cable from SMK3.0 to drawer's outside, length 1.5 m | CDP24.150 | 1SAJ929240R0015 | | 1 | 0.060 |
| Terminal block 2-pole for SMK3.0 supply (spare parts) | SMK3-X2.10 | 1SAJ929610R0001 | | 10 | 0.017 |
| Terminal block 5-pole for SMK3.0 comm. (spare parts) | SMK3-X1.10 | 1SAJ929620R0001 | | 10 | 0.041 |

# Ethernet interfaces

## Ordering details




MTQ22-FBP.0




PNQ22-FBP.0




EIU32.0




PNU32.0

**Description**

Ethernet communication interfaces enable the UMC100.3 to communicate via an Ethernet network. There are two types of interfaces:

Interfaces for the connection of one to four Universal Motor Controllers UMC100.3:
- MTQ22-FBP.0 for Modbus TCP
- PNQ22-FBP.0 for Profinet IO

Interface for a single universal motor controller UMC100.3:
- EIU32.0 for EtherNet/IP™

**MTQ22-FBP.0**
- Protocol Modbus TCP
- For one to four UMC100.3
- Master supervision with timeout control for up to four masters
- Micro USB-port for configuration via PC (configuration software downloaded from UMC100.3 webpage)
- Integrated Ethernet switch
- Supports all network topologies
- Ring topology with redundancy (MRP protocol)
- Easy to use in withdrawable applications
- No special Ethernet connectors required in MCCs
- 24 V DC supply voltage
- DIN-rail mounting

**PNQ22-FBP.0**
- Protocol Profinet IO
- PNO-certified
- For one to four UMC100.3 devices
- Integrated Ethernet switch
- Supports all network topologies
- Ring topology with redundancy (MRP protocol)
- Easy to use in withdrawable applications
- No special Ethernet connectors required in MCCs
- Fully integrated into ABB 800xA
- Time-stamped events with ABB 800xA
- 24 V DC supply voltage
- DIN-rail mounting
- GSDML downloaded from UMC100.3 webpage

**EIU32.0**
- Protocol EtherNet/IP™
- ODVA-certified
- For one motor controller UMC100.3
- Mounting directly on an UMC100.3 (supplied by UMC100.3) or remotely on an SMK3.0 adapter (24 V DC supply required)
- Integrated Ethernet switch
- Supports all network topologies
- DLR (Device Level Ring) function for redundancy
- Easy to use in withdrawable applications
- No special Ethernet connectors required in MCCs
- EDS download from UMC100.3 webpage

**PNU32.0**
- Protocol Profinet
- PNO-certified
- For one motor controller UMC100.3
- Mounting directly on an UMC100.3 (supplied by UMC100.3) or remotely on an SMK3.0 adapter (24 V DC supply required)
- Integrated Ethernet switch
- Supports all network topologies
- MRP redundancy
- S2 master redundancy supported
- Easy to use in withdrawable applications
- No special Ethernet connectors required in MCCs
- GSDML download from UMC100.3 webpage

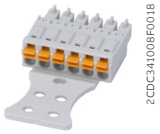
| Description | Type | Order code | | Pkg qty | Weight (1 pc.) kg |
|---|---|---|---|---|---|
| Ethernet Modbus TCP interface | MTQ22-FBP.0 | 1SAJ260000R0100 | | 1 | 0.172 |
| Ethernet Profinet IO interface | PNQ22-FBP.0 | 1SAJ261000R0100 | | 1 | 0.172 |
| EtherNet/IP™ interface | EIU32.0 | 1SAJ262000R0100 | | 1 | 0.110 |
| Ethernet Profinet S2 interface | PNU32.0 | 1SAJ263000R0100 | | 1 | 0.110 |

# Ready-made cables, terminal blocks

## Ordering details




CDP18.150




Terminal blocks ETHTB-FBP.xx

### Ready-made cables

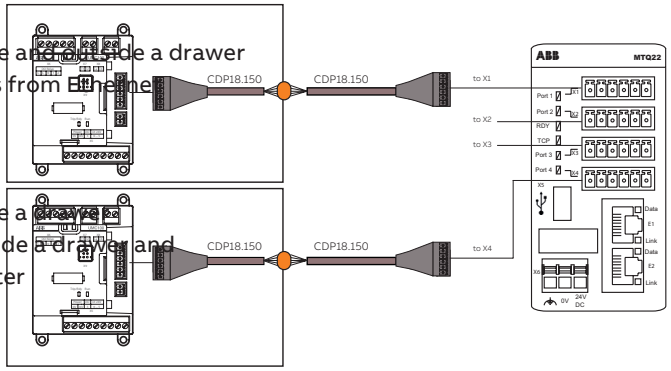
Ready-made cables are available for application in withdrawable systems as well as for fixed installations. Cables include ready-mounted terminal blocks. All connectors are also available as spare parts for creating individual cable connections.
Terminal blocks for making own cables are also available:

**MTQ22-FBP.0, PNQ22-FBP.0**

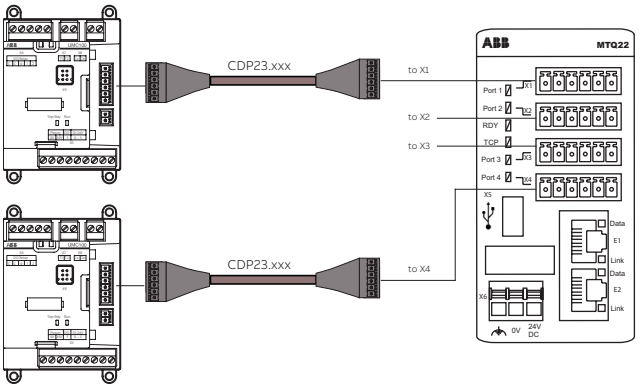
- CDP18.150 cable for use inside and outside a drawer
- CDP23.150, CDP23.300 cables from Ethernet interface to UMC100.3

**EIU32.0**

- CDP18.150 cable for use inside a drawer
- CDP24.150 cable for use outside a drawer and connection to a SMK3.0 adapter




UMC100.3, withdrawable application with MTQ22 -FBP.0/PNQ22-FBP.0

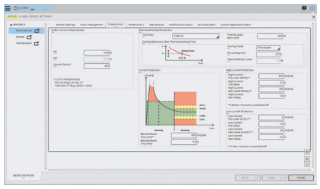



UMC100.3, fix mounted application with solution MTQ22-FBP.0/PNQ22-FBP.0

| Description | Type | Order code | | Pkg qty | Weight (1 pc.) kg |
|---|---|---|---|---|---|
| Cable for inside and outside drawer, length 1.5 m | CDP18.150 | 1SAJ929180R0015 | | 1 | 0.060 |
| Cable Ethernet interface - UMC100.3, length 1.5 m | CDP23.150 | 1SAJ929230R0015 | | 1 | 0.100 |
| Cable Ethernet interface - UMC100.3, length 3 m | CDP23.300 | 1SAJ929230R0030 | | 1 | 0.160 |
| Cable from SMK3.0 to drawer's outside, length 1.5 m | CDP24.150 | 1SAJ929240R0015 | | 1 | 0.060 |
| Terminal blocks for MTQ22/PNQ22 X1...X4 | ETHTB-FBP.4 | 1SAJ929200R0001 | | 4 | 0.015 |
| Terminal blocks for MTQ22/PNQ22 X1...X4 | ETHTB-FBP.50 | 1SAJ929200R0002 | | 50 | 0.015 |

# Configuration software

## Ordering details



Configuration software example

**FIM UMC EDITION configuration software for the UMC100.3 motor management system**
The FIM UMC Edition is based on the Field Device Integration (FDI) standard. This latest standard combines the benefits of both major former technologies, EDD and FDT/DTM. It is the perfect tool for configuration of the UMC100.3 universal motor controller in large applications in the process industry and also in smaller projects such as the water industry. The FIM UMC Edition is equipped with a high-performance graphical user interface which is quick to install. It scans, identifies and enables access to devices within three minutes. It provides effective basic functionality for configuration, diagnosis and maintenance, during commissioning, in the workshop or as second master in a Profibus network of a process control system.

**Overview of features**
- Online/offline configuration and parameterization of UMC100.3
- Maximum number of tags is 2500
- Reading parameterization and configuration information from the device
- Online display of measuring, status and diagnostics data
- Online operation and error acknowledgment
- Creation of custom application logics
- Archiving




2CDC341004F0011

UTP22-FBP.0

**Supported languages**

| | |
|---|---|
| FIM basic package | Chinese, English, German |
| UMC100.3 Device Package | Chinese, English, Spanish, German, Italian, Polish, Portuguese, Russian |
| UMC100.3 Custom Application Editor | English |

**System requirements**
- Windows 7 (64 bit)/Windows 8.1, Windows 10, admin rights
- 10 GB storage space
- Minimum of 1 GB RAM

Connection to UMC100.3 can be done either via PROFIBUS DP or as a point-to-point connection
Connection to Profibus DP network: UTP22-FBP.0
Connection to UMC100.3: With micro-USB cable via control panel UMC100-PAN
Connection to Profinet ethernet network: With RJ-45 cable via ethernet socket

A trial version with limited functionality can be downloaded from
https://new.abb.com/control-systems/fieldbus-solutions/fim

The single user license in the FIM UMC Edition package upgrades the trial version to a full version

| Description | Type | Order code | | Pkg qty | Weight (1 pc.) kg |
|---|---|---|---|---|---|
| USB interface for Profibus networks | UTP22-FBP.0 | 1SAJ924013R0001 | | 1 | 0.261 |
| FIM UMC Edition, Single user license | FIM UMC Editon | 1SAJ925000R0001 | | 1 | n.a. |

# Earth fault monitors, current transformers

## Ordering details

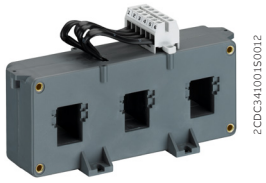



CEM11-FBP.xxx

**Earth fault monitors CEM11-FBP.xxx for use with the UMC100.3 Universal Motor Controller**
The CEM11-FBP.xxx device monitors if the sum of the currents flowing through it is zero (factorial addition). If the sum is zero, no residual current is present. If the residual current is above an adjusted threshold value, the output signal of the CEM11-FBP.xxx changes. It can be used in motor feeders to detect leakage currents, as well as ground faults caused by insulation breakdowns for example.

- CEM11-FBP.xxx is connected to a digital input of the UMC100.3
- Earth fault current threshold can be set in eight steps with a screwdriver
- Test position for easy control of wiring

CEM11-FBP.xxx is delivered with adapters for DIN-rail or wall mounting.
CEM-11.FBP.120 is for wall-mounting only.




CT4L185R/4, CT4L310R/4

| Earth fault currents [mA] | Through-hole diameter | Type | Order code | | Pkg qty | Weight (1 pc.) kg |
|---|---|---|---|---|---|---|
| 80[1)], 300, 550, 750, 1000, 1200, 1500, 1700 | 20 mm | CEM11-FBP.20 | 1SAJ929200R0020 | | 1 | 0.130 |
| 100[1)], 500, 1000, 1400, 2000, 2400, 3000, 3400 | 35 mm | CEM11-FBP.35 | 1SAJ929200R0035 | | 1 | 0.200 |
| 120[1)], 1000, 2000, 2800, 4000, 4800, 6000, 6800 | 60 mm | CEM11-FBP.60 | 1SAJ929200R0060 | | 1 | 0.330 |
| 300[1)], 2000, 4000, 5600, 8000, 9600, 12000, 13600 | 120 mm | CEM11-FBP.120 | 1SAJ929200R0120 | | 1 | 0.940 |

[1)] Lower values have higher inaccuracy




CT5L500R/4, CT5L850R/4

**Current transformers for use with the Universal Motor Controller UMC100.3**
Linear type three-phase transformers, for use with the UMC100.3 and nominal motor currents >63 A. Terminal blocks for conductors Cu 2.5 mm² for wiring on the UMC100.3 side.

| Description | Recommended current range | Type | Order code | | Pkg qty | Weight (1 pc.) kg |
|---|---|---|---|---|---|---|
| Current transformer | 60...185 A AC | CT4L185R/4 | 1SAJ929500R0185 | | 1 | 1.600 |
| Current transformer | 180...310 A AC | CT4L310R/4 | 1SAJ929500R0310 | | 1 | 1.500 |
| Current transformer | 300...500 A AC | CT5L500R/4 | 1SAJ929501R0500 | | 1 | 1.700 |
| Current transformer | 500...850 A AC | CT5L850R/4 | 1SAJ929501R0850 | | 1 | 1.900 |

UMC100-FBP.0 and FBP system accessories are being phased out. Please contact your local ABB contact for spare parts or retrofit solutions.

# Universal Motor Controller UMC100.3

## Technical data

### Control voltage circuit

| Type | UMC100.3 DC | UMC100.3 UC |
|---|---|---|
| Supply voltage | 24 V DC (+30 % ... -20 %)<br>(19,2 ... 31,2 V DC) including ripple | 110V - 240V AC/DC<br>-15% / +10% |
| Total power dissipation<br>Conditions: all digital inputs high, all relay outputs activated* | min. 3 W | min P: 3.5 W / S: 8 W |
| Reverse polarity protection | yes | not relevant |

### Controller unit

| | |
|---|---|
| LEDs | Red: Motor has been tripped due to a thermal overload condition or another fault<br>Yellow: Motor is running<br>Green: Ready for operation |

### Digital inputs

| | |
|---|---|
| Number of digital inputs | 6 (DI0 ... D15) Type 1 accord. to EN 61131-2 |
| Supply for digital inputs | 24 V DC |
| Isolation | No |
| Input signal bounce suppression | Typ. 2 ms |
| Signal 0 range including ripple | -31.2 ... +5 V |
| Signal 1 range including ripple | +15 ... +31.2 V |
| Input current per channel (24 V DC) | Typ. 6.0 mA |
| Input resistor to 0 V | 3.9 k Ω |
| Cable length | Unshielded max. 600 m<br>Shielded max. 1000 m |

### Relay outputs

| | |
|---|---|
| Number of relay outputs | 3 x monostable with one common root |
| Voltage range of contacts | 12-250 V AC/DC |
| Lowest switched power for correct signals | 1 W or 1 VA |
| Switching capacity per relay contact according to EN 60947-5-1 (electromagnetic load) | AC-15 240 V AC max. 1.5 A<br>AC-15 120 V AC max. 3 A<br>DC-13 250 V DC max. 0.11 A<br>DC-13 25 V DC max. 0.22 A<br>DC-13 24 V DC max. 1 A |
| Short circuit protection | 6 A gG |
| Rated impulse withstand voltage $U_{imp}$ | 4 kV |
| Switching of inductive power | Inductive loads need additional measures for spark suppression<br>Diodes for DC voltage and varistors / RC elements for AC voltage are suitable<br>Some DC coil contactors contain rectifiers which suppress sparks perfectly |
| Relay contact service life | Mechanical 500 000 switching cycles<br>Electrical (250 V AC):<br>0.5 A; 100 000 cycles<br>1.5 A 50 000 switching |
| Internal clearance and creepage distances relay contacts to 24 V circuits | > 5.5 mm (safety insulation up to 250 V AC)<br>(EN 60947-1, Pollution degree 2) |
| Pollution degree terminals | 3 |
| Supply power down/up, behaviour: Valid for all motor control functions, except transparent and overload relay | Whenever the supply voltage of the UMC is switched off and on, the starting of the motor needs a new RUN signal |

*Please refer to the product manual for more detailed information.

# Universal Motor Controller UMC100.3

## Technical data

### Transistor output

| Type | UMC100.3 DC | UMC100.3 UC |
|---|---|---|
| Max. output current | 200 mA | 50 mA |
| Short circuit protected | Yes | Yes |
| Output voltage if high | UMC100.3 supply voltage, nominal 24 V DC | nominal 24 V DC |
| Isolation | No | Yes, to AC mains |

### Thermistor motor protection (PTC - binary) type A

| | |
|---|---|
| Broken wire resistance | > 4.8 kΩ |
| Voltage at broken wires between terminals T1/T2 | 12 V DC (typ.) |
| Response resistance | 3.4-3.8 kΩ |
| Reset resistance | 1.5-1.65 kΩ |
| Short circuit resistance | < 21 Ω |
| Current at short circuit conditions | 1.5 mA (typ.) |
| Response time | 800 ms |
| Max. cold resistance of PTC sensor chain | < 1.5 kΩ |
| Line length | 2.5 $mm^2$: 2 x 250 m<br>1.5 $mm^2$: 2 x 150 m<br>0.5 $mm^2$: 2 x 50 m |
| Isolation | No |

### Environmental and mechanical data

| Type | UMC100.3 DC | UMC100.3 UC |
|---|---|---|
| Mounting | On DIN-rail (EN 50022-35) or with four screws M4 | |
| Mounting position | Any | |
| Dimensions (W x H x D) | 70 x 105 x 106 mm | |
| Net weight | 0.3 kg | 0.35 kg |
| Tightening torque | ø 3.5 mm / 0.138 in ; 0.5 Nm, 4.5 in.lb | |
| Wire size with wire end ferrule | 1 x 0.2-2.5$mm^2$ (1 x 28 ... 12 AWG) | |
| Wire size with rigid | 1 x 0.2-2.5$mm^2$ (1 x 28 ... 12 AWG) | |
| Tightening torque for screw mounting | 0.8 Nm | |
| Degree of protection | IP20 | |
| Temperature range storage | -25 ... +70 °C | |
| Temperature range operation | 0 ... +60 °C with two output relays activated | 0 ... +60°C with two relay outputs activated and 24 V DC supply output loaded with 200 mA<br>0 ... +50°C with two relay outputs activated and 24 V DC supply output loaded with 400 mA |

### Performance data

| | |
|---|---|
| Reaction time UMC100 DI to UMC100 Relay Output (incl. hardware delays) | typ. 10 ms (Transparent Control Function) |
| Reaction time UMCI00 DI to DX111 Relay Output (incl. hardware delays) | typ. 10 ms (Transparent Control Function) |
| Reaction time from DX111 DI to UMC100 Relay Ouput (incl. hardware delays) | typ. 14 ms (Transparent Control Function) |
| Number of supported function blocks | See 2CDC135014D02xx |

# Digital expansion modules DX111-FBP.0, DX122-FBP.0

## Technical data

### Digital inputs

| Type | | DX111-FBP.0 | DX122-FBP.0 |
|---|---|---|---|
| Number of inputs | | Eight inputs in two groups of common reference potential (One group with five inputs, one group with three inputs)<br>Insulation: Type 1 acc. to EN 61131-1 | Eight inputs in two groups of common reference potential (One group with five inputs, one group with three inputs)<br>Insulation: Type 2 acc. to EN 61131-1 |
| Input voltage | | 24 V DC | 110 V AC ... 240 V AC |
| Input delay | | 6 ms typ. | 20 ms typ. |
| Signal levels | 0 state | - 31.2 ... + 5 V | 0 ... 40 V AC |
| | 1 state | + 15 ... + 31.2 V | 74 ... 265 V AC |
| ON current per channel | | 6.0 mA typ. (24 V DC) | 10.0 mA typ. (230 V AC) |
| Input resistance against 0 V | | 3.9 kΩ | |
| Frequency range | | | 45 ... 65 Hz |

### Digital output

| | | |
|---|---|---|
| Number of digital outputs | | 4 relay outputs with 2 common supplies (1DO0 & 1DO1 by 1DOC; 2DO2 & 2DO3 by 2DOC) |
| Voltage switching capacity | | 12 ... 250 V AC/DC |
| Load current via common | | $I_{max}$ = 6 A gL / gG per common supply (1DOC, 2DOC) |
| Minimum load for proper switching | | 1 W or 1 VA |
| Contact wiring for inductive load | | Free-wheeling diode for direct current, varistors/VDRs for alternating current |
| Current switching capacity per relay | | EN 60947-5-1 |
| | 240 V AC (AC-15) | max. 1.5 A |
| | 120 V AC (AC-15) | max. 3 A |
| | 250 V DC (DC-13) | max. 0.11 A |
| | 125 V DC (DC-13) | max. 0.22 A |
| | 24 V DC (DC-13) | max. 1 A |
| Relay contact lifetime | | > 500.000 switching cycles – mechanical, > 100.000 switching cycles – at 250 V AC, 0.5 A<br>> 50.000 switching cycles – at 250 V AC, 1.5 A |

### Analog output

| | |
|---|---|
| Number of analog outputs | 1 |
| Connection type | 2-wire, for motor current indication on an external analog instrument |
| Output ranges | Configurable: 0/4 ...20 mA or 0 ... 10 V |
| Cable specification | < 30 m outside the control cabinet; >30 m if shielded |
| Max. output voltage | 10 V |
| Accuracy | < 5% |
| Output load | 500 Ω max. if configured for 0/4 ... 20 mA output; 1 k Ω min. if configured for 0 ... 10 V output |
| Resolution | 8 bits |
| Short-circuit detection | Yes, if configured for 0 ... 10 V output |
| Wire break detection | Yes, if configured for 4 ... 20 mA output |
| Insulation | none |

### Interfaces

| | |
|---|---|
| Interface for I/O expansion | 1 for connection to UMC100 and/or other expansion modules |
| Integrated diagnostic functions | Green LED: Device ready for operation, Yellow LED: Wire break or short circuit indication<br>Red LED: Error (loss of communication, failure, ...) |

# Digital expansion modules DX111-FBP.0, DX122-FBP.0

## Technical data

### General data

| Type | DX111-FBP.0 | DX122-FBP.0 |
|---|---|---|
| Supply voltage | 24 V DC (+ 30%, – 20%) (19.2 … 31.2 V DC incl. residual ripple) | |
| Conductor cross section | max. 2 x 0.75 - 2.5 $mm^2$ | |
| Mounting | Snap-on mounting on DIN rail, any mounting position | |
| Dimensions | 45 x 77 x 100 mm (without communication plug) | |
| Weight | 0.220 kg | |
| Degree of protection | IP20 | |
| Temperature range | Storage: -25 ... +70 °C | Storage: -25 ... +70 °C |
| | Operation: 0 ... +60 °C | Operation: 0 ... +55 °C |
| Approvals | ATEX, CCC, CE, cUL, EAC (other approvals on request)<br>Shipping ABS, DNV, GL | |

# Voltage expansion modules VI150-FBP.0, VI155-FBP.0

## Technical data

| Type | VI150-FBP.0 | VI155-FBP.0 |
|---|---|---|
| Application | only in grounded networks | in grounded and ungrounded networks |

### Electrical data

| Type | VI150-FBP.0 | VI155-FBP.0 |
|---|---|---|
| Supply voltaqe | 24 V DC (+ 30 %, - 20 %) (19.2 ... 31.2 V DC including ripple) | |
| Current consumption relay enerqized | max. 40 mA | max. 55 mA |
| Voltaqe input | L1, L2, L3 | L1, L2, L3 |
| Overvoltaqe category | III in grounded networks | |
| | | II in ungrounded networks |
| Nominal voltaqe input range (phase to phase) | 90 - 690 V AC | |
| $U_{imp}$ | 8 kV | |
| Accuracy voltage | +/- 2% in nominal input range | |
| Accuracy power factor | +/- 3.5 % in range 0.4 ... 0.95, I > 0.75 A | |
| Accuracy real power kW | +/- 5 % typ. | |
| Accuracy energy kWh | +/- 5 % typ. | |
| Total Harmonic Distortion THD | in % | |
| Rated operational voltage $U_e$ | 690 V AC | |
| Voltage supply cables | connection cables for voltage measurement may require additional cable protection | |

### Digital output

| | | |
|---|---|---|
| Number | | 1 relay output |
| Voltage switching capacity | | 12 ... 250 V AC/DC |
| Current switching capacity | | EN 60947-5-1 |
| | 240 V AC (AC-15) | max. 1.5 A |
| | 120 V AC (AC-15) | max. 3 A |
| | 250 V DC (DC-13) | max. 0.11 A |
| | 125 V DC (DC-13) | max. 0.22 A |
| | 24 V DC (DC-13) | max. 1 A |
| Minimum load for proper switching | | 1 W or 1 VA |
| Contact wiring for inductive load | | Free-wheeling diode for DC, Varistors/VDRs for AC |
| Relay contact lifetime | | > 500.000 switching cycles – mechanical<br>> 100.000 switching cycles – at 250 V AC, 0.5 A<br>> 50.000 switching cycles – at 250 V AC, 1.5 A |

### Interfaces

| | |
|---|---|
| Interface for I/O expansion | 1 for connection to UMC100.3 and/or other expansion modules |
| Integrated diagnostic functions | Green LED: Device ready<br>Yellow LED: Diagnostics<br>Red LED: Fault |

### General data

| Type | VI150-FBP.0 | VI155-FBP.0 |
|---|---|---|
| Conductor cross section | 2 x 0.75 - 2.5 $mm^2$ max. | |
| Mounting | Snap-on mounting on DIN-rail, any mounting position<br>Min. 10 mm distance left and right to the L1 and L3 terminals required for voltages > 230 / 400 V | |
| Dimensions (W x H x D) | 22.5 x 77 x 100 mm (excl. communication connector) | |
| Weight | 0.110 kg | |
| Degree of protection | IP20 | |
| Temperature range | Storage: - 25 ... + 70 °C, operation:: 0 ... + 60 °C | |
| Operation altitude above sea level | Max. 2000 m | Max. 4000 m without derating |
| Approvals | ATEX, CCC, CE, cUL,EAC (other approvals on request)<br>Shipping: ABS, DNV, GL | |

# Analog/temperature expansion module AI111.0

## Technical data

### General

| Type | AI111.0 |
|---|---|
| Mounting | On DIN rail (EN 50022-35) |
| Mounting position | Any |
| Dimensions (W x H x D) | See dimensions of expansion modules |
| LEDs: Red/yellow/green | Red: Hardware error of module<br>Yellow: Diagnosis available<br>Green: Ready for operation |
| Supply voltage | 24 V DC (+30 % ... -20 %)<br>(19.2 ... 31.2 V DC) including ripple |
| Supply current | Max. 40 mA (at 19.2 ... 31.2 V DC) |
| Tightening torque for the communication terminals | See section DX1xx |
| Tightening torque for the input, output and supply terminals | See section DX1xx |
| Net weight | 0.118 kg (0.260 lb) |
| Degree of protection | IP20 |
| Temperature range | Storage -25 ... +70 °C<br>Operation 0 ... +60 °C |
| Marks, Approvals | CE, cUL<br>Further in preparation. Ask your local sales representative for other marks/approvals. |
| Functional isolation between anlog inputs and 24 V DC supply / communication interface | Yes |
| Indiviual configuration of each analog input | Yes |
| $U_{imp}$ sensor analog inputs | 0.5 kV |
| Pollution degree terminals | 3 |
| Operation altitude above sea level | Up to 5000 m |

### Temperature inputs

| Type | AI111.0 |
|---|---|
| Type of connection | 2 or 3 wire |
| Number of input channels | 3 (one AI111.0) / 6 (two AI111.0) |
| Type of temperature inputs (adjustable per channel) | PT100 -50 °C...+400 °C<br>PT100 -50 °C...+70 °C<br>PT1000 -50 °C...+400 °C<br>KTY83-110 -50 °C...+175 °C<br>KTY84-130 -40 °C...+300 °C<br>NTC +80...+160 °C [B75227-K333-A1] |
| Accuracy at 20 °C (T20) | ≤ ± 2 K |
| Temperature coefficient | 0.1 K per K deviation from T20 |
| Out of range detection | Yes |
| Max. cable length | Max. cable resistance: 50R (single wire)<br>[e.g. with copper wire 1.5 mm²: 1900 m cable length] |
| Cable shielding | Recommended for up to 30 m and outside the switchgear cabinet; shielding mandatory for cables over 30 m |
| Update rate | Typ. 600 ms |
| Sensor current (typ.) | PT100 1 mA<br>PT1000/KTY83/KTY84/NTC 0.2 mA |

# Analog/temperature expansion module AI111.0

## Technical data

### Analog inputs

| Type | AI111.0 |
|---|---|
| Number of inputs | 3 (one AI111.0) / 6 (two AI111.0) |
| Type of analog inputs (adjustable) | 0/4 mA - 20 mA / 0-10 V |
| Resolution | 15 Bit |

### Measuring ranges

| Type | AI111.0 |
|---|---|
| 0…20 mA and 0…10 V | 0 …. 27648 dec (6C00 hex) |
| 4…20 mA | 0 …. 27648 dec (6C00 hex) |
| Max. input current for 0/4-20 mA | 60 mA (destruction limit) |
| Accuracy at 20 °C (T20) | ±1 % from full scale value |
| Temperature coefficient | 0.05 / K deviation from T20 |
| Input resistance | ≤ 300 Ohm at 0/4 -20 mA<br>≥ 10 k Ohm at 0-10 V |
| Wire break detection | In operation mode: 4 mA - 20 mA |
| Cable shielding | Recommended for up to 30 m and outside the switchgear cabinet; shielding mandatory for cables over 30 m |

# Fieldbus communication interfaces PDP32.0, MRP31.0, DNP31.0, PDR31.0

Technical data

## General data

| Type | PDP32.0 | MRP31.0 | DNP31.0 | PDR31.0 |
|---|---|---|---|---|
| Supply voltage | 24 V DC -20 … +30% (19.2 … 31.2 V DC) incl. ripple | 24 V DC -20% / - 20% (19.2 … 31.2 V DC) incl. ripple | 24 V DC (11 … 24,7 V DC) according to DeviceNet specification | 24 V DC -20 … +30% (19.2 … 31.2 V DC) incl. ripple |
| Current consumption | 55 mA (excl. load on 5 V supply for termination resistors) | Typ. 30 mA | Typ. 18.5 mA (from DeviceNet) | 28 mA |
| Communication protocol | Profibus DP-V0/DP-V1 | Modbus RTU | DeviceNet | Active Profibus DP termination |
| Certificate | Yes, PNO | - | Yes, ODVA | - |
| Fieldbus connection | 9-pole Sub-D connector or terminal blocks | Removable 5-pole terminal blocks | Removable 5-pole terminal blocks | 9-pole Sub-D connector or terminal blocks |
| Integrated termination resistors | No | No | No | Yes |
| Possible bus addresses (set via UMC100.3) | 1 ... 125 | 1 ... 125 | 0 ... 63 | - |
| Max. baud rate | 12 MBit/s | 57.6 kbaud | 500 kbaud | - |
| Isolated +5 V supply available for bus termination circuitry (X3 pins 5 and 6) | 30 mA max. - | - | - | - |

## Standards / directives

| Type | PDP32.0 | MRP31.0 | DNP31.0 | PDR31.0 |
|---|---|---|---|---|
| EMC Directive | 2014/30/EC | 2014/30/EC | 2014/30/EC | 2014/30/EC |
| RoHS Directive | 2011/65/EU | 2011/65/EU | 2011/65/EU | 2011/65/EU |

## Environmental and mechanical data

| Type | | PDP32.0 | MRP31.0 | DNP31.0 | PDR31.0 |
|---|---|---|---|---|---|
| Mounting | | On UMC100.3 or SMK3.0 adapter | On UMC100.3 or SMK3.0 adapter | On UMC100.3 or SMK3.0 adapter | On SMK3.0 adapter |
| Mounting position | | Any | Any | Any | Any |
| Ambient air temperature | Operation | 0 ... +60 °C | 0 ... +60 °C | 0 ... +60 °C | 0 ... +60 °C |
| | Storage | -25 ... +70 °C | -25 ... +70 °C | -25 ... +70 °C | -25 ... +70 °C |
| Vibration (sinusoidal) acc. to IEC/EN 60068-2-6 (Fc) | | 0.7 g / 10 .... 150 Hz | 0.7 g / 10 .... 150 Hz | 0.7 g / 10 .... 150 Hz | 0.7 g / 10 .... 150 Hz |
| Shock (half-sine) acc. to IEC/EN 60068-2-27 (Ea) | | 15 g / 11 ms | 15 g / 11 ms | 15 g / 11 ms | 15 g / 11 ms |
| Degree of protection | | IP20 | IP20 | IP20 | IP20 |
| Pollution degree | | 3 | 3 | 3 | 3 |
| Operation altitude above sea level | | 4000 m | 4000 m | 4000 m | 4000 m |
| Duty cycle | | 100 % | 100 % | 100 % | 100 % |
| Weight | | 0.051 kg | 0.039 kg | 0.042 kg | 0.047 kg |

# Ethernet communication interfaces MTQ22-FBP.0, PNQ22-FBP.0, EIU32.0, PNU32.0

Technical data

### General data

| Type | MTQ22-FBP.0 | PNQ22-FBP.0 | EIU32.0 | PNU32.0 |
|---|---|---|---|---|
| Supply voltage | 24 V DC -20 ... +30% (19.2 ... 31.2 V DC) incl. ripple | 24 V DC -20 ... +30% (19.2 ... 31.2 V DC) incl. ripple | 24 V DC -20 ... +30% (19.2 ... 31.2 V DC) incl. ripple | 24 V DC -20 ... +30% (19.2 ... 31.2 V DC) incl. ripple |
| Current consumption | Max. 180 mA | Max. 180 mA | Typ 90 mA, max. 130 mA | Typ 90 mA, max. 130 mA |
| Total power dissipation | Max. 3.5 W | Max. 3.5 W | Typ. 2.2 W, max. 2.5 W | Typ. 2.2 W, max. 2.5 W |
| Short circuit protection at port 1 ... 4 | PTC resistor | Yes, PTC resistor | - | - |
| Connection between Ethernet interface and UMC100.3 | Max. 3 m | Max. 3 m | Max. 3 m | Max. 3 m |
| Communication protocol | Modbus TCP | Profinet IO | EtherNet/IP™ | Profinet IO |
| Certificate | - | Yes, PNO | Yes, ODVA | Yes, PNO |
| Integrated Ethernet switch | Yes | Yes | Yes | Yes |
| Supported bit rates | 10 / 100 Mbit/s | 100 Mbit/s | 10 / 100 Mbit/s | 10 / 100 Mbit/s |
| Network redundancy protocol | MRP client acc. to EN/IEC 62439-2 | MRP client acc. to EN/IEC 62439-2 | DLR (Device Level Ring) | MRP client acc. to EN/IEC 62439-2 |
| Master redundancy protocol | | | | S2 master redundancy |
| USB port | For configuration via PC and software tool | Reserved | Reserved | Reserved |

### Standards / directives

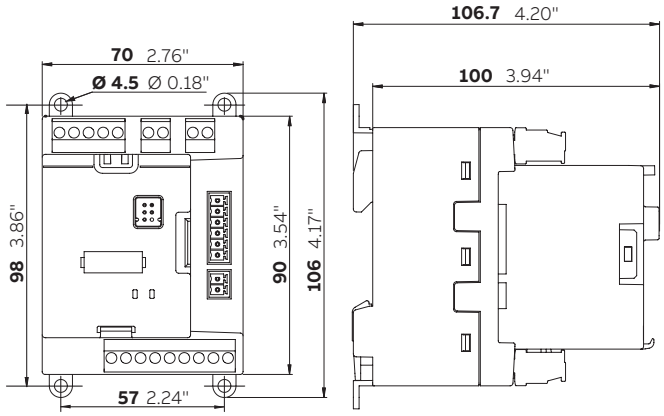
| Type | MTQ22-FBP.0 | PNQ22-FBP.0 | EIU32.0 | PNU32.0 |
|---|---|---|---|---|
| EMC Directive | 2014/30/EC | 2014/30/EC | 2014/30/EU | 2014/30/EU |
| RoHS Directive | 2011/65/EU | 2011/65/EU | 2011/65/EU | 2011/65/EU incl. 2015/863/EU |

### Environmental and mechanical data

| Type | | MTQ22-FBP.0 | PNQ22-FBP.0 | EIU32.0 | PNU32.0 |
|---|---|---|---|---|---|
| Mounting | | DIN-rail | DIN-rail | Directly on the UMC100.3 or remotely on SMK3.0 adapter | Directly on the UMC100.3 or remotely on SMK3.0 adapter |
| Mounting position | | Any | Any | Any | Any |
| Ambient air temperature | Operation | 0 ... +60 °C | 0 ... +60 °C | 0 ... +60 °C | 0 ... +60 °C |
| | Storage | -25 ... +70 °C | -25 ... +70 °C | -25 ... +70 °C | -25 ... +70 °C |
| Dimensions (W x H x D) | | 45 mm x 90 mm x 96 mm | 45 mm x 90 mm x 96 mm | 42.5 mm x 64 mm x 96 mm | 42.5 mm x 64 mm x 96 mm |
| Vibration (sinusoidal) acc. to IEC/EN 60068-2-6 (Fc) | | 0.7 g / 10 ... 150 Hz | 0.7 g / 10 ... 150 Hz | 0.7 g / 10 ... 150 Hz (mounted on UMC100.3/ SMK3.0) | 0.7 g / 10 ... 150 Hz (mounted on UMC100.3/ SMK3.0) |
| Shock (half-sine) acc. to IEC/EN 60068-2-27 (Ea) | | 15 g / 11 ms | 15 g / 11 ms | 15 g / 11 ms | 15 g / 11 ms |
| Degree of protection | | IP20 | IP20 | IP20 | IP20 |
| Pollution degree | | 3 | 3 | 3 | 3 |
| Operation altitude above sea level | | 2000 m | 2000 m | 2000 m | 2000 m |
| Duty cycle | | 100 % | 100 % | 100 % | 100 % |
| Weight | | 0.172 kg | 0.172 kg | 0.110 kg | 0.110 kg |

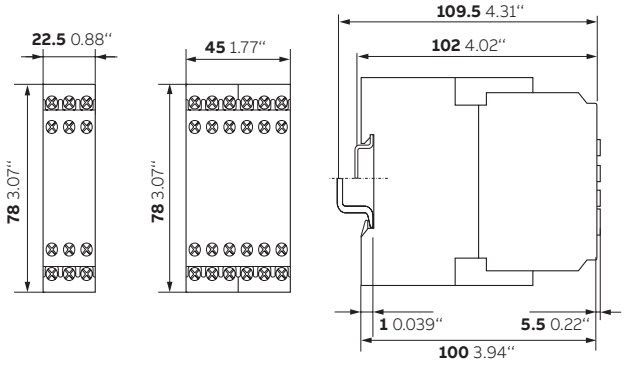
# Dimensional drawings

### Universal Motor Controller UMC100.3




UMC100.3

### Expansion modules

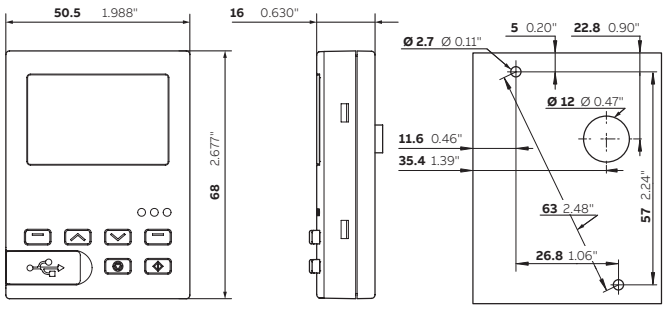



VI150-FBP.0
VI155-FBP.0
AI111.0

DX111-FBP.0,
DX122-FBP.0

DX111-FBP.0, DX122-FBP.0
VI150-FBP.0, VI155-FBP.0
AI111.0

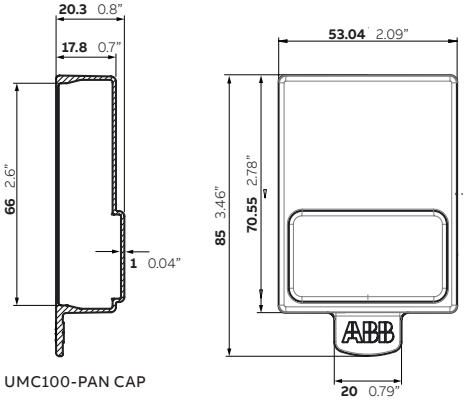
### Operating panel




UMC100.3-PAN

UMC100.3-PAN
drilling instruction

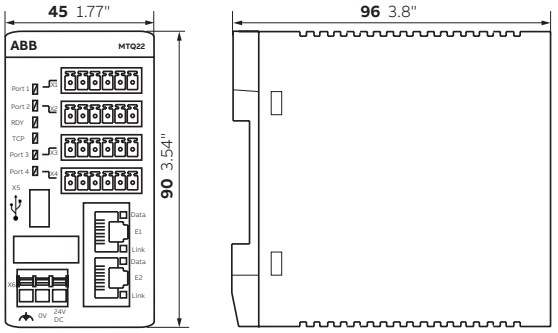
### Operating panel protection cap



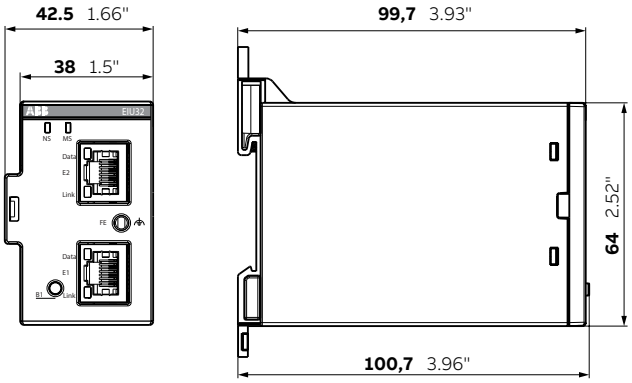

UMC100-PAN CAP

# Dimensional drawings

## Ethernet communication interfaces

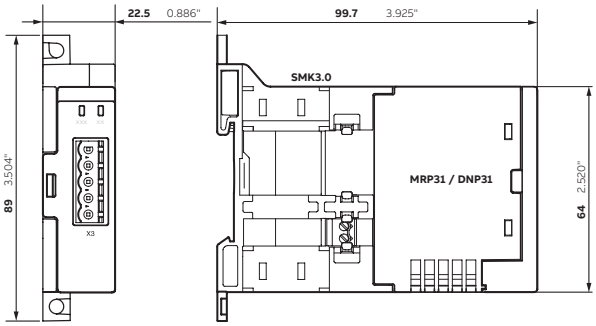



MTQ22-FBP.0
PNQ22-FBP.0

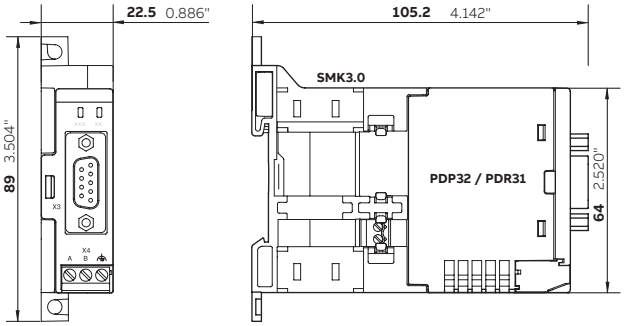



EIU32.0

## Fieldbus communication interfaces



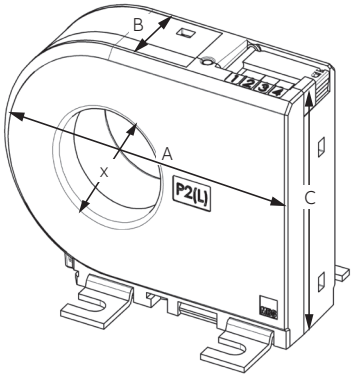

DNP31.0, MRP31.0, SMK3.0




PDP32.0, PDR31.0

# Dimensional drawings

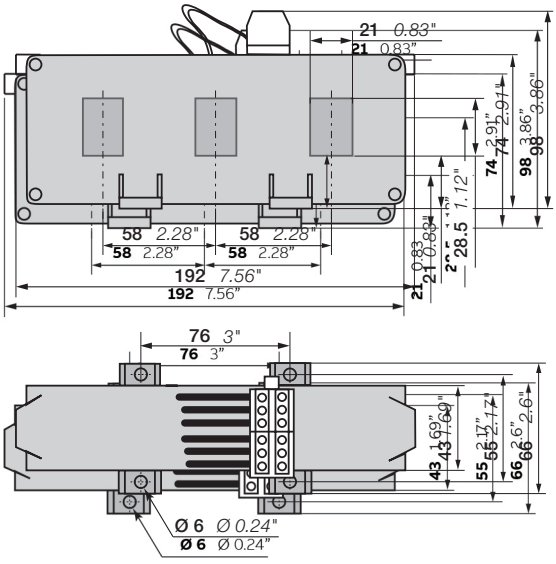
## Earth fault monitor



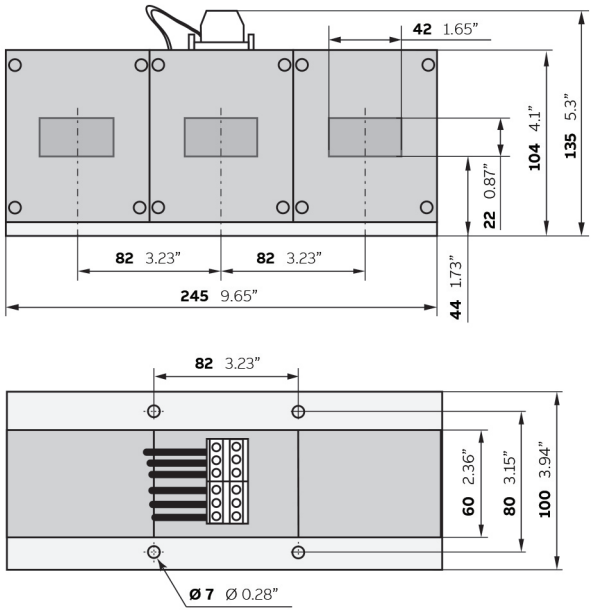

CEM11-FBP.xx

| Type | Width (A) | Depth (B) | Height (C) | Ø |
|---|---|---|---|---|
| **CEM11-FBP.20** | 76.4 (3.01) | 30 (1.18) | 56 (2.20) | 20 (0.79) |
| **CEM11-FBP.35** | 99.5 (1.38) | 30 (1.18) | 79 (3.11) | 35 (1.38) |
| **CEM11-FBP.60** | 135 (5.31) | 38 (1.46) | 116 (4.57) | 60 (2.36) |
| **CEM11-FBP.120** | 210 (8.27) | 38 (1.46) | 190 (7.48) | 120 (4.72) |

## Current transformer




CT4L185R/4, CT4L310R/4




CT5L500R/4, CT5L850R/4

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| SMK3-X2.10 | 1SAJ929610R0001 | 18 |
| SMK3-X1.10 | 1SAJ929620R0001 | 18 |



**For direct product details information, use product type or order code, ex:**

new.abb.com/products/**1SBL137005R1310**

# Customer made Motor starting solution with AF contactors


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# Motor rated operational powers and currents

The currents given below concern standard three-phase four-pole cage motors (1500 r.p.m. at 50 Hz 1800 r.p.m. at 60 Hz). These values are given for guidance and may vary according to the motor manufacturer and depending on the number of poles.

| IEC | Motor nominal current: standardized values in grey (according to IEC 60947-4-1 Annex G) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Motor power | 220 V | 230 V | 240 V | 380 V | 400 V | 415 V | 440 V | 500 V | 660 V | 690 V |
| kW | A | A | A | A | A | A | A | A | A | A |
| **0.06** | 0.37 | **0.35** | 0.34 | 0.21 | **0.2** | 0.19 | 0.18 | **0.16** | 0.13 | **0.12** |
| **0.09** | 0.54 | **0.52** | 0.50 | 0.32 | **0.3** | 0.29 | 0.26 | **0.24** | 0.18 | **0.17** |
| **0.12** | 0.73 | **0.7** | 0.67 | 0.46 | **0.44** | 0.42 | 0.39 | **0.32** | 0.24 | **0.23** |
| **0.18** | 1 | **1** | 1 | 0.63 | **0.6** | 0.58 | 0.53 | **0.48** | 0.37 | **0.35** |
| **0.25** | 1.6 | **1.5** | 1.4 | 0.9 | **0.85** | 0.82 | 0.74 | **0.68** | 0.51 | **0.49** |
| **0.37** | 2.0 | **1.9** | 1.8 | 1.2 | **1.1** | 1.1 | 1 | **0.88** | 0.67 | **0.64** |
| **0.55** | 2.7 | **2.6** | 2.5 | 1.6 | **1.5** | 1.4 | 1.3 | **1.2** | 0.91 | **0.87** |
| **0.75** | 3.5 | **3.3** | 3.2 | 2.0 | **1.9** | 1.8 | 1.7 | **1.5** | 1.15 | **1.1** |
| **1.1** | 4.9 | **4.7** | 4.5 | 2.8 | **2.7** | 2.6 | 2.4 | **2.2** | 1.7 | **1.6** |
| **1.5** | 6.6 | **6.3** | 6 | 3.8 | **3.6** | 3.5 | 3.2 | **2.9** | 2.2 | **2.1** |
| **2.2** | 8.9 | **8.5** | 8.1 | 5.2 | **4.9** | 4.7 | 4.3 | **3.9** | 2.9 | **2.8** |
| **3** | 11.8 | **11.3** | 10.8 | 6.8 | **6.5** | 6.3 | 5.7 | **5.2** | 4 | **3.8** |
| **4** | 15.7 | **15** | 14.4 | 8.9 | **8.5** | 8.2 | 7.4 | **6.8** | 5.1 | **4.9** |
| **5.5** | 20.9 | **20** | 19.2 | 12.1 | **11.5** | 11.1 | 10.1 | **9.2** | 7 | **6.7** |
| **7.5** | 28.2 | **27** | 25.9 | 16.3 | **15.5** | 14.9 | 13.6 | **12.4** | 9.3 | **8.9** |
| **11** | 39.7 | **38** | 36.4 | 23.2 | **22** | 21.2 | 19.3 | **17.6** | 13.4 | **12.8** |
| **15** | 53.3 | **51** | 48.9 | 30.5 | **29** | 28 | 25.4 | **23** | 17.8 | **17** |
| **18.5** | 63.8 | **61** | 58.5 | 36.8 | **35** | 33.7 | 30.7 | **28** | 22 | **21** |
| **22** | 75.3 | **72** | 69 | 43.2 | **41** | 39.5 | 35.9 | **33** | 25.1 | **24** |
| **30** | 100 | **96** | 92 | 57.9 | **55** | 53 | 48.2 | **44** | 33.5 | **32** |
| **37** | 120 | **115** | 110 | 69 | **66** | 64 | 58 | **53** | 40.8 | **39** |
| **45** | 146 | **140** | 134 | 84 | **80** | 77 | 70 | **64** | 49.1 | **47** |
| **55** | 177 | **169** | 162 | 102 | **97** | 93 | 85 | **78** | 59.6 | **57** |
| **75** | 240 | **230** | 220 | 139 | **132** | 127 | 116 | **106** | 81 | **77** |
| **90** | 291 | **278** | 266 | 168 | **160** | 154 | 140 | **128** | 97 | **93** |
| **110** | 355 | **340** | 326 | 205 | **195** | 188 | 171 | **156** | 118 | **113** |
| **132** | 418 | **400** | 383 | 242 | **230** | 222 | 202 | **184** | 140 | **134** |
| **160** | 509 | **487** | 467 | 295 | **280** | 270 | 245 | **224** | 169 | **162** |
| **200** | 637 | **609** | 584 | 368 | **350** | 337 | 307 | **280** | 212 | **203** |
| **250** | 782 | **748** | 717 | 453 | **430** | 414 | 377 | **344** | 261 | **250** |
| **315** | 983 | **940** | 901 | 568 | **540** | 520 | 473 | **432** | 327 | **313** |
| **355** | 1109 | **1061** | 1017 | 642 | **610** | 588 | 535 | **488** | 370 | **354** |
| **400** | 1255 | **1200** | 1150 | 726 | **690** | 665 | 605 | **552** | 418 | **400** |
| **500** | 1545 | **1478** | 1416 | 895 | **850** | 819 | 745 | **680** | 515 | **493** |
| **560** | 1727 | **1652** | 1583 | 1000 | **950** | 916 | 832 | **760** | 576 | **551** |
| **630** | 1928 | **1844** | 1767 | 1116 | **1060** | 1022 | 929 | **848** | 643 | **615** |
| **710** | 2164 | **2070** | 1984 | 1253 | **1190** | 1147 | 1043 | **952** | 721 | **690** |
| **800** | 2446 | **2340** | 2243 | 1417 | **1346** | 1297 | 1179 | **1076** | 815 | **780** |
| **900** | 2760 | **2640** | 2530 | 1598 | **1518** | 1463 | 1330 | **1214** | 920 | **880** |
| **1000** | 3042 | **2910** | 2789 | 1761 | **1673** | 1613 | 1466 | **1339** | 1014 | **970** |

| UL/CSA | Motor nominal current: single and three phase (according to UL 60947-4-1A) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Motor power | 120 V 1-ph | 200 V 1-ph | 200 V 3-ph | 208 V 1-ph | 208 V 3-ph | 220-240 V 1-ph | 220-240 V 3-ph | 380-415 V 3-ph | 440-480 V 3-ph | 550-600 V 3-ph |
| hp | A | A | A | A | A | A | A | A | A | A |
| **1/10** | 3 | – | – | – | – | 1.5 | – | – | – | – |
| **1/8** | 3.8 | – | – | – | – | 1.9 | – | – | – | – |
| **1/6** | 4.4 | 2.5 | – | 2.4 | – | 2.2 | – | – | – | – |
| **1/4** | 5.8 | 3.3 | – | 3.2 | – | 2.9 | – | – | – | – |
| **1/3** | 7.2 | 4.1 | – | 4 | – | 3.6 | – | – | – | – |
| **1/2** | 9.8 | 5.6 | 2.5 | 5.4 | 2.4 | 4.9 | 2.2 | 1.3 | 1.1 | 0.9 |
| **3/4** | 13.8 | 7.9 | 3.7 | 7.6 | 3.5 | 6.9 | 3.2 | 1.8 | 1.6 | 1.3 |
| **1** | 16 | 9.2 | 4.8 | 8.8 | 4.6 | 8 | 4.2 | 2.3 | 2.1 | 1.7 |
| **1-1/2** | 20 | 11.5 | 6.9 | 11 | 6.6 | 10 | 6 | 3.3 | 3 | 2.4 |
| **2** | 24 | 13.8 | 7.8 | 13.2 | 7.5 | 12 | 6.8 | 4.3 | 3.4 | 2.7 |
| **3** | 34 | 19.6 | 11 | 18.7 | 10.6 | 17 | 9.6 | 6.1 | 4.8 | 3.9 |
| **5** | 56 | 32.2 | 17.5 | 30.8 | 16.7 | 28 | 15.2 | 9.7 | 7.6 | 6.1 |
| **7-1/2** | 80 | 46 | 25.3 | 44 | 24.2 | 40 | 22 | 14 | 11 | 9 |
| **10** | 100 | 57.5 | 32.2 | 55 | 30.8 | 50 | 28 | 18 | 14 | 11 |
| **15** | 135 | – | 48.3 | – | 46.2 | 68 | 42 | 27 | 21 | 17 |
| **20** | – | – | 62.1 | – | 59.4 | 88 | 54 | 34 | 27 | 22 |
| **25** | – | – | 78.2 | – | 74.8 | 110 | 68 | 44 | 34 | 27 |
| **30** | – | – | 92 | – | 88 | 136 | 80 | 51 | 40 | 32 |
| **40** | – | – | 120 | – | 114 | 176 | 104 | 66 | 52 | 41 |
| **50** | – | – | 150 | – | 143 | 216 | 130 | 83 | 65 | 52 |
| **60** | – | – | 177 | – | 169 | – | 154 | 103 | 77 | 62 |
| **75** | – | – | 221 | – | 211 | – | 192 | 128 | 96 | 77 |
| **100** | – | – | 285 | – | 273 | – | 248 | 165 | 124 | 99 |
| **125** | – | – | 359 | – | 343 | – | 312 | 208 | 156 | 125 |
| **150** | – | – | 414 | – | 396 | – | 360 | 240 | 180 | 144 |
| **200** | – | – | 552 | – | 528 | – | 480 | 320 | 240 | 192 |
| **250** | – | – | – | – | – | – | 604 | 403 | 302 | 242 |
| **300** | – | – | – | – | – | – | 722 | 482 | 361 | 289 |
| **350** | – | – | – | – | – | – | 828 | 560 | 414 | 336 |
| **400** | – | – | – | – | – | – | 954 | 636 | 477 | 382 |
| **450** | – | – | – | – | – | – | 1030 | – | 515 | 412 |
| **500** | – | – | – | – | – | – | 1180 | 786 | 590 | 472 |

# Customer assembled motor starting solutions

### ABB Expertise

ABB has acquired years of experience with respect to problems of coordination and is able to make a complete offer based on tests performed in its qualified laboratories. This offer covers 400 V AC, 500 V AC, 690 V AC networks.

A complete database of coordination tables, according to IEC/EN 60947-4-1 and UL 60947-4-1 between the branch circuit protective device and the motor starter is available on the ABB Website.

In the coordination tables the following short-circuit protection devices are recommended:

- Moulded-case circuit-breakers (MCCBs)
- Miniature circuit-breakers (MCBs)
- Switch-disconnector-fuses (aM, gG and BS)
- Manual motor starters (MMS).

### Select Optimized Coordination tool (SOC)

Selected Optimized Coordination is a web tool for the selection of ABB products to be used in the following applications:

- Motor starting and protection
- Selectivity between protection devices
- Back-up protection
- Other devices protection
- UL Component ratings.

In order to guarantee the best performance and the longest lifetime, devices involved into the applications mentioned above (short-circuit protection devices, contactors, overload relays, softstarters, ...) need to be coordinated.

- The coordination among devices cannot be determined directly: tests in power laboratories shall be carried out to qualify the coordination type at low fault and high fault currents, according to IEC or UL standards.
- ABB coordination tables are the results of such tests and represent the ABB offerings in terms of motor starting and protection, selectivity, back-up and switch-disconnector protection.
- In Selected Optimized Coordination all available ABB coordination tables are stored and easily accessible.

### Website access:

https://www.lowvoltage-tools.abb.com/soc

### How to combine assemble and wire starter components

The section "customer assembled motor stating solutions" in this catalog gives the components lists and wiring diagrams to assemble the most typical motor starting solutions.

It covers direct-on-line Starters, reversing starters or star-delta starters protected with manual motor starters or with thermal overload relays for Type I or type II coordination for normal starting time.

Note:

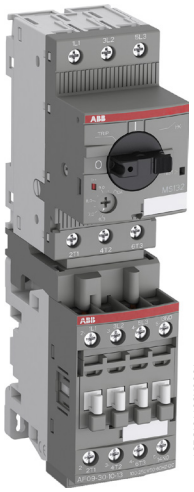
In order to confirm your starter combination ratings according to ABB's lattest coordination test results, or to see other coordination of components please refer to the above mentioned SOC tool. SOC tool get constant updates and additions.

### General remarks applicable to all tables

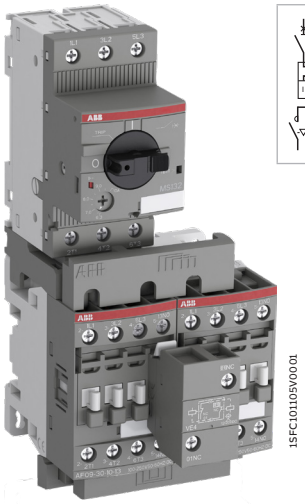
- Each table is defined for a maximum ambient temperature of 40 °C. For higher temperatures, apply a derating factor according to the following rules:
- Fuses: factor of 0.8 applied to In for an ambient temperature of 70 °C
- MCCBs and MCBs: factor of 0.8 applied to In for an ambient temperature of 60 °C
- The starter derating factor depends on the operating conditions of thermal overload relays:
- Factor of 0.9 applied to In for an ambient temperature of 70 °C.
- Each table is defined for motor currents: 3-phase motors, 4-pole
- Normal starting means a starting time < 2 s. - Difficult starting means an accelerating time 10 s < ts < 30 s
- Tripping classes of thermal overload relays according to IEC/EN 60947-4-1: 10A and 10
- Tripping classes of electronic overload relays according to IEC/EN 60947-4-1: 10E, 20E, 30E selectable
- In the tables with MCCBs, these are fitted with the magnetic relay alone. Setting is always carried out at > 12.3 Ie AC-3 so that the transient current peak occurring during starting does not lead to tripping.

# DOL and reversing starters protected by manual motor starters

## With AF contactors - open type version in kit form



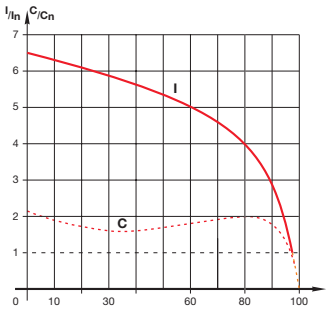

DOL starter
MS132-10 + BEA16-4 + AF09-30-10




Reversing starter
MS132-10 + BEA16-4 + BER16-4
+ VEM4 + AF09-30-10

### Application

Full voltage direct-on-line (DOL) starting and reversing starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.




I = current
C = torque
In = nominal current
Cn = nominal torque

### Coordination types

The contactor and the manual motor starter control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC/EN 60947-4-1) defining the anticipated level of service continuity as follow:

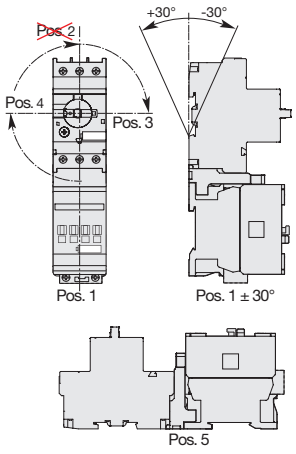
**Type 1:** In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

**Type 2:** In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

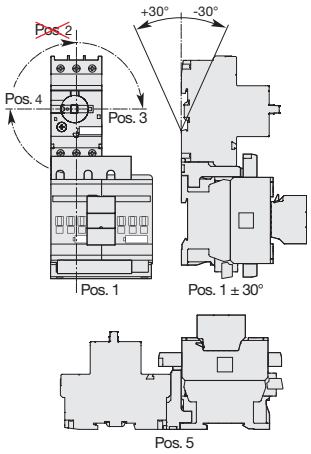
### Main Technical Data

| | | |
|---|---|---|
| Standards | | IEC/EN 60947-4-1 |
| Rated operational voltage Ue max. | | 690 V - 50/60 Hz |
| Rated insulation voltage Ui | | |
| acc. to IEC 60947-4-1 | | 690 V |
| acc. to UL / CSA | | 600 V |
| Switching frequency | | ≤ 15 starts/hour - 80 % max. load factor - with max. 1.5 s starting time |
| | | ≤ 30 starts/hour - 50 % max. load factor - with max. 1.5 s starting time |
| Ambient air temperature | | |
| Close to the device | use with MS116 | ≤ 55 °C |
| | use with MS132, MS165 | ≤ 60 °C |
| Degree of protection | | IP20 |

### Mounting positions




DOL starters



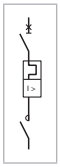

Reversing starters

# DOL and reversing starters protected by manual motor starters

## With AF contactors - open type version in kit form



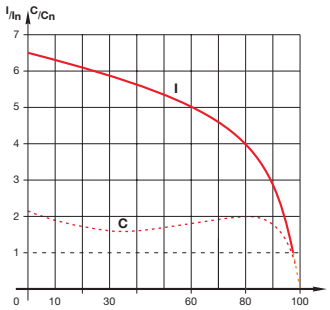
1SFC101102V0001



DOL starter
MS132-10K + BEA16-4KF
+ AF09-30-10K

### Application

Full voltage direct-on-line (DOL) starting and reversing starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



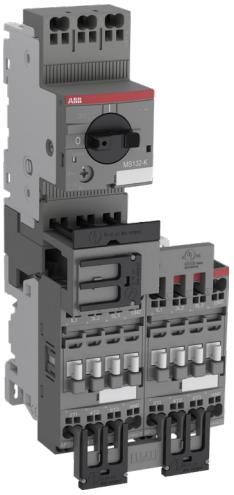

I = current
C = torque
In = nominal current
Cn = nominal torque

### Coordination types

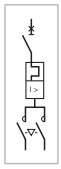
The contactor and the manual motor starter control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC/EN 60947-4-1) defining the anticipated level of service continuity as follow:

**Type 1:** In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

**Type 2:** In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.



1SFC101105V0001

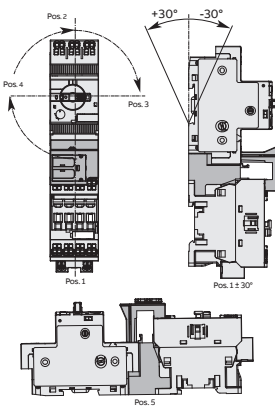


Reversing starter
MS132-10K + BEA16-4KF
+ BER16-4KF + AF09-30-10K

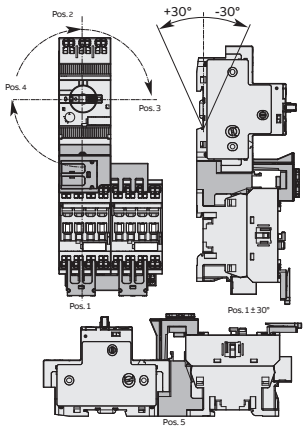
### Main Technical Data

| | | |
|---|---|---|
| Standards | | IEC/EN 60947-4-1 |
| Rated operational voltage Ue max. | | 690 V - 50/60 Hz |
| Rated insulation voltage Ui | | |
| acc. to IEC 60947-4-1 | | 690 V |
| acc. to UL / CSA | | 600 V |
| Switching frequency | | ≤ 15 starts/hour - 80 % max. load factor - with max. 1.5 s starting time |
| | | ≤ 30 starts/hour - 50 % max. load factor - with max. 1.5 s starting time |
| Ambient air temperature | | |
| Close to the device | use with MS116 | ≤ 55 °C |
| | use with MS132 | ≤ 60 °C |
| Degree of protection | | IP20 |

### Mounting positions



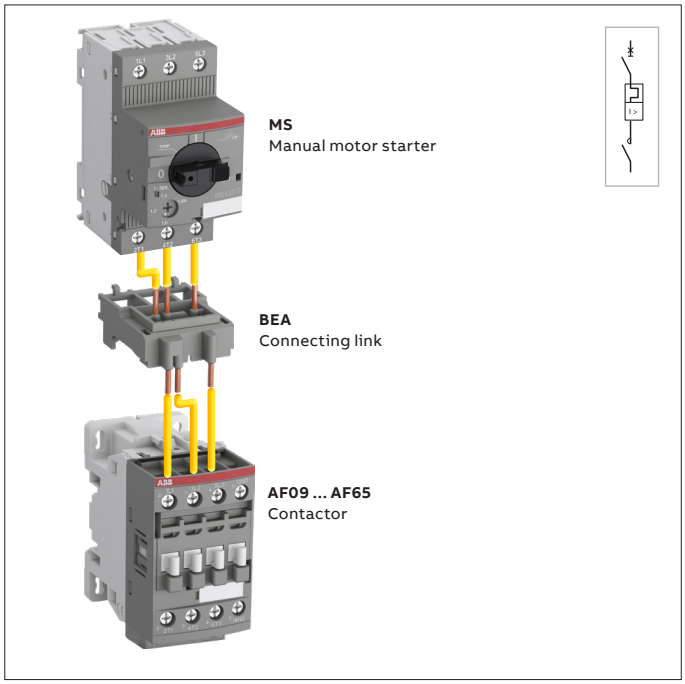

DOL starters




Reversing starters

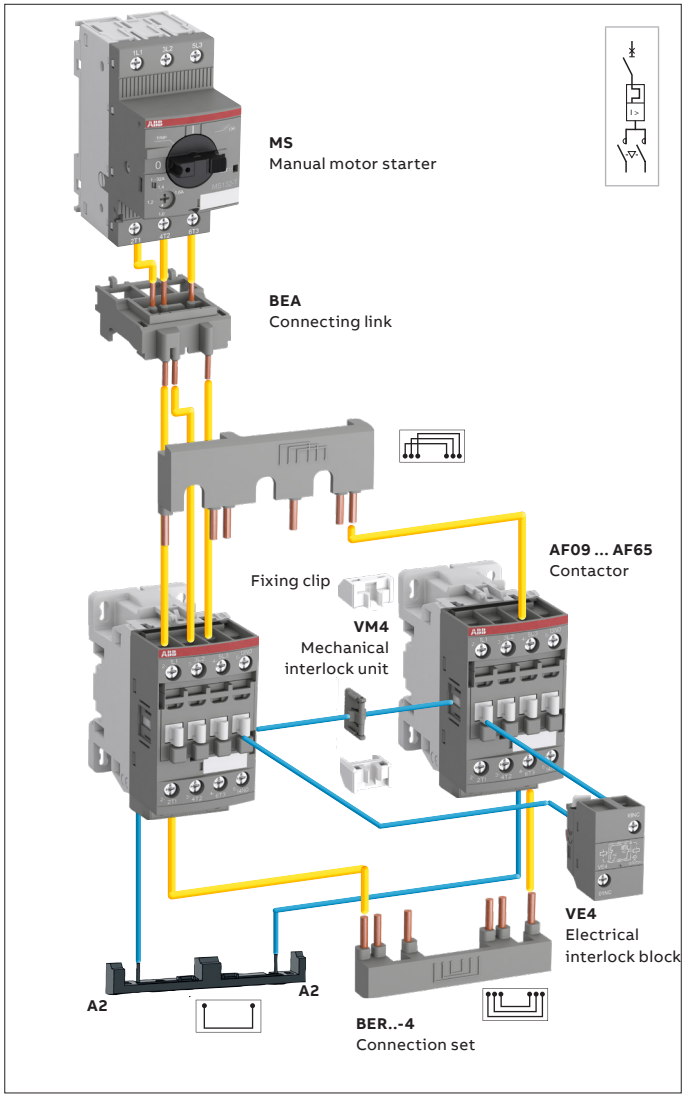
# DOL and reversing starters protected by manual motor starters

With AF contactors - open type version in kit form




**Direct-on-line starters**

You can easily assemble a direct-on-line starter by using the BEA..-4 connecting link 3-pole insulated. It is used to electrically and mechanically connect MS116, MS132 or MS165 manual motor starter and AF09 ... AF65 contactor, AC or DC operated.




**Reversing starters**

You can easily assemble reversing starter thanks to our complete range of accessories:

- BEA..-4 connecting link 3-pole insulated: it is used to electrically and mechanically connect MS116, MS132 or MS165 manual motor starter and AF09 ... AF65 contactor, AC or DC operated
- For AF09 ... AF38, use VEM4 mechanical and electrical interlock set for reversing starter in 90 mm width, made of:
  - VM4 mechanical interlock unit including 2 fixing clips
  - VE4 electrical interlock block with an A2-A2 connection.
- For AF40 ... AF96, use VM96-4 mechanical interlock unit and additional auxiliary contact blocks for electrical interlocking
- BER..-4 connection set to assure a safe and simple reversing connection between both contactor main terminals.

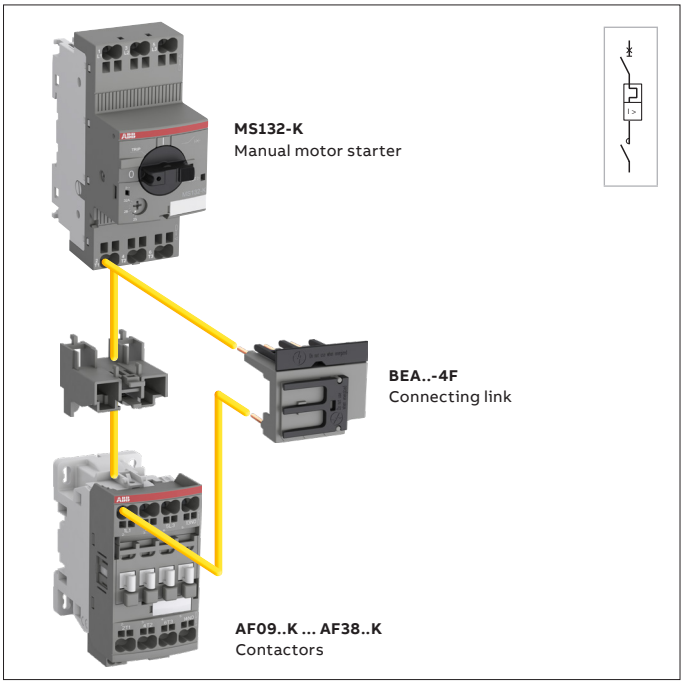
Note: for direct mounting on 2 rails 35 mm of MS165 manual motor starter with AF40 ... AF65 contactors, BEA65-4 connecting link must be associated with BPR65-4 35 mm rail hook fixed on each contactor base. Starter combination using BPR65-4 are applicable for MS165 manufactured after week 31, 2016 (date code > 16214).

**Select now easily and quickly your starter** in the following pages for coordination type 1 or 2 at 400 V, 50/60 Hz, Iq = 16 kA up to 18.5 kW and Iq = 50 kA up to 45 kW.

For the full coordination tables, please visit our SOC tool : https://www.lowvoltage-tools.abb.com/soc

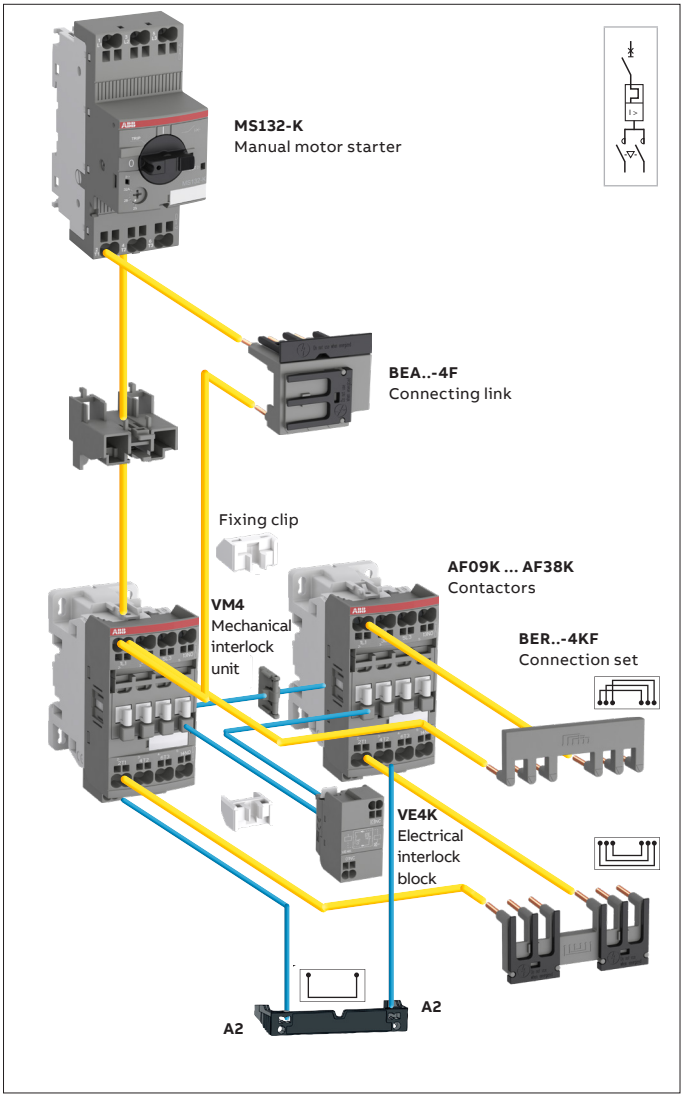
# DOL and reversing starters protected by manual motor starters

With AF contactors - open type version in kit form




**Direct-on-line starters**

You can easily assemble a direct-on-line starter by using the BEA..-4KF connecting link 3-pole insulated. It is used to electrically and mechanically connect MS132-K manual motor starter and AF09 ... AF38..K contactor, AC or DC operated.




**Reversing starters**

You can easily assemble reversing starter thanks to our complete range of accessories:

- BEA..-4KF 3-pole insulated connecting link is used to electrically and mechanically connect MS132-K manual motor starter and AF09..K ... AF38..K contactor, AC or DC operated.
- VEM4K mechanical and electrical interlock set for reversing starter in 90 mm width, made of:
  - VM4 mechanical interlock unit including 2 fixing clips.
  - VE4K electrical interlock block with A2-A2 connection.
- BER..-4KF connection set to assure a safe and simple reversing connection between both contactor main terminals.

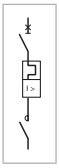
**Select now easily and quickly your starter** in the following pages for coordination type 1 or 2 at 400 V, 50/60 Hz, Iq = 16 kA up to 18.5 kW and Iq = 50 kA up to 45 kW.

For the full coordination tables, please visit our SOC tool : https://www.lowvoltage-tools.abb.com/soc

# DOL starters protected by MS manual motor starters

## Coordination type 1

### Coordination type 1, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz



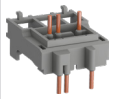
**Manual motor starters**



**Contactors**



**Accessories**



BEA..-4



CA4-10

| IEC AC-3, 400 V Rated operational power | current | Type (1) | Order code | Setting range | Rated instantaneous short-circuit current setting Ii | Rated control circuit voltage Uc min. ... Uc max. (2) | | Type (3) | Order code | Allowed setting current | Type | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| kW | A | | | A | | V 50/60 Hz | V DC | | | A | | |
| 0.06 | 0.2 | MS132-0.25 | 1SAM350000R1002 | 0.16...0.25 | 3.13 | 24...60 | 20...60 (5) | AF09Z-30-10-21 | 1SBL136001R2110 | 0.25 | BEA16-4 | 1SBN081306T1000 |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.09 | 0.3 | MS132-0.4 | 1SAM350000R1003 | 0.25...0.40 | 5 | 24...60 | 20...60 (5) | AF09Z-30-10-21 | 1SBL136001R2110 | 0.4 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.12 | 0.44 | MS132-0.63 | 1SAM350000R1004 | 0.40...0.63 | 7.88 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 0.63 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.18 | 0.6 | MS132-0.63 | 1SAM350000R1004 | 0.40...0.63 | 7.88 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 0.63 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.25 | 0.85 | MS132-1.0 | 1SAM350000R1005 | 0.63...1.00 | 12.5 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 1 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.37 | 1.1 | MS132-1.6 | 1SAM350000R1006 | 1.00...1.60 | 20 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 1.6 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.55 | 1.5 | MS132-1.6 | 1SAM350000R1006 | 1.00...1.60 | 20 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 1.6 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.75 | 1.9 | MS132-2.5 | 1SAM350000R1007 | 1.60...2.50 | 31.25 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 2.5 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 1.1 | 2.7 | MS132-4.0 | 1SAM350000R1008 | 2.50...4.00 | 50 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 4 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 1.5 | 3.6 | MS132-4.0 | 1SAM350000R1008 | 2.50...4.00 | 50 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 4 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 2.2 | 4.9 | MS132-6.3 | 1SAM350000R1009 | 4.00...6.30 | 78.75 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 6.3 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 3 | 6.5 | MS132-10 | 1SAM350000R1010 | 6.30...10.0 | 150 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 9 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 4 | 8.5 | MS132-10 | 1SAM350000R1010 | 6.30...10.0 | 150 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 9 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 5.5 | 11.5 | MS132-12 | 1SAM350000R1012 | 8.00...12.0 | 180 | 24...60 | 20...60 | AF12Z-30-10-21 | 1SBL156001R2110 | 12 | | |
| | | | | | | 100...250 | 100...250 | AF12-30-10-13 | 1SBL157001R1310 | | | |
| 7.5 | 15.5 | MS132-16 | 1SAM350000R1011 | 10.0...16.0 | 240 | 24...60 | 20...60 | AF16Z-30-10-21 | 1SBL176001R2110 | 16 | | |
| | | | | | | 100...250 | 100...250 | AF16-30-10-13 | 1SBL177001R1310 | | | |
| 11 | 22 | MS132-25 | 1SAM350000R1014 | 20.0...25.0 | 375 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | 25 | BEA38-4 | 1SBN082306T2000 |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | CA4-10 | 1SBN010110R1010 |
| 15 | 29 | MS132-32 | 1SAM350000R1015 | 25.0...32.0 | 480 | 24...60 | 20...60 | AF30Z-30-00-21 | 1SBL276001R2100 | 32 | | |
| | | | | | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | |
| 18.5 | 35 | MS165-42 | 1SAM451000R1015 | 30.0...42.0 | 630 | 24...60 | 20...60 | AF40-30-00-11 | 1SBL347001R1100 | 40 | BEA65-4 | 1SBN083406R1000 |
| | | | | | | 100...250 | 100...250 | AF40-30-00-13 | 1SBL347001R1300 | | BPR65-4 (4) | 1SBN113405R1000 |
| 22 | 41 | MS165-54 | 1SAM451000R1016 | 40.0...54.0 | 810 | 24...60 | 20...60 | AF52-30-00-11 | 1SBL367001R1100 | 53 | CA4-10 | 1SBN010110R1010 |
| | | | | | | 100...250 | 100...250 | AF52-30-00-13 | 1SBL367001R1300 | | | |
| 30 | 55 | MS165-65 | 1SAM451000R1017 | 52.0...65.0 | 975 | 24...60 | 20...60 | AF65-30-00-11 | 1SBL387001R1100 | 65 | | |
| | | | | | | 100...250 | 100...250 | AF65-30-00-13 | 1SBL387001R1300 | | | |
| 37 | 66 | MS165-73 | 1SAM451000R1018 | 62.0...73.0 | 1022 | 24...60 | 20...60 | AF80-30-00-11 | 1SBL397001R1100 | 75 | - | - |
| | | | | | | 100...250 | 100...250 | AF80-30-00-13 | 1SBL397001R1300 | | | |
| 45 | 80 | MS165-80 | 1SAM451000R1019 | 70.0 - 80.0 | 1120 | 24...60 | 20...60 | AF96-30-00-11 | 1SBL407001R1100 | 90 | | |
| | | | | | | 100...250 | 100...250 | AF96-30-00-13 | 1SBL407001R1300 | | | |

(1) MS116 manual motor starter can be selected according to the current setting range indicated on the coordination line, up to:
- 15 kW, 400 V - AC-3 at 16 kA
- 4 kW, 400 V - AC-3 at 50 kA.

(2) For other control voltages, see "Voltage code table".

(3) AF38 3-pole contactor can be selected for coordination type 1, 16 kA and 50 kA, 18.5 kW, 400 V - AC-3 (BEA65-4 available for AF40 ... AF65 only).

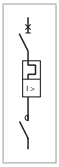
(4) For direct mounting on 2 rails 35 mm of MS165 with AF40 ... AF65: BEA65-4 must be associated with BPR65-4 fixed on contactor base. Applicable for MS165 manufactured after week 31, 2016 (date code > 16114).

(5) AF ... -11 not suitable for direct control by PLC-output.

# DOL starters protected by MS manual motor starters

## Coordination type 2

### Coordination type 2, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz



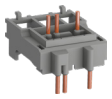
**Manual motor starters**



**Contactors**



**Accessories**



BEA..-4



CA4-10

| IEC AC-3, 400 V Rated operational power | current | Manual motor starters Type (1) | Order code | Setting range | Rated instantaneous short-circuit current setting Ii | Contactors Rated control circuit voltage Uc min. ... Uc max. (2) | | Type (3) | Order code | Allowed setting current | Accessories Type | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | V 50/60 Hz | V DC (6) | | | | | |
| kW | A | | | A | A | | | | | A | | |
| 0.06 | 0.2 | MS132-0.25 | 1SAM350000R1002 | 0.16...0.25 | 3.13 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 0.25 | BEA16-4 | 1SBN081306T1000 |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.09 | 0.3 | MS132-0.4 | 1SAM350000R1003 | 0.25...0.40 | 5 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 0.4 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.12 | 0.44 | MS132-0.63 | 1SAM350000R1004 | 0.40...0.63 | 7.88 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 0.63 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.18 | 0.6 | MS132-0.63 | 1SAM350000R1004 | 0.40...0.63 | 7.88 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 0.63 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.25 | 0.85 | MS132-1.0 | 1SAM350000R1005 | 0.63...1.00 | 12.5 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 1 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.37 | 1.1 | MS132-1.6 | 1SAM350000R1006 | 1.00...1.60 | 20 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 1.6 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.55 | 1.5 | MS132-1.6 | 1SAM350000R1006 | 1.00...1.60 | 20 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 1.6 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.75 | 1.9 | MS132-2.5 | 1SAM350000R1007 | 1.60...2.50 | 31.25 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 2.5 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 1.1 | 2.7 | MS132-4.0 | 1SAM350000R1008 | 2.50...4.00 | 50 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | 4 | BEA26-4 | 1SBN082306T1000 |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | CA4-10 | 1SBN010110R1010 |
| 1.5 | 3.6 | MS132-4.0 | 1SAM350000R1008 | 2.50...4.00 | 50 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | 4 | | |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | |
| 2.2 | 4.9 | MS132-6.3 | 1SAM350000R1009 | 4.00...6.30 | 78.75 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | 6.3 | | |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | |
| 3 | 6.5 | MS132-10 | 1SAM350000R1010 | 6.30...10.0 | 150 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | 10 | | |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | |
| 4 | 8.5 | MS132-10 | 1SAM350000R1010 | 6.30...10.0 | 150 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | 10 | | |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | |
| 5.5 | 11.5 | MS132-12 | 1SAM350000R1012 | 8.00...12.0 | 180 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | 12 | BEA38-4 | 1SBN082306T2000 |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | CA4-10 | 1SBN010110R1010 |
| 7.5 | 15.5 | MS132-16 | 1SAM350000R1011 | 10.0...16.0 | 240 | 24...60 | 20...60 | AF30Z-30-00-21 | 1SBL276001R2100 | 16 | | |
| | | | | | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | |
| 11 | 22 | MS132-25 | 1SAM350000R1014 | 20.0...25.0 | 375 | 24...60 | 20...60 | AF30Z-30-00-21 | 1SBL276001R2100 | 25 | | |
| | | | | | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | |
| 15 | 29 | MS132-32 | 1SAM350000R1015 | 25.0...32.0 | 480 | 24...60 | 20...60 | AF30Z-30-00-21 | 1SBL276001R2100 | 32 | | |
| | | | | | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | |
| 18.5 | 35 | MS165-42 | 1SAM451000R1015 | 30.0...42.0 | 630 | 24...60 | 20...60 | AF40-30-00-11 | 1SBL347001R1100 | 40 | BEA65-4 | 1SBN083406R1000 |
| | | | | | | 100...250 | 100...250 | AF40-30-00-13 | 1SBL347001R1300 | | BPR65-4 (5) | 1SBN113405R1000 |
| 22 | 41 | MS165-54 | 1SAM451000R1016 | 40.0...54.0 | 810 | 24...60 | 20...60 | AF52-30-00-11 | 1SBL367001R1100 | 53 | CA4-10 | 1SBN010110R1010 |
| | | | | | | 100...250 | 100...250 | AF52-30-00-13 | 1SBL367001R1300 | | | |
| 30 | 55 | MS165-65 | 1SAM451000R1017 | 52.0...65.0 | 975 | 24...60 | 20...60 | AF65-30-00-11 | 1SBL387001R1100 | 65 | | |
| | | | | | | 100...250 | 100...250 | AF65-30-00-13 | 1SBL387001R1300 | | | |
| 37 | 66 | MS165-73 | 1SAM451000R1018 | 62.0...73.0 | 1022 | 24...60 | 20...60 | AF80-30-00-11 | 1SBL397001R1100 | 75 | - | - |
| | | | | | | 100...250 | 100...250 | AF80-30-00-13 | 1SBL397001R1300 | | | |
| 45 | 80 | MS165-80 | 1SAM451000R1019 | 70.0 - 80.0 | 1120 | 24...60 | 20...60 | AF96-30-00-11 | 1SBL407001R1100 | 90 | | |
| | | | | | | 100...250 | 100...250 | AF96-30-00-13 | 1SBL407001R1300 | | | |

(1) MS116 manual motor starter can be selected according to the current setting range indicated on the coordination line, up to
- 15 kW 400V - AC-3 at 16 kA
- 4 kW, 400 V - AC-3 at 50 kA.

(2) For other control voltages, see "Voltage code table".

(3) AF26 3-pole contactor can be selected for coordination type 2, 16 kA, 7.5 kW, 400 V - AC-3.
AF38 3-pole contactor can be selected for coordination type 2, 16 kA and 50 kA, 18.5 kW, 400 V - AC-3 (BEA65-4 available for AF40 ... AF65 only).

(4) BEA26-4 should be selected with MS116-12 ... MS116-16 and AF26 ... AF38.
BEA38-4 can only be selected with MS116-20 ... MS116-32.

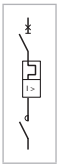
(5) For direct mounting on 2 rails 35 mm of MS165 with AF40 ... AF65: BEA65-4 must be associated with BPR65-4 fixed on contactor base. Applicable for MS165 manufactured after week 31, 2016 (date code > 16114).

(6) AF ... -11 not suitable for direct control by PLC-output.

# DOL starters protected by MS manual motor starters

## Coordination type 1 and type 2 with Push-in Spring terminals

### Coordination type 1, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz



**Manual motor starters**



**Contactors**



**Accessories**



BEA..-4KF



CA4-10K

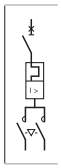
| IEC AC-3, 400 V Rated operational power | current | Manual motor starters Type | Order code | Setting range | Rated instantaneous short-circuit current setting Ii | Contactors Rated control circuit voltage Uc min. ... Uc max. (1) | | Type | Order code | Allowed setting current | Accessories Type | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| kW | A | | | A | A | V 50/60 Hz | V DC | | | A | | |
| **Coordination type 1, AC-3, 50 kA, 400 V, 50/60 Hz** | | | | | | | | | | | | |
| 0.06 | 0.2 | MS132-0.25K | 1SAM350010R1002 | 0.16...0.25 | 3.10 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 0.25 | BEA16-4KF | 1SBN081325T1000 |
| 0.09 | 0.3 | MS132-0.4K | 1SAM350010R1003 | 0.25...0.40 | 5 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 0.4 | | |
| 0.12 | 0.44 | MS132-0.63K | 1SAM350010R1004 | 0.40...0.63 | 7.9 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 0.63 | | |
| 0.18 | 0.6 | MS132-0.63K | 1SAM350010R1004 | 0.40...0.63 | 7.9 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 0.63 | | |
| 0.25 | 0.85 | MS132-1.0K | 1SAM350010R1005 | 0.63...1.00 | 12.5 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 1 | | |
| 0.37 | 1.1 | MS132-1.6K | 1SAM350010R1006 | 1.00...1.60 | 20 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 1.6 | | |
| 0.55 | 1.5 | MS132-1.6K | 1SAM350010R1006 | 1.00...1.60 | 20 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 1.6 | | |
| 0.75 | 1.9 | MS132-2.5K | 1SAM350010R1007 | 1.60...2.50 | 31.3 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 2.5 | | |
| 1.1 | 2.7 | MS132-4.0K | 1SAM350010R1008 | 2.50...4.00 | 50 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 4 | | |
| 1.5 | 3.6 | MS132-4.0K | 1SAM350010R1008 | 2.50...4.00 | 50 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 4 | | |
| 2.2 | 4.9 | MS132-6.3K | 1SAM350010R1009 | 4.00...6.30 | 78.8 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 6.3 | | |
| 3 | 6.5 | MS132-10K | 1SAM350010R1010 | 6.30...10.0 | 150 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 9 | | |
| 4 | 8.5 | MS132-10K | 1SAM350010R1010 | 6.30...10.0 | 150 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 9 | | |
| 5.5 | 11.5 | MS132-16K | 1SAM350010R1011 | 10.0...16.0 | 240 | 100...250 | 100...250 | AF12-30-10K-13 | 1SBL157005R1310 | 12 | | |
| 7.5 | 15.5 | MS132-16K | 1SAM350010R1011 | 10.0...16.0 | 240 | 100...250 | 100...250 | AF16-30-10K-13 | 1SBL177005R1310 | 16 | | |
| 11 | 22 | MS132-25K | 1SAM350010R1014 | 20.0...25.0 | 375 | 100...250 | 100...250 | AF26-30-00K-13 | 1SBL237005R1300 | 25 | BEA38-4KF | 1SBN082325T2000 |
| 15 | 29 | MS132-32K | 1SAM350010R1015 | 25.0...32.0 | 480 | 100...250 | 100...250 | AF30-30-00K-13 | 1SBL277005R1300 | 32 | CA4-10K | 1SBN010160R1010 |
| **Coordination type 2, AC-3,50 kA, 400 V, 50/60 Hz** | | | | | | | | | | | | |
| 0.06 | 0.2 | MS132-0.25K | 1SAM350010R1002 | 0.16...0.25 | 3.10 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 0.25 | BEA16-4KF | 1SBN081325T1000 |
| 0.09 | 0.3 | MS132-0.4K | 1SAM350010R1003 | 0.25...0.40 | 5 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 0.4 | | |
| 0.12 | 0.44 | MS132-0.63K | 1SAM350010R1004 | 0.40...0.63 | 7.9 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 0.63 | | |
| 0.18 | 0.6 | MS132-0.63K | 1SAM350010R1004 | 0.40...0.63 | 7.9 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 0.63 | | |
| 0.25 | 0.85 | MS132-1.0K | 1SAM350010R1005 | 0.63...1.00 | 12.5 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 1 | | |
| 0.37 | 1.1 | MS132-1.6K | 1SAM350010R1006 | 1.00...1.60 | 20 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 1.6 | | |
| 0.55 | 1.5 | MS132-1.6K | 1SAM350010R1006 | 1.00...1.60 | 20 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 1.6 | | |
| 0.75 | 1.9 | MS132-2.5K | 1SAM350010R1007 | 1.60...2.50 | 31.3 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 2.5 | | |
| 1.1 | 2.7 | MS132-4.0K | 1SAM350010R1008 | 2.50...4.00 | 50 | 100...250 | 100...250 | AF26-30-00K-13 | 1SBL237005R1300 | 4 | BEA38-4KF | 1SBN082325T2000 |
| 1.5 | 3.6 | MS132-4.0K | 1SAM350010R1008 | 2.50...4.00 | 50 | 100...250 | 100...250 | AF26-30-00K-13 | 1SBL237005R1300 | 4 | CA4-10K | 1SBN010160R1010 |
| 2.2 | 4.9 | MS132-6.3K | 1SAM350010R1009 | 4.00...6.30 | 78.8 | 100...250 | 100...250 | AF26-30-00K-13 | 1SBL237005R1300 | 6.3 | | |
| 3 | 6.5 | MS132-10K | 1SAM350010R1010 | 6.30...10.0 | 150 | 100...250 | 100...250 | AF26-30-00K-13 | 1SBL237005R1300 | 10 | | |
| 4 | 8.5 | MS132-10K | 1SAM350010R1010 | 6.30...10.0 | 150 | 100...250 | 100...250 | AF26-30-00K-13 | 1SBL237005R1300 | 10 | | |
| 5.5 | 11.5 | MS132-16K | 1SAM350010R1011 | 10.0...16.0 | 240 | 100...250 | 100...250 | AF26-30-00K-13 | 1SBL237005R1300 | 12 | | |
| 7.5 (2) | 15.5 | MS132-16K | 1SAM350010R1011 | 10.0...16.0 | 240 | 100...250 | 100...250 | AF30-30-00K-13 | 1SBL277005R1300 | 16 | | |
| 11 | 22 | MS132-25K | 1SAM350010R1014 | 20.0...25.0 | 375 | 100...250 | 100...250 | AF30-30-00K-13 | 1SBL277005R1300 | 25 | | |
| 15 | 29 | MS132-32K | 1SAM350010R1015 | 25.0...32.0 | 480 | 100...250 | 100...250 | AF30-30-00K-13 | 1SBL277005R1300 | 32 | | |

(1) For other control voltages, see "ordering details pages".
(2) AF26 3-pole contactor can be selected for coordination type 2, 16 kA, 7.5 kW, 400 V - AC-3.

# Reversing starters protected by MS manual motor starters

## Coordination type 1

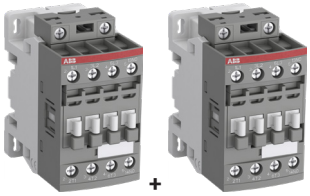
### Coordination type 1, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz



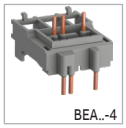
**Manual motor starters**

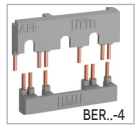


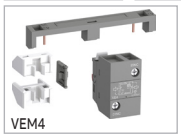
**Contactors**



**Accessories**







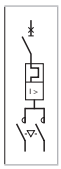
| IEC AC-3, 400 V Rated operational power kW | current A | Type (1) | Order code | Setting range A | Rated instantaneous short-circuit current setting Ii A | Rated control circuit voltage Uc min. ... Uc max. (2) V 50/60 Hz | V DC | Type (3) | Order code | Allowed setting current A | Type | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.06 | 0.2 | MS132-0.25 | 1SAM350000R1002 | 0.16...0.25 | 3.13 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 0.25 | BEA16-4 | 1SBN081306T1000 |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | BER16-4 | 1SBN081311R1000 |
| 0.09 | 0.3 | MS132-0.4 | 1SAM350000R1003 | 0.25...0.40 | 5 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 0.4 | VEM4 | 1SBN030111R1000 |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.12 | 0.44 | MS132-0.63 | 1SAM350000R1004 | 0.40...0.63 | 7.88 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 0.63 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.18 | 0.6 | MS132-0.63 | 1SAM350000R1004 | 0.40...0.63 | 7.88 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 0.63 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.25 | 0.85 | MS132-1.0 | 1SAM350000R1005 | 0.63...1.00 | 12.5 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 1 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.37 | 1.1 | MS132-1.6 | 1SAM350000R1006 | 1.00...1.60 | 20 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 1.6 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.55 | 1.5 | MS132-1.6 | 1SAM350000R1006 | 1.00...1.60 | 20 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 1.6 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.75 | 1.9 | MS132-2.5 | 1SAM350000R1007 | 1.60...2.50 | 31.25 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 2.5 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 1.1 | 2.7 | MS132-4.0 | 1SAM350000R1008 | 2.50...4.00 | 50 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 4 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 1.5 | 3.6 | MS132-4.0 | 1SAM350000R1008 | 2.50...4.00 | 50 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 4 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 2.2 | 4.9 | MS132-6.3 | 1SAM350000R1009 | 4.00...6.30 | 78.75 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 6.3 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 3 | 6.5 | MS132-10 | 1SAM350000R1010 | 6.30...10.0 | 150 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 9 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 4 | 8.5 | MS132-10 | 1SAM350000R1010 | 6.30...10.0 | 150 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 9 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 5.5 | 11.5 | MS132-12 | 1SAM350000R1012 | 8.00...12.0 | 180 | 24...60 | 20...60 | AF12Z-30-10-21 | 1SBL156001R2110 | 12 | | |
| | | | | | | 100...250 | 100...250 | AF12-30-10-13 | 1SBL157001R1310 | | | |
| 7.5 | 15.5 | MS132-16 | 1SAM350000R1011 | 10.0...16.0 | 240 | 24...60 | 20...60 | AF16Z-30-10-21 | 1SBL176001R2110 | 16 | | |
| | | | | | | 100...250 | 100...250 | AF16-30-10-13 | 1SBL177001R1310 | | | |
| 11 | 22 | MS132-25 | 1SAM350000R1014 | 20.0...25.0 | 375 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | 25 | BEA38-4 | 1SBN082306T2000 |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | BER38-4 | 1SBN082311R1000 |
| 15 | 29 | MS132-32 | 1SAM350000R1015 | 25.0...32.0 | 480 | 24...60 | 20...60 | AF30Z-30-00-21 | 1SBL276001R2100 | 32 | VEM4 | 1SBN030111R1000 |
| | | | | | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | 2x CA4-10 | 1SBN010110R1010 |
| 18.5 | 35 | MS165-42 | 1SAM451000R1015 | 30.0...42.0 | 630 | 24...60 | 20...60 | AF40-30-00-11 | 1SBL347001R1100 | 40 | BEA65-4 | 1SBN083406R1000 |
| | | | | | | 100...250 | 100...250 | AF40-30-00-13 | 1SBL347001R1300 | | 2x BPR65-4 (4) | 1SBN113405R1000 |
| 22 | 41 | MS165-54 | 1SAM451000R1016 | 40.0...54.0 | 810 | 24...60 | 20...60 | AF52-30-00-11 | 1SBL367001R1100 | 53 | BER65-4 | 1SBN083411R1000 |
| | | | | | | 100...250 | 100...250 | AF52-30-00-13 | 1SBL367001R1300 | | VM96-4 | 1SBN033405T1000 |
| 30 | 55 | MS165-65 | 1SAM451000R1017 | 52.0...65.0 | 975 | 24...60 | 20...60 | AF65-30-00-11 | 1SBL387001R1100 | 65 | 2x CA4-10 | 1SBN010110R1010 |
| | | | | | | 100...250 | 100...250 | AF65-30-00-13 | 1SBL387001R1300 | | 2x CA4-01 | 1SBN010110R1001 |
| 37 | 66 | MS165-73 | 1SAM451000R1018 | 62.0...73.0 | 1022 | 24...60 | 20...60 | AF80-30-00-11 | 1SBL397001R1100 | 75 | BER96-4 | 1SBN083911R1000 |
| | | | | | | 100...250 | 100...250 | AF80-30-00-13 | 1SBL397001R1300 | | VM96-4 | 1SBN033405T1000 |
| 45 | 80 | MS165-80 | 1SAM451000R1019 | 70.0 - 80.0 | 1120 | 24...60 | 20...60 | AF96-30-00-11 | 1SBL407001R1100 | 90 | 2x CA4-10 | 1SBN010110R1010 |
| | | | | | | 100...250 | 100...250 | AF96-30-00-13 | 1SBL407001R1300 | | 2x CA4-01 | 1SBN010110R1001 |

(1) MS116 manual motor starter can be selected according to the current setting range indicated on the coordination line, up to: - 15 kW, 400 V - AC-3 at 16 kA - 4 kW, 400 V - AC-3 at 50 kA.
(2) For other control voltages, see "Voltage code table".
(3) AF38 3-pole contactor can be selected for coordination type 1, 16 kA and 50 kA, 18.5 kW, 400 V - AC-3 (BEA65-4 available for AF40 ... AF65 only).
(4) For direct mounting on 2 rails 35 mm of MS165 with AF40 ... AF65: BEA65-4 must be associated with BPR65-4 fixed on each contactor base. Applicable for MS165 manufactured after week 31, 2016 (date code > 16114).
(5) AF ... -11 not suitable for direct control by PLC-output.

# Reversing starters protected by MS manual motor starters

## Coordination type 2

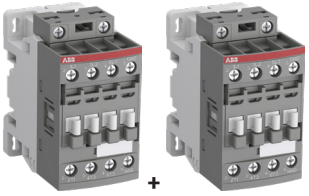
### Coordination type 2, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz



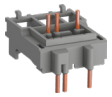
**Manual motor starters**

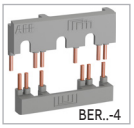


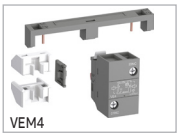
**Contactors**



**Accessories**


BEA..-4


BER..-4


VEM4


CA4-10

| IEC AC-3, 400 V Rated operational power kW | current A | Type (1) | Order code | Setting range A | Rated instantaneous short-circuit currentsetting Ii | Rated control circuit voltage Uc min. ... Uc max. (2) V 50/60 Hz | V DC | Type (3) | Order code | Allowed setting current A | Type (4) | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.06 | 0.2 | MS132-0.25 | 1SAM350000R1002 | 0.16...0.25 | 3.13 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 0.25 | BEA16-4 | 1SBN081306T1000 |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | BER16-4 | 1SBN081311R1000 |
| 0.09 | 0.3 | MS132-0.4 | 1SAM350000R1003 | 0.25...0.40 | 5 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 0.4 | VEM4 | 1SBN030111R1000 |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.12 | 0.44 | MS132-0.63 | 1SAM350000R1004 | 0.40...0.63 | 7.88 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 0.63 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.18 | 0.6 | MS132-0.63 | 1SAM350000R1004 | 0.40...0.63 | 7.88 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 0.63 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.25 | 0.85 | MS132-1.0 | 1SAM350000R1005 | 0.63...1.00 | 12.5 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 1 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.37 | 1.1 | MS132-1.6 | 1SAM350000R1006 | 1.00...1.60 | 20 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 1.6 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.55 | 1.5 | MS132-1.6 | 1SAM350000R1006 | 1.00...1.60 | 20 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 1.6 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.75 | 1.9 | MS132-2.5 | 1SAM350000R1007 | 1.60...2.50 | 31.25 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 2.5 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 1.1 | 2.7 | MS132-4.0 | 1SAM350000R1008 | 2.50...4.00 | 50 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | 4 | BEA26-4 | 1SBN082306T1000 |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | BER38-4 | 1SBN082311R1000 |
| 1.5 | 3.6 | MS132-4.0 | 1SAM350000R1008 | 2.50...4.00 | 50 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | 4 | VEM4 | 1SBN030111R1000 |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | 2x CA4-10 | 1SBN010110R1010 |
| 2.2 | 4.9 | MS132-6.3 | 1SAM350000R1009 | 4.00...6.30 | 78.75 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | 6.3 | | |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | |
| 3 | 6.5 | MS132-10 | 1SAM350000R1010 | 6.30...10.0 | 150 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | 10 | | |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | |
| 4 | 8.5 | MS132-10 | 1SAM350000R1010 | 6.30...10.0 | 150 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | 10 | | |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | |
| 5.5 | 11.5 | MS132-12 | 1SAM350000R1012 | 8.00...12.0 | 180 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | 12 | BEA38-4 | 1SBN082306T2000 |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | BER38-4 | 1SBN082311R1000 |
| 7.5 | 15.5 | MS132-16 | 1SAM350000R1011 | 10.0...16.0 | 240 | 24...60 | 20...60 | AF30Z-30-00-21 | 1SBL276001R2100 | 16 | VEM4 | 1SBN030111R1000 |
| | | | | | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | 2x CA4-10 | 1SBN010110R1010 |
| 11 | 22 | MS132-25 | 1SAM350000R1014 | 20.0...25.0 | 375 | 24...60 | 20...60 | AF30Z-30-00-21 | 1SBL276001R2100 | 25 | | |
| | | | | | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | |
| 15 | 29 | MS132-32 | 1SAM350000R1015 | 25.0...32.0 | 480 | 24...60 | 20...60 | AF30Z-30-00-21 | 1SBL276001R2100 | 32 | | |
| | | | | | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | |
| 18.5 | 35 | MS165-42 | 1SAM451000R1015 | 30.0...42.0 | 630 | 24...60 | 20...60 | AF40-30-00-11 | 1SBL347001R1100 | 40 | BEA65-4 | 1SBN083406R1000 |
| | | | | | | 100...250 | 100...250 | AF40-30-00-13 | 1SBL347001R1300 | | 2x BPR65-4 (5) | 1SBN113405R1000 |
| 22 | 41 | MS165-54 | 1SAM451000R1016 | 40.0...54.0 | 810 | 24...60 | 20...60 | AF52-30-00-11 | 1SBL367001R1100 | 53 | BER65-4 | 1SBN083411R1000 |
| | | | | | | 100...250 | 100...250 | AF52-30-00-13 | 1SBL367001R1300 | | VM96-4 | 1SBN033405T1000 |
| 30 | 55 | MS165-65 | 1SAM451000R1017 | 52.0...65.0 | 975 | 24...60 | 20...60 | AF65-30-00-11 | 1SBL387001R1100 | 65 | 2x CA4-10 | 1SBN010110R1010 |
| | | | | | | 100...250 | 100...250 | AF65-30-00-13 | 1SBL387001R1300 | | 2x CA4-01 | 1SBN010110R1001 |
| 37 | 66 | MS165-73 | 1SAM451000R1018 | 62.0...73.0 | 1022 | 24...60 | 20...60 | AF80-30-00-11 | 1SBL397001R1100 | 75 | BER96-4 | 1SBN083911R1000 |
| | | | | | | 100...250 | 100...250 | AF80-30-00-13 | 1SBL397001R1300 | | VM96-4 | 1SBN033405T1000 |
| 45 | 80 | MS165-80 | 1SAM451000R1019 | 70.0 - 80.0 | 1120 | 24...60 | 20...60 | AF96-30-00-11 | 1SBL407001R1100 | 90 | 2x CA4-10 | 1SBN010110R1010 |
| | | | | | | 100...250 | 100...250 | AF96-30-00-13 | 1SBL407001R1300 | | 2x CA4-01 | 1SBN010110R1001 |

(1) MS116 manual motor starter can be selected according to the current setting range indicated on the coordination line, up to
- 15 kW 400V - AC-3 at 16 kA
- 4 kW, 400 V - AC-3 at 50 kA.

(2) For other control voltages, see "Voltage code table".

(3) AF26 3-pole contactor can be selected for coordination type 2, 16 kA, 7.5 kW, 400 V - AC-3.
AF38 3-pole contactor can be selected for coordination type 2, 16 kA and 50 kA, 18.5 kW, 400 V - AC-3 (BEA65-4 available for AF40 ... AF65 only).

(4) BEA26-4 should be selected with MS116-12 ... MS116-16 and AF26 ... AF38.
BEA38-4 can only be selected with MS116-20 ... MS116-32.

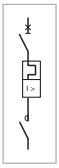
(5) For direct mounting on 2 rails 35 mm of MS165 with AF40 ... AF65: BEA65-4 must be associated with BPR65-4 fixed on each contactor base. Applicable for MS165 manufactured after week 31, 2016 (date code > 16114).

(6) AF ... -11 not suitable for direct control by PLC-output.

# Reversing starters protected by MS manual motor starters

Coordination type 1 and type 2 with Push-in Spring terminals

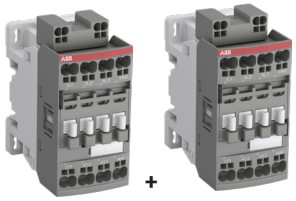
## Coordination type 1, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz



### Manual motor starters

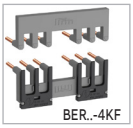


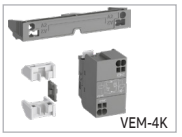
### Contactors



### Accessories


BEA..-4KF


BER..-4KF


VEM-4K


CA4-10K

| IEC AC-3, 400 V Rated operational power | current | Type | Order code | Setting range | Rated instantaneous short-circuit current setting Ii | Rated control circuit voltage Uc min. ... Uc max. (1) | | Type | Order code | Allowed setting current | Type | Order code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| kW | A | | | A | A | V 50/60 Hz | V DC | | | A | | |
| **Coordination type 1, AC-3, 50 kA, 400 V, 50/60 Hz** | | | | | | | | | | | | |
| 0.06 | 0.2 | MS132-0.25K | 1SAM350010R1002 | 0.16...0.25 | 3.10 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 0.25 | BEA16-4KF | 1SBN081325T1000 |
| 0.09 | 0.3 | MS132-0.4K | 1SAM350010R1003 | 0.25...0.40 | 5 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 0.4 | BER16-4KF | 1SBN081322R1000 |
| 0.12 | 0.44 | MS132-0.63K | 1SAM350010R1004 | 0.40...0.63 | 7.9 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 0.63 | VEM4K | 1SBN030113R1000 |
| 0.18 | 0.6 | MS132-0.63K | 1SAM350010R1004 | 0.40...0.63 | 7.9 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 0.63 | | |
| 0.25 | 0.85 | MS132-1.0K | 1SAM350010R1005 | 0.63...1.00 | 12.5 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 1 | | |
| 0.37 | 1.1 | MS132-1.6K | 1SAM350010R1006 | 1.00...1.60 | 20 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 1.6 | | |
| 0.55 | 1.5 | MS132-1.6K | 1SAM350010R1006 | 1.00...1.60 | 20 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 1.6 | | |
| 0.75 | 1.9 | MS132-2.5K | 1SAM350010R1007 | 1.60...2.50 | 31.3 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 2.5 | | |
| 1.1 | 2.7 | MS132-4.0K | 1SAM350010R1008 | 2.50...4.00 | 50 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 4 | | |
| 1.5 | 3.6 | MS132-4.0K | 1SAM350010R1008 | 2.50...4.00 | 50 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 4 | | |
| 2.2 | 4.9 | MS132-6.3K | 1SAM350010R1009 | 4.00...6.30 | 78.8 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 6.3 | | |
| 3 | 6.5 | MS132-10K | 1SAM350010R1010 | 6.30...10.0 | 150 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 9 | | |
| 4 | 8.5 | MS132-10K | 1SAM350010R1010 | 6.30...10.0 | 150 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 9 | | |
| 5.5 | 11.5 | MS132-16K | 1SAM350010R1011 | 10.0...16.0 | 240 | 100...250 | 100...250 | AF12-30-10K-13 | 1SBL157005R1310 | 12 | | |
| 7.5 | 15.5 | MS132-16K | 1SAM350010R1011 | 10.0...16.0 | 240 | 100...250 | 100...250 | AF16-30-10K-13 | 1SBL177005R1310 | 16 | | |
| 11 | 22 | MS132-25K | 1SAM350010R1014 | 20.0...25.0 | 375 | 100...250 | 100...250 | AF26-30-00K-13 | 1SBL237005R1300 | 25 | BEA38-4KF | 1SBN082325T2000 |
| 15 | 29 | MS132-32K | 1SAM350010R1015 | 25.0...32.0 | 480 | 100...250 | 100...250 | AF30-30-00K-13 | 1SBL277005R1300 | 32 | BER38-4KF | 1SBN082332R1000 |
| | | | | | | | | | | | VEM4K | 1SBN030113R1000 |
| | | | | | | | | | | | 2x CA4-10K | 1SBN010160R1010 |
| **Coordination type 2, AC-3,50 kA, 400 V, 50/60 Hz** | | | | | | | | | | | | |
| 0.06 | 0.2 | MS132-0.25K | 1SAM350010R1002 | 0.16...0.25 | 3.10 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 0.25 | BEA16-4KF | 1SBN081325T1000 |
| 0.09 | 0.3 | MS132-0.4K | 1SAM350010R1003 | 0.25...0.40 | 5 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 0.4 | BER16-4KF | 1SBN081322R1000 |
| 0.12 | 0.44 | MS132-0.63K | 1SAM350010R1004 | 0.40...0.63 | 7.9 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 0.63 | VEM4K | 1SBN030113R1000 |
| 0.18 | 0.6 | MS132-0.63K | 1SAM350010R1004 | 0.40...0.63 | 7.9 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 0.63 | | |
| 0.25 | 0.85 | MS132-1.0K | 1SAM350010R1005 | 0.63...1.00 | 12.5 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 1 | | |
| 0.37 | 1.1 | MS132-1.6K | 1SAM350010R1006 | 1.00...1.60 | 20 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 1.6 | | |
| 0.55 | 1.5 | MS132-1.6K | 1SAM350010R1006 | 1.00...1.60 | 20 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 1.6 | | |
| 0.75 | 1.9 | MS132-2.5K | 1SAM350010R1007 | 1.60...2.50 | 31.3 | 100...250 | 100...250 | AF09-30-10K-13 | 1SBL137005R1310 | 2.5 | | |
| 1.1 | 2.7 | MS132-4.0K | 1SAM350010R1008 | 2.50...4.00 | 50 | 100...250 | 100...250 | AF26-30-00K-13 | 1SBL237005R1300 | 4 | BEA38-4KF | 1SBN082325T2000 |
| 1.5 | 3.6 | MS132-4.0K | 1SAM350010R1008 | 2.50...4.00 | 50 | 100...250 | 100...250 | AF26-30-00K-13 | 1SBL237005R1300 | 4 | BER38-4KF | 1SBN082332R1000 |
| 2.2 | 4.9 | MS132-6.3K | 1SAM350010R1009 | 4.00...6.30 | 78.8 | 100...250 | 100...250 | AF26-30-00K-13 | 1SBL237005R1300 | 6.3 | VEM4K | 1SBN030113R1000 |
| 3 | 6.5 | MS132-10K | 1SAM350010R1010 | 6.30...10.0 | 150 | 100...250 | 100...250 | AF26-30-00K-13 | 1SBL237005R1300 | 10 | 2x CA4-10K | 1SBN010160R1010 |
| 4 | 8.5 | MS132-10K | 1SAM350010R1010 | 6.30...10.0 | 150 | 100...250 | 100...250 | AF26-30-00K-13 | 1SBL237005R1300 | 10 | | |
| 5.5 | 11.5 | MS132-16K | 1SAM350010R1011 | 10.0...16.0 | 240 | 100...250 | 100...250 | AF26-30-00K-13 | 1SBL237005R1300 | 12 | | |
| 7.5 (2) | 15.5 | MS132-16K | 1SAM350010R1011 | 10.0...16.0 | 240 | 100...250 | 100...250 | AF30-30-00K-13 | 1SBL277005R1300 | 16 | | |
| 11 | 22 | MS132-25K | 1SAM350010R1014 | 20.0...25.0 | 375 | 100...250 | 100...250 | AF30-30-00K-13 | 1SBL277005R1300 | 25 | | |
| 15 | 29 | MS132-32K | 1SAM350010R1015 | 25.0...32.0 | 480 | 100...250 | 100...250 | AF30-30-00K-13 | 1SBL277005R1300 | 32 | | |

(1) For other control voltages, see "ordering details pages"
(2) AF26 3-pole contactor can be selected for coordination type 2, 16 kA, 7.5 kW, 400 V - AC-3.

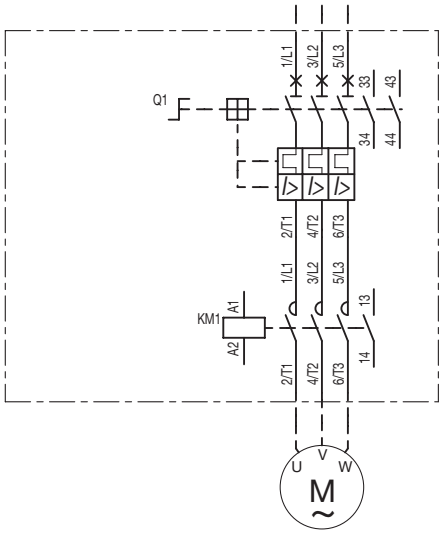
# DOL and reversing starters protected by manual motor starters

With AF contactors - open type version in kit form

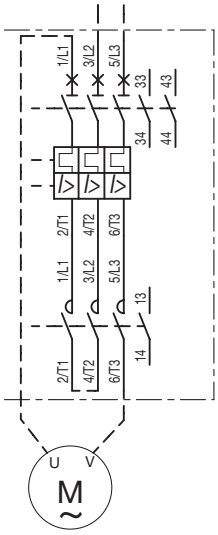
Wiring diagrams

### Direct-on-line starters

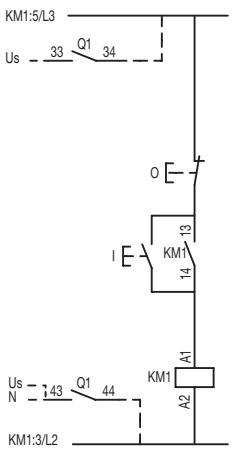
**Power circuit**




**1-phase**

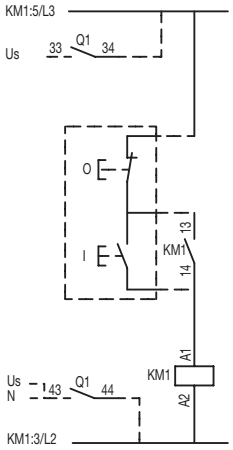



**AC or DC local control**



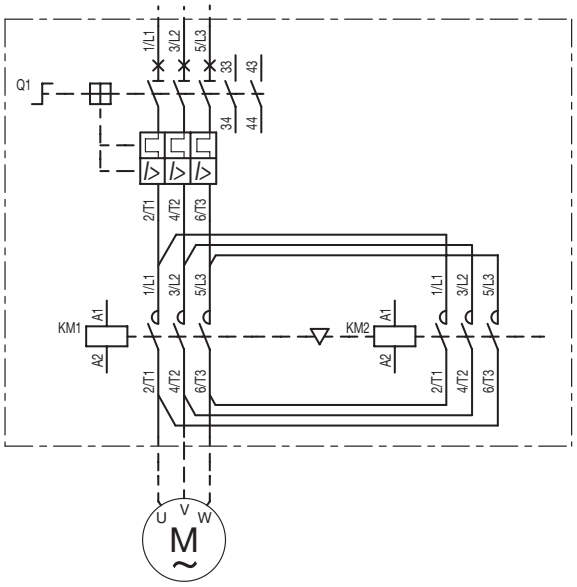

Note: coil Uc 12-20 V DC : A1+, A2-

**AC or DC remote control**

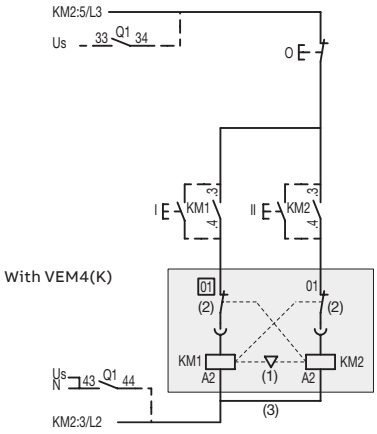



### Reversing starters

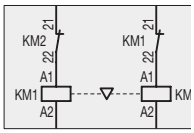
**Power circuit**



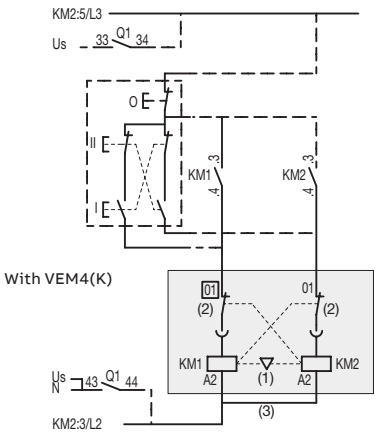

**AC or DC local control**



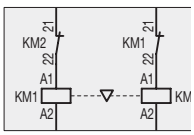

With VM




**AC or DC remote control**



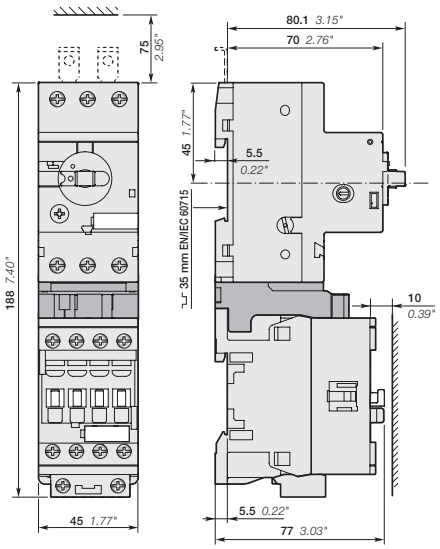

With VM



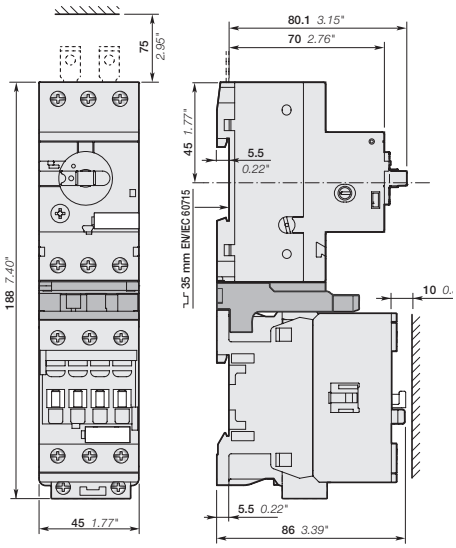

Note: - VEM4(K) = VM4 (1) + VE4(K) (2) with A2-A2 (3) connection
(Except for coil Uc 12-20 V DC : use VM4 with CA4(K)).
- coil Uc 12-20 V DC : A1+, A2-

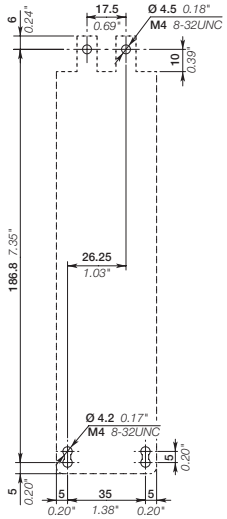
# DOL starters protected by MS116 manual motor starters

## With AF contactors - open type version in kit form




MS116-0.16 ... MS116-16
+ BEA16-4
+ AF09, AF12, AF16



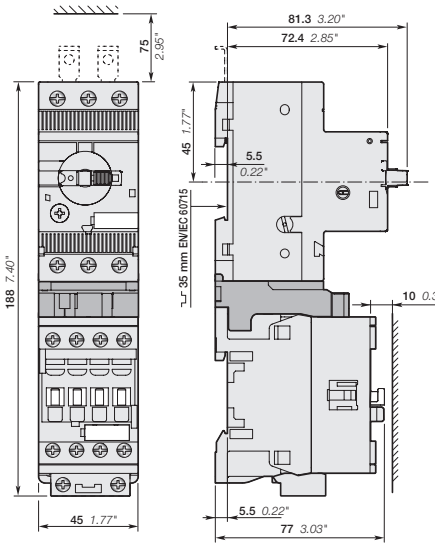

MS116-0.16 ... MS116-16
+ BEA26-4
+ AF26, AF30, AF38

Note: contactor lateral distance to grounded component 2 mm 0.08" min.

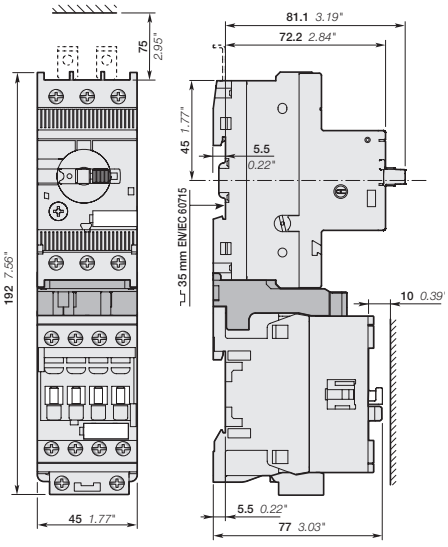
Main dimensions mm, inches

# DOL starters protected by MS132 manual motor starters

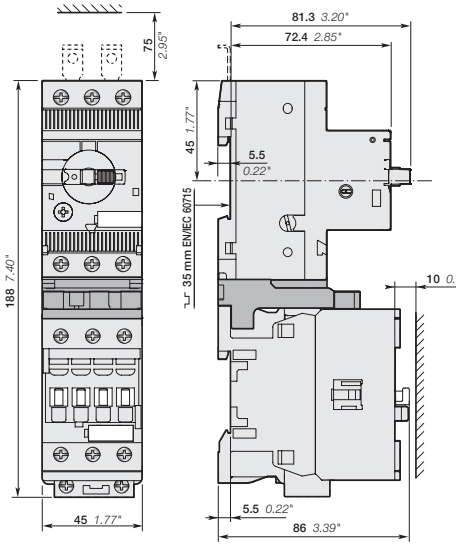
## With AF contactors - open type version in kit form



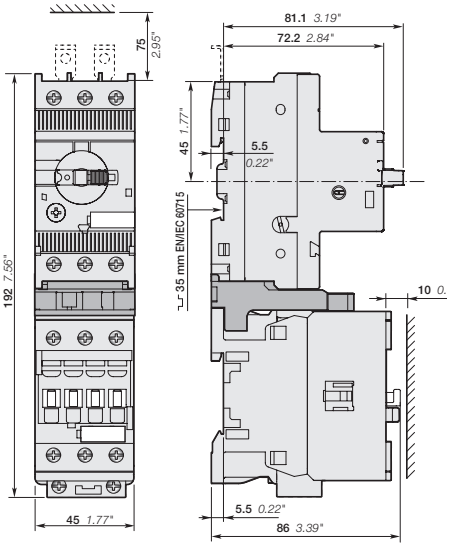

MS132-0.16 ... MS132-10
+ BEA16-4
+ AF09, AF12, AF16



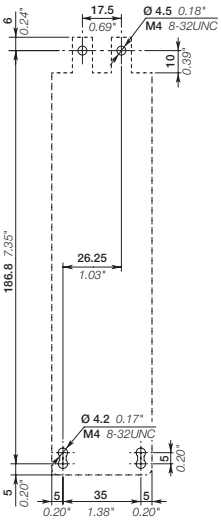

MS132-12 ... MS132-25
+ BEA16-4
+ AF09, AF12, AF16




MS132-0.16 ... MS132-10
+ BEA26-4
+ AF26, AF30, AF38




MS132-12 ... MS132-32
+ BEA38-4
+ AF26, AF30, AF38

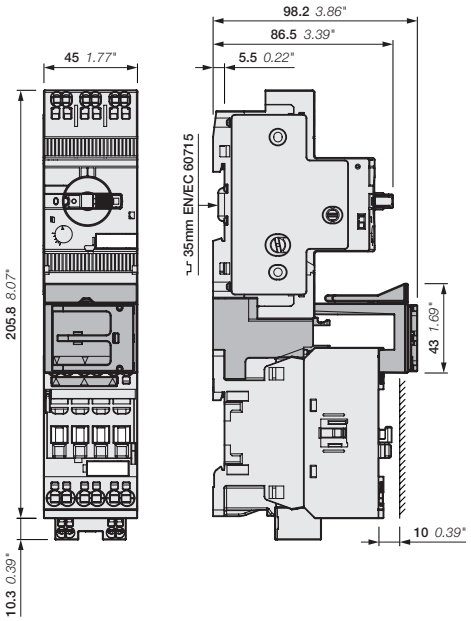



Note: contactor lateral distance to grounded component 2 mm 0.08" min.

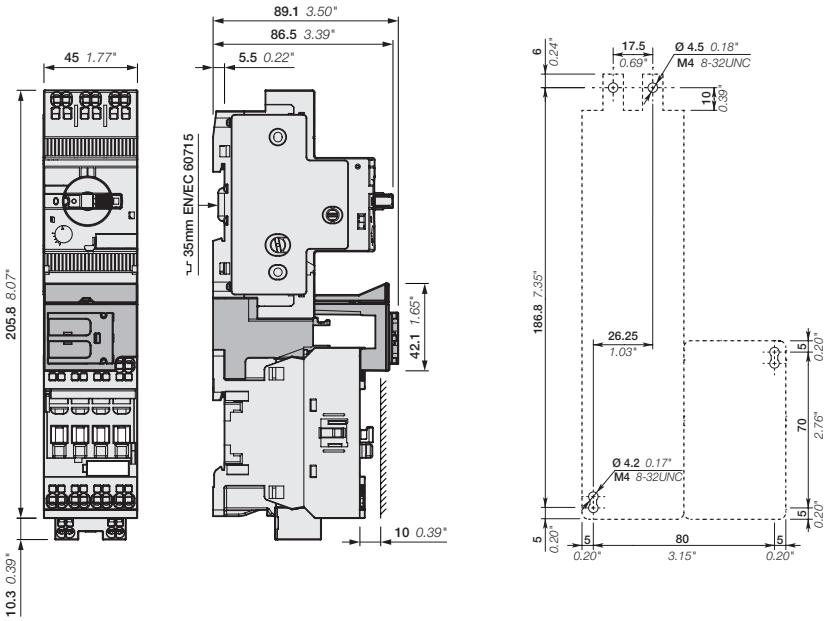
Main dimensions mm, inches

# DOL starters protected by MS132-K manual motor starters

## With AF..K contactors - open type version in kit form




MS132-0.16K ... MS132-32K
+ BEA16-4KF
+ AF09..K, AF12..K, AF16..K



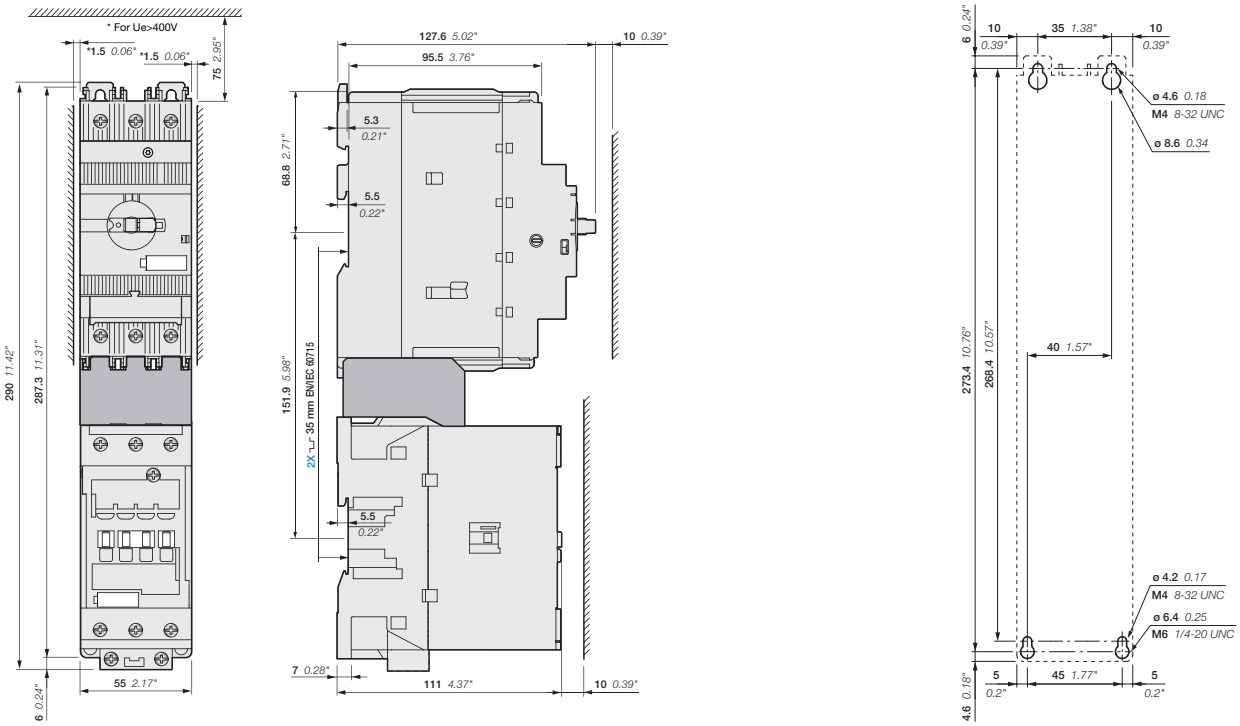

MS132-0.16K ... MS132-32K
+ BEA38-4KF
+ AF26..K, AF30..K, AF38..K

Note: contactor lateral distance to grounded component 2 mm 0.08" min.

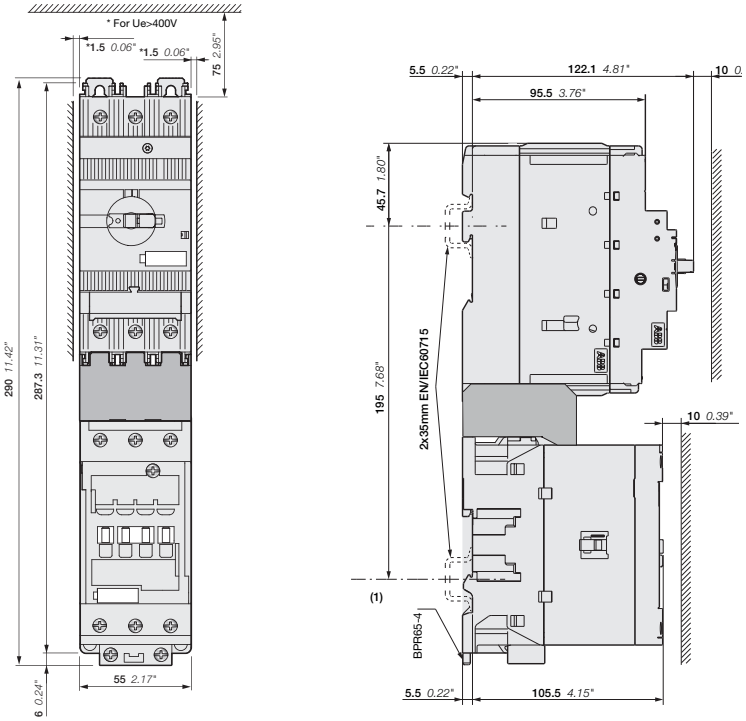
Main dimensions mm, inches

# DOL starters protected by MS165 manual motor starters

## With AF contactors - open type version in kit form




MS165
+ BEA65-4
+ AF40, AF52, AF65



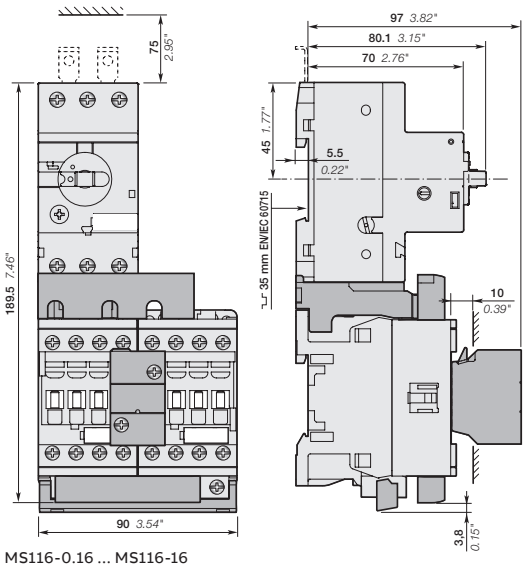

MS165
+ BEA65-4
+ AF40, AF52, AF65 + BPR65-4

Note: for Ue > 400 V, manual motor starter lateral distance to grounded component 1.5 mm 0.06" min.
(1) Assembly on fixed TH35 mm rails for DOL starter with BPR65-4 rail hook

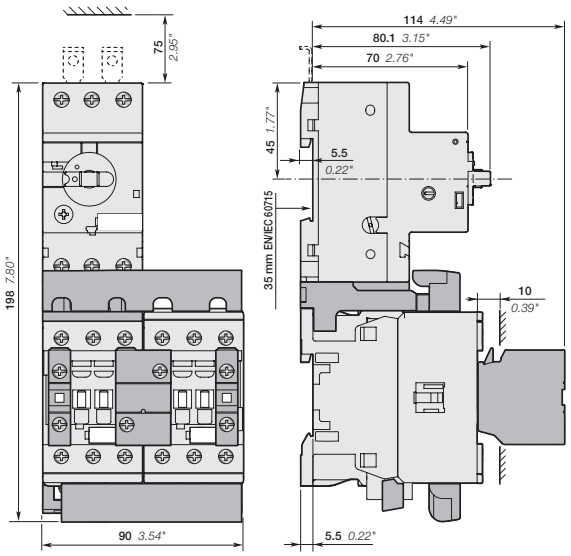
Main dimensions mm, inches

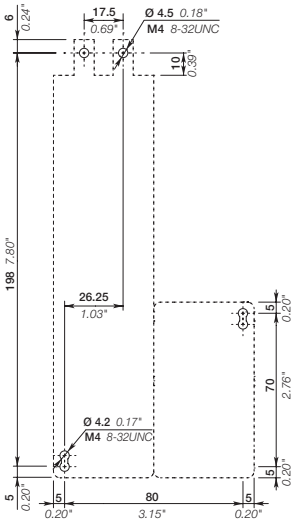
# Reversing starters protected by MS116 manual motor starters

## With AF contactors - open type version in kit form




MS116-0.16 ... MS116-16
+ BEA16-4, BER16-4, VEM4
+ AF09, AF12, AF16



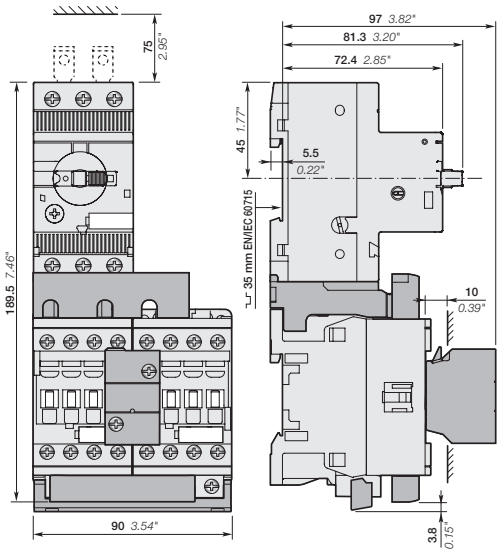

MS116-0.16 ... MS116-16
+ BEA26-4, BER38-4, VEM4, CA4-10
+ AF26, AF30, AF38

Note: contactor lateral distance to grounded component 2 mm 0.08" min.

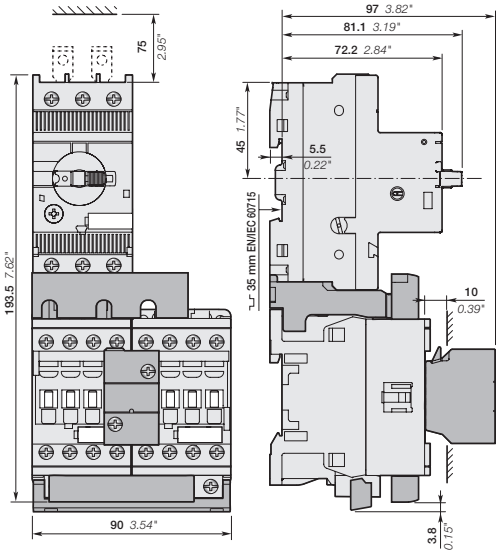
Main dimensions mm, inches

# Reversing starters protected by MS132 manual motor starters

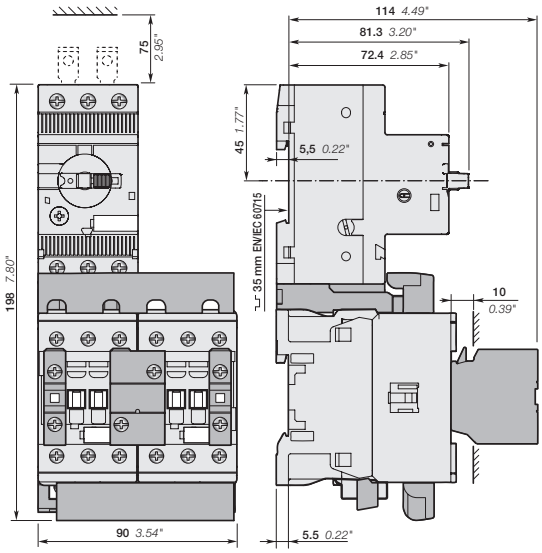
## With AF contactors - open type version in kit form



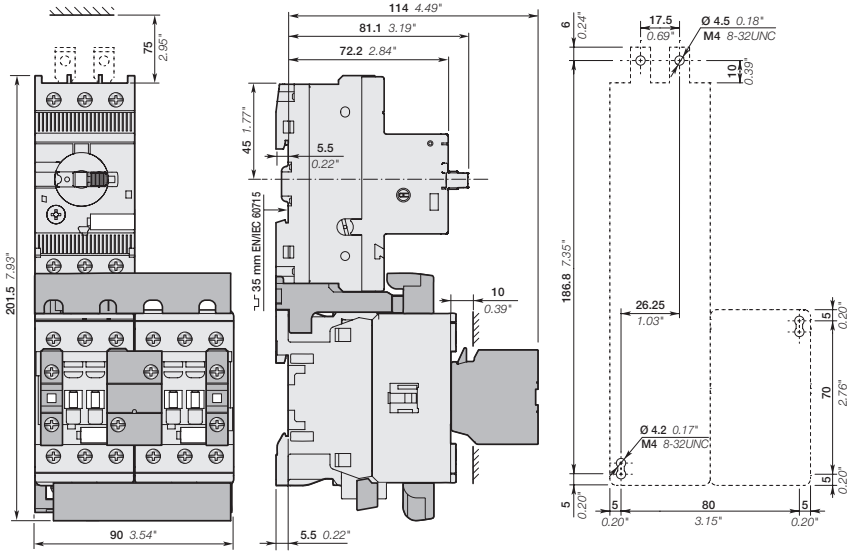

MS132-0.16 ... MS132-10
+ BEA16-4, BER16-4, VEM4
+ AF09, AF12, AF16




MS132-12 ... MS132-25
+ BEA16-4, BER16-4, VEM4
+ AF09, AF12, AF16




MS132-0.16 ... MS132-10
+ BEA26-4, BER38-4, VEM4, CA4-10
+ AF26, AF30, AF38



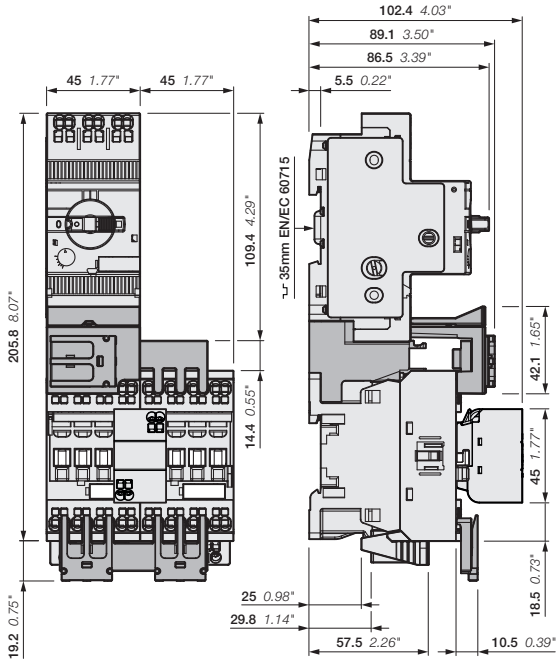

MS132-12 ... MS132-32
+ BEA38-4, BER38-4, VEM4, CA4-10
+ AF26, AF30, AF38

Note: contactor lateral distance to grounded component 2 mm 0.08" min.

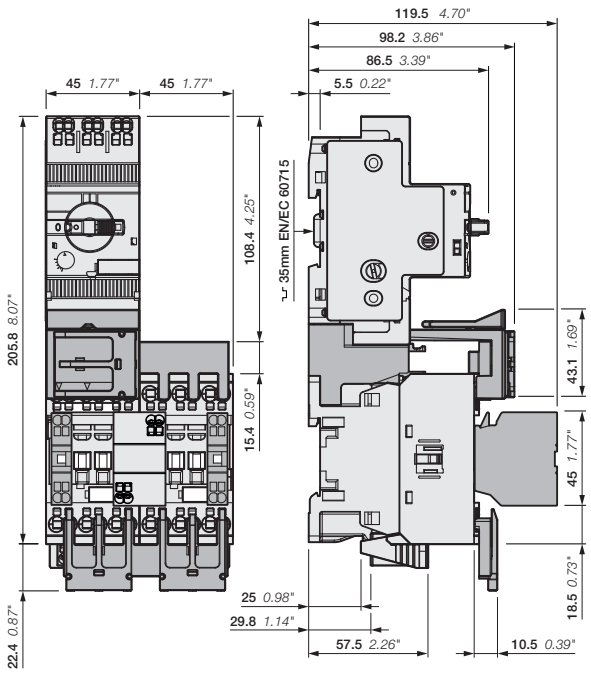
Main dimensions mm, inches

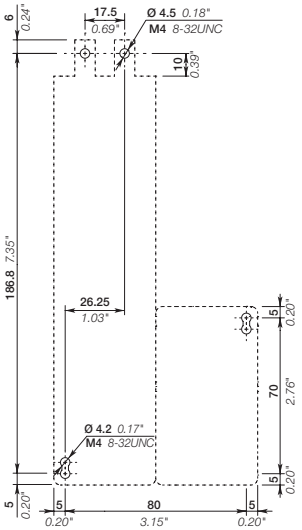
# DOL starters protected by MS132-K manual motor starters

## With AF..K contactors - open type version in kit form




MS132-0.16K ... MS132-32K
+ BEA16-4KF, BER16-4KF, VEM4K
+ AF09..K, AF12..K, AF16..K



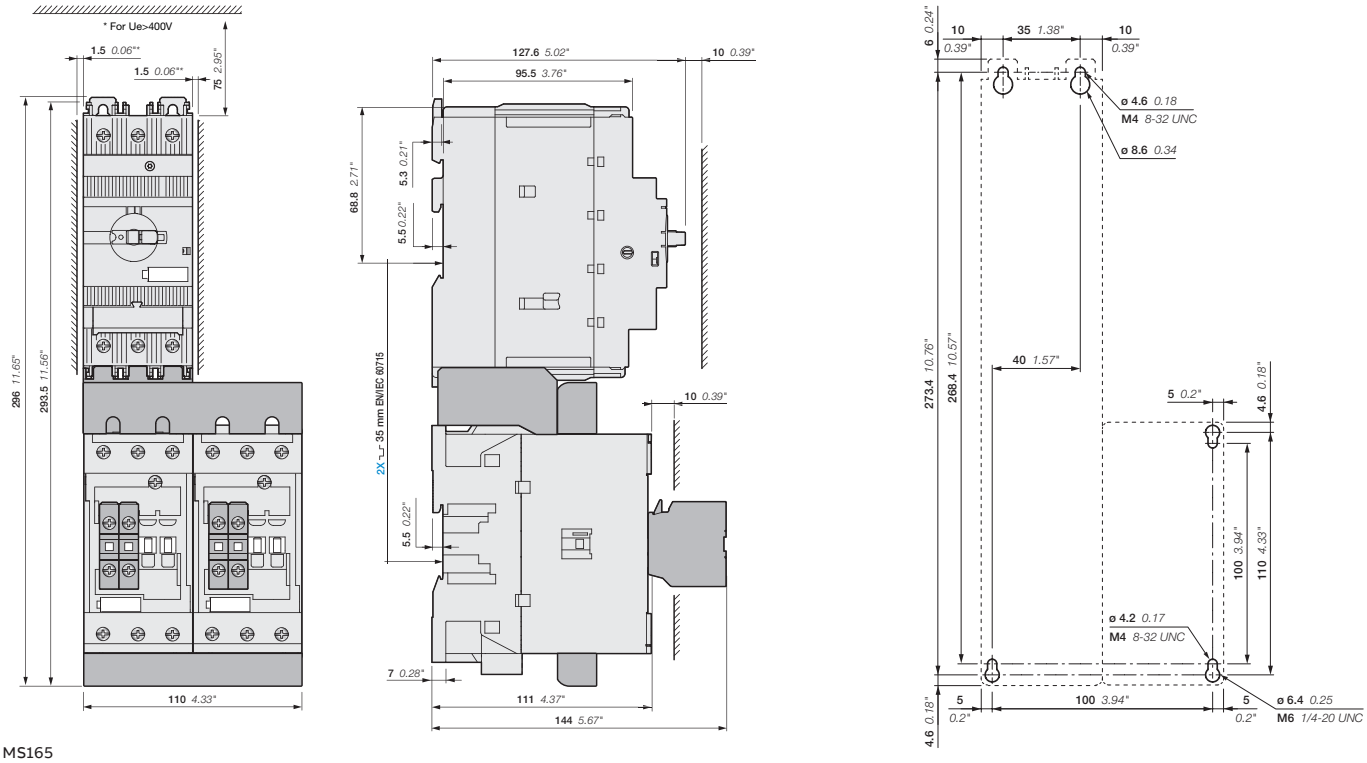

MS132-0.16K ... MS132-32K
+ BEA38-4KF, BER38-4KF, VEM4K, CA4-10K
+ AF26..K, AF30..K, AF38..K

Note: contactor lateral distance to grounded component 2 mm 0.08" min.

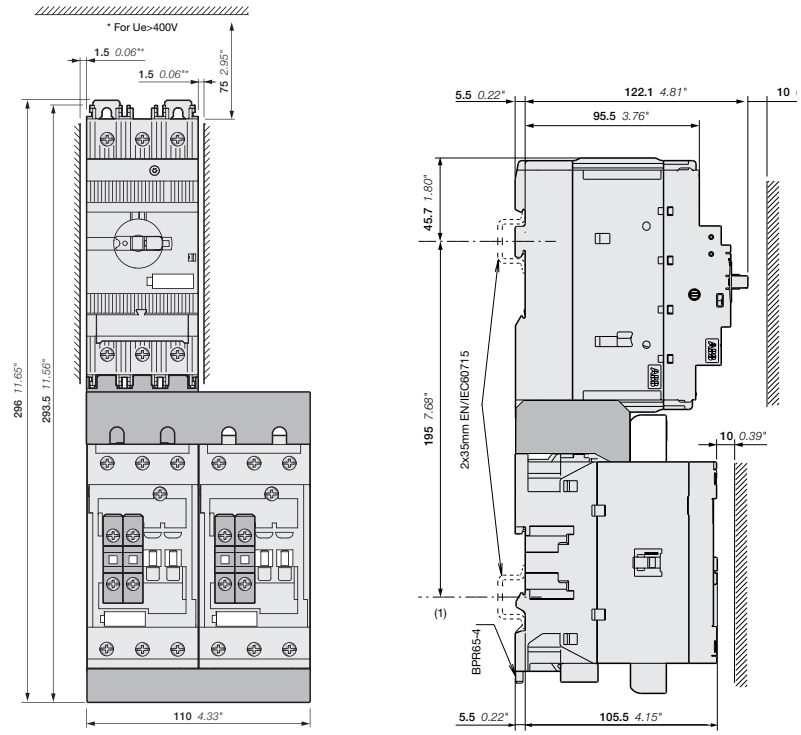
Main dimensions mm, inches

# Reversing starters protected by MS165 manual motor starters

## With AF contactors - open type version in kit form




MS165
+ BEA65-4, BER65-4, VM96-4
+ AF40, AF52, AF65




MS165
+ BEA65-4,
+ AF40, AF52, AF65 + 2x BPR65-4

Note: for Ue > 400 V, TH35 mm rails lateral distance to grounded component 1.5 mm 0.06" min.
(1): Assembly on fixed TH35 mm rails for reverser starter with 2 BPR65-4 rail hook

Main dimensions mm, inches

# DOL starters protected by moulded-case circuit-breakers and overload relays

## With AF contactors - open type version in kit form



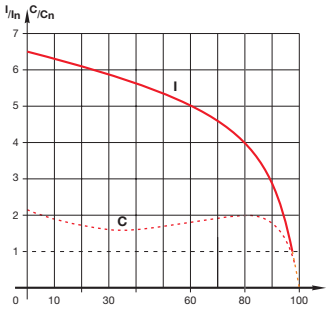

XT2S 160 + BEA140/XT2 + AF140-30-11




XT2S 160 + BEA140/XT2 + AF140-30-11 + EF146

### Application

Full voltage direct-on-line (DOL) starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.




I = current
C = torque
In = nominal current
Cn = nominal torque

### Coordination types

The contactor and the moulded-case circuit-breaker control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC/EN 60947-4-1) defining the anticipated level of service continuity as follow:

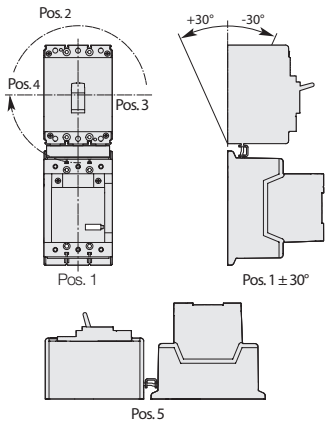
**Type 1:** In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

**Type 2:** In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

### Main Technical Data

| Standards | IEC/EN 60947-4-1 |
|---|---|
| Rated operational voltage Ue max. | 400 V - 50/60 Hz |
| Rated insulation voltage Ui | |
| acc. to IEC 60947-4-1 | 690 V |
| acc. to UL / CSA | 600 V |
| Switching frequency | ≤ 15 starts/hour - 80 % max. load factor - with max. 1.5 s starting time<br>≤ 30 starts/hour - 50 % max. load factor - with max. 1.5 s starting time |
| Ambient air temperature | |
| Close to the device | < 55 °C |
| Degree of protection | IP20 |

### Mounting positions




Direct-on-line
MCCB + AF




Direct-on-line
MCCB + AF + OL

# DOL starters protected by moulded-case circuit-breakers and overload relays

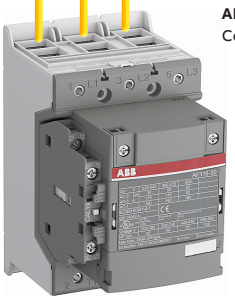
## With AF contactors - open type version in kit form

**MCCB**
Moulded-case circuit-breaker including motor protection



**BEA**
Connection bar

**AF116 ... AF370**
Contactor

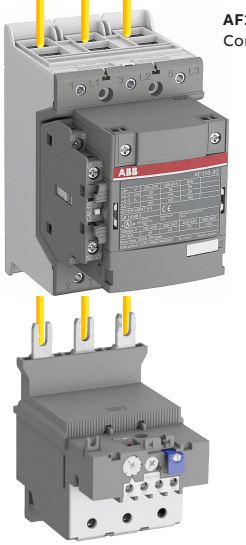


**MCCB**
Moulded-case circuit-breaker (magnetic only)



**BEA**
Connection bar

**AF116 ... AF370**
Contactor



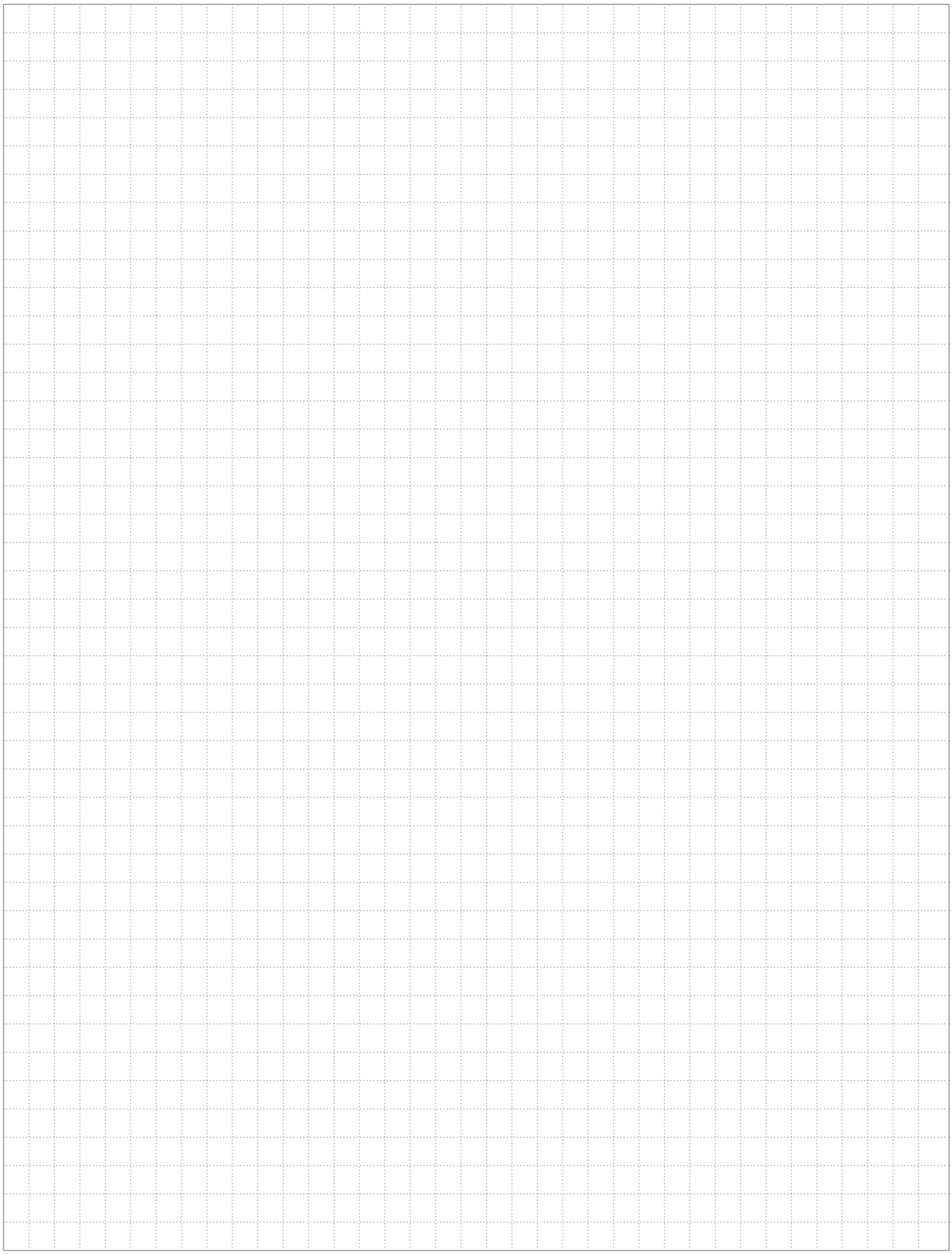
**TF**
Thermal overload relay
**EF**
Electronic overload relay

You can easily assemble a direct-on-line starter by using the BEA connection bars. It is used to electrically connect MCCB moulded-case circuit-breaker and AF116 ... AF370 contactor, AC or DC operated.

**Select now easily and quickly your starter in the following pages** for coordination type 1 or 2 at 400 V, 50/60 Hz, Iq = 50 kA up to 200 kW.

For the full coordination tables, please visit our SOC tool :
**https://www.lowvoltage-tools.abb.com/soc**

# Notes



# DOL starters protected by MCCB including motor protection

Coordination type 1 or 2

### Coordination type 1 or 2, AC-3, 50 kA, 400 V, 50/60 Hz

**MCCB**



\+

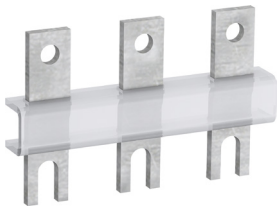


| IEC | | Magnetic triping current setting | Max. allowed thermal setting | Base | | | Trip unit | |
|---|---|---|---|---|---|---|---|---|
| AC-3, 400 V | | | | Type | Order code | | Type | Order code |
| Rated power kW | Rated current A | A | | | | | | |
| 55 | 97 | 1440 | 116 | XT2S 160 | 1SDA068164R1 | + | Ekip M-LIU In160 | 1SDA067355R1 |
| 75 | 132 | 1920 | 140 | XT2S 160 | 1SDA068164R1 | + | Ekip M-LIU In160 | 1SDA067355R1 |
| 90 | 160 | 2400 | 190 | T4S 250 PR222MP In200 | 1SDA054527R1 | | Included | - |
| 110 | 195 | 2880 | 205 | T5S 400 PR222MP In320 | 1SDA054553R1 | | Included | - |
| 132 | 230 | 3600 | 265 | T5S 400 PR222MP In400 | 1SDA054554R1 | | Included | - |
| 160 | 280 | 4400 | 305 | T5S 400 PR222MP In400 | 1SDA054554R1 | | Included | - |

## Contactors



## Connection bars



| Control voltage Uc min. ... Uc max. | | Type | Order code | Type | Order code |
|---|---|---|---|---|---|
| V 50/60 Hz | V DC | | | | |
| 24...60 | 20...60 | AF116-30-11-11 | 1SFL427001R1111 | BEA140/XT2 | 1SFN084206R1000 |
| 100...250 | 100...250 | AF116-30-11-13 | 1SFL427001R1311 | | |
| 24...60 | 20...60 | AF140-30-11-11 | 1SFL447001R1111 | | |
| 100...250 | 100...250 | AF140-30-11-13 | 1SFL447001R1311 | | |
| 24...60 | 20...60 | AF190-30-11-11 | 1SFL487002R1111 | BEA205/T4 | 1SFN084806R1001 |
| 100...250 | 100...250 | AF190-30-11-13 | 1SFL487002R1311 | | |
| 24...60 | 20...60 | AF205-30-11-11 | 1SFL527002R1111 | | |
| 100...250 | 100...250 | AF205-30-11-13 | 1SFL527002R1311 | | |
| 24...60 | 20...60 | AF265-30-11-11 | 1SFL547002R1111 | BEA370/T5 | 1SFN085406R1000 |
| 100...250 | 100...250 | AF265-30-11-13 | 1SFL547002R1311 | | |
| 24...60 | 20...60 | AF305-30-11-11 | 1SFL587002R1111 | | |
| 100...250 | 100...250 | AF305-30-11-13 | 1SFL587002R1311 | | |

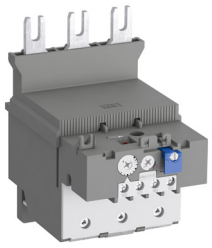
# DOL starters protected by MCCB (magnetic only) and overload relays

Coordination type 1 or 2

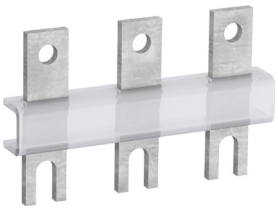
### Coordination type 1 or 2, AC-3, 50 kA, 400 V, 50/60 Hz

| | MCCB | | | Contactors | | | |
|---|---|---|---|---|---|---|---|
| |  | | |  | | | |
| **IEC AC-3, 400 V** | | **Magnetic triping current** | **Type** | **Order code** | **Control voltage Uc min. ... Uc max.** | | **Type** | **Order code** |
| **Rated power** kW | **Rated current** A | A | | | V 50/60 Hz | V DC | | |
| **Thermal overload relays** | | | | | | | | |
| 55 | 97 | 1600 | XT2S 160 MA 160 | 1SDA076530R1 | 24...60 | 20...60 | AF116-30-11-11 | 1SFL427001R1111 |
| | | | | | 100...250 | 100...250 | AF116-30-11-13 | 1SFL427001R1311 |
| 75 | 132 | 1920 | XT2S 160 MA 160 | 1SDA076530R1 | 24...60 | 20...60 | AF140-30-11-11 | 1SFL447001R1111 |
| | | | | | 100...250 | 100...250 | AF140-30-11-13 | 1SFL447001R1311 |
| 90 | 160 | 2250 | XT4S 250 Ekip I In250 | 1SDA068480R1 | 24...60 | 20...60 | AF190-30-11-11 | 1SFL487002R1111 |
| | | | | | 100...250 | 100...250 | AF190-30-11-13 | 1SFL487002R1311 |
| 110 | 195 | 2720 | T4S 320 PR221-I In320 | 1SDA054126R1 | 24...60 | 20...60 | AF205-30-11-11 | 1SFL527002R1111 |
| | | | | | 100...250 | 100...250 | AF205-30-11-13 | 1SFL527002R1311 |
| **Electronic overload relays** | | | | | | | | |
| 55 | 97 | 1600 | XT2S 160 MA 160 | 1SDA076530R1 | 24...60 | 20...60 | AF116-30-11-11 | 1SFL427001R1111 |
| | | | | | 100...250 | 100...250 | AF116-30-11-13 | 1SFL427001R1311 |
| 75 | 132 | 1920 | XT2S 160 MA 160 | 1SDA076530R1 | 24...60 | 20...60 | AF140-30-11-11 | 1SFL447001R1111 |
| | | | | | 100...250 | 100...250 | AF140-30-11-13 | 1SFL447001R1311 |
| 90 | 160 | 2250 | XT4S 250 Ekip I In250 | 1SDA068480R1 | 24...60 | 20...60 | AF190-30-11-11 | 1SFL487002R1111 |
| | | | | | 100...250 | 100...250 | AF190-30-11-13 | 1SFL487002R1311 |
| 110 | 195 | 2720 | T4S 320 PR221-I In320 | 1SDA054126R1 | 24...60 | 20...60 | AF205-30-11-11 | 1SFL527002R1111 |
| | | | | | 100...250 | 100...250 | AF205-30-11-13 | 1SFL527002R1311 |
| 132 | 230 | 3200 | T5S 400 PR221-I In400 | 1SDA054335R1 | 24...60 | 20...60 | AF265-30-11-11 | 1SFL547002R1111 |
| | | | | | 100...250 | 100...250 | AF265-30-11-13 | 1SFL547002R1311 |
| 160 | 280 | 4000 | T5S 400 PR221-I In400 | 1SDA054335R1 | 24...60 | 20...60 | AF305-30-11-11 | 1SFL587002R1111 |
| | | | | | 100...250 | 100...250 | AF305-30-11-13 | 1SFL587002R1311 |
| 200 | 350 | 5040 | T5S 630 PR221-I In630 | 1SDA054405R1 | 24...60 | 20...60 | AF370-30-11-11 | 1SFL607002R1111 |
| | | | | | 100...250 | 100...250 | AF370-30-11-13 | 1SFL607002R1311 |

## Overload relays



## Connection bars



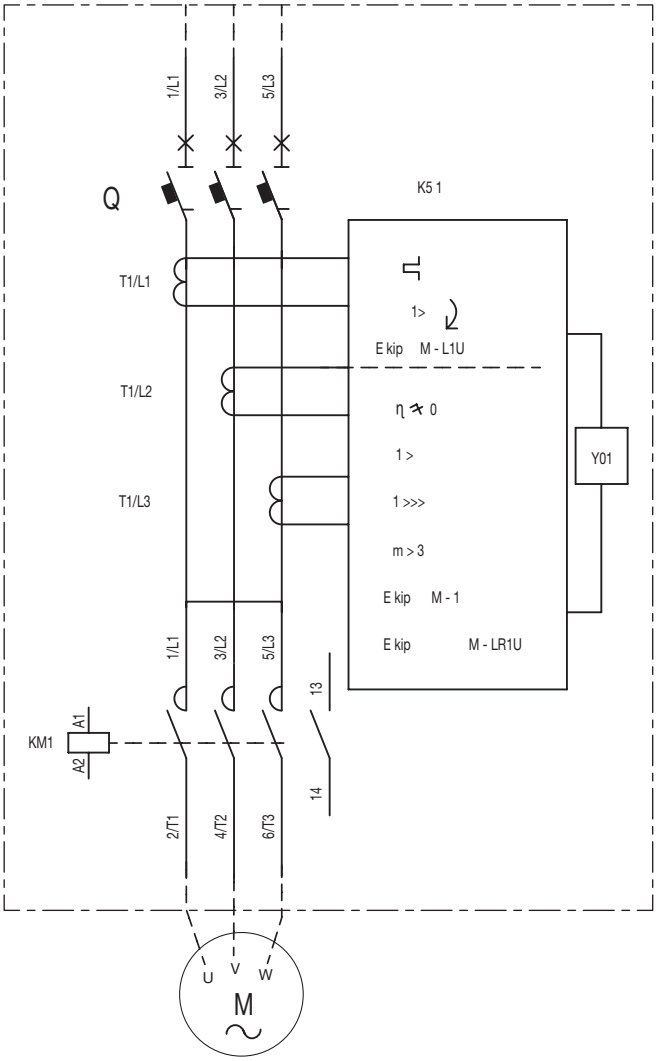
| | Setting ranges<br>A | Max. allowed setting current<br>A | Type | Order code | Type | Order code |
|---|---|---|---|---|---|---|
| | 80...110 | 110 | TF140DU-110 | 1SAZ431201R1002 | BEA140/XT2 | 1SFN084206R1000 |
| | 110...142 | 140 | TF140DU-142 | 1SAZ431201R1004 | | |
| | 130...175 | 175 | TA200DU-175 | 1SAZ421201R1005 | BEA205/XT4 | 1SFN084806R1000 |
| | 155...200 | 200 | TA200DU-200 | 1SAZ421201R1006 | BEA205/T4 | 1SFN084806R1001 |
| | 54...150 | 116 | EF146-150 | 1SAX351001R1101 | BEA140/XT2 | 1SFN084206R1000 |
| | 54...150 | 140 | EF146-150 | 1SAX351001R1101 | | |
| | 63...210 | 190 | EF205-210 | 1SAX531001R1101 | BEA205/XT4 | 1SFN084806R1000 |
| | 63...210 | 205 | EF205-210 | 1SAX531001R1101 | BEA205/T4 | 1SFN084806R1001 |
| | 115...380 | 265 | EF370-380 | 1SAX611001R1101 | BEA370/T5 | 1SFN085406R1000 |
| | 115...380 | 305 | EF370-380 | 1SAX611001R1101 | | |
| | 115...380 | 350 | EF370-380 | 1SAX611001R1101 | | |

# DOL starters protected by moulded-case circuit-breakers and overload relays

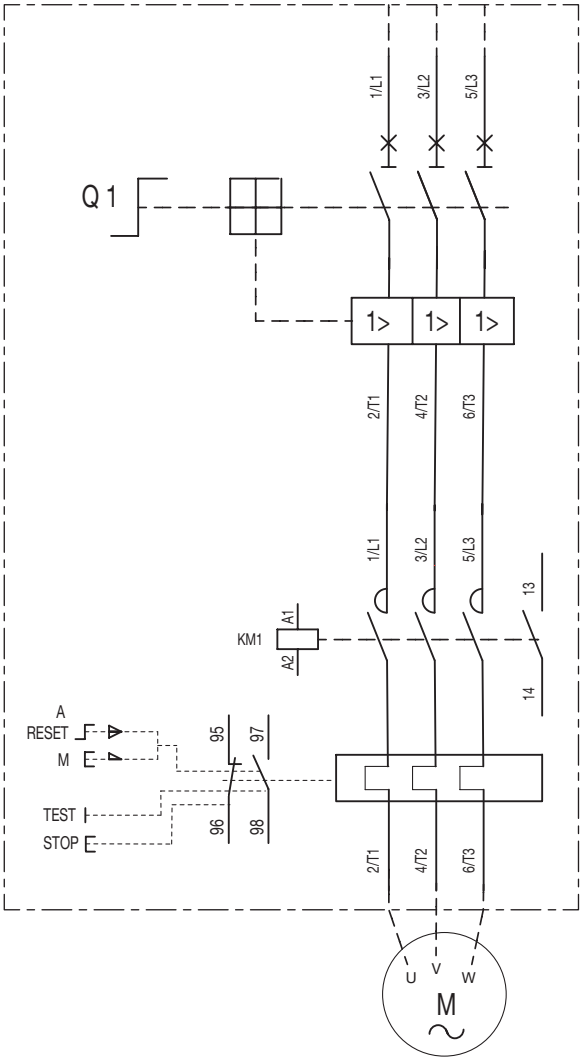
With AF contactors - Open type version in kit form

**Direct-on-line starters**

**Protected by MCCB including motor protection**

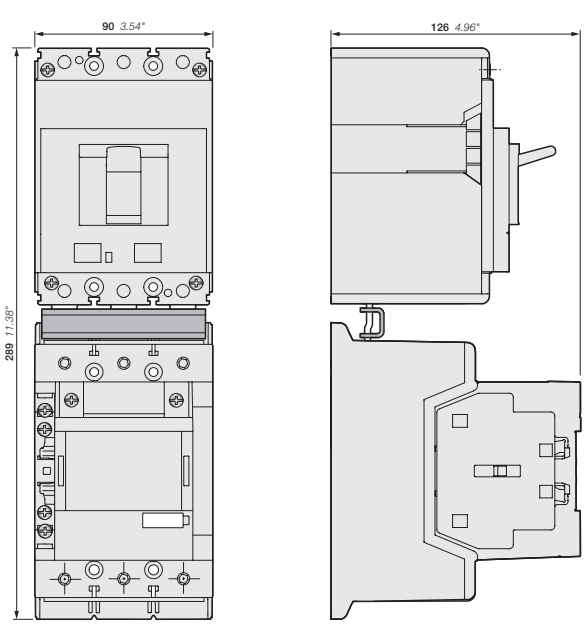



**Protected by MCCB (magnetic only) and overload relays**

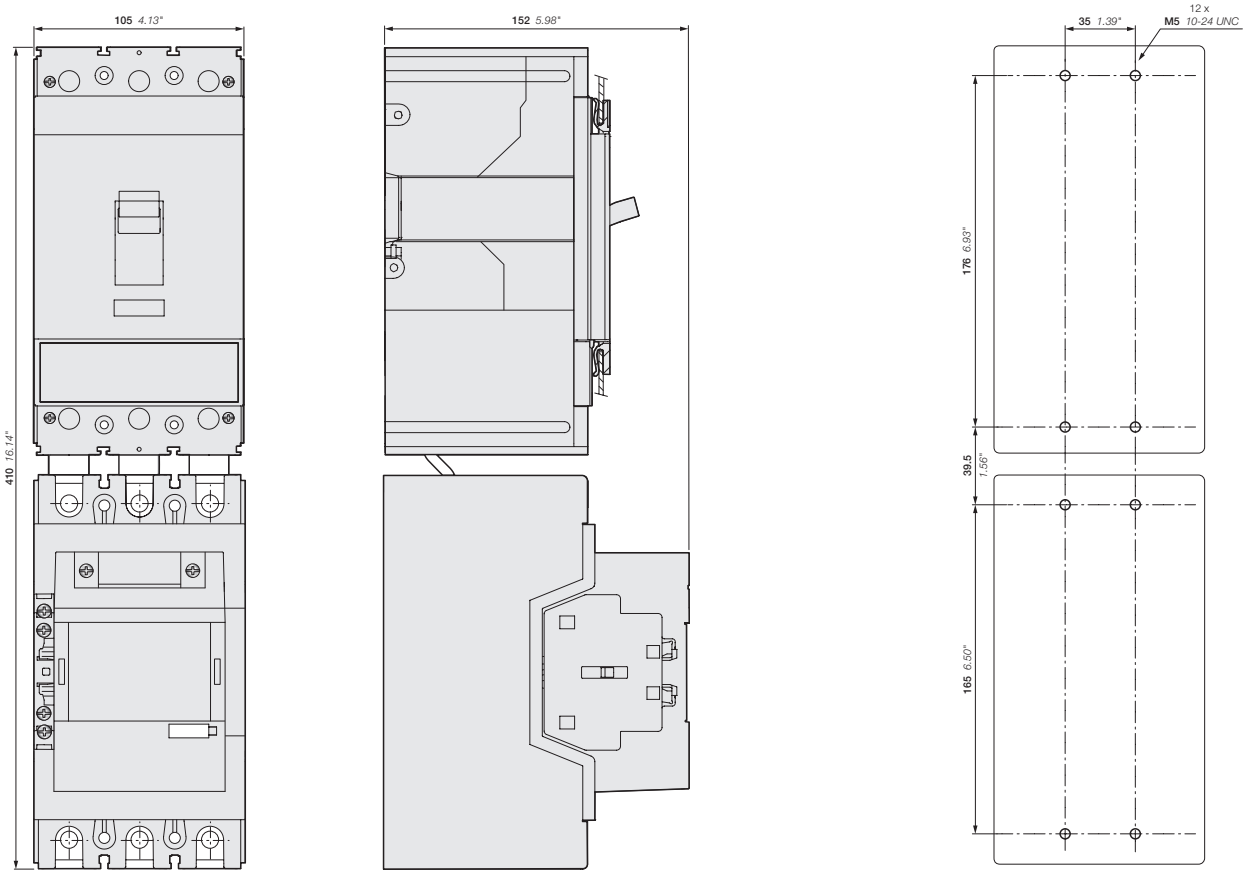


# DOL starters protected by MCCB, including motor protection

## With AF contactors - Open type version in kit form




XT2S 160 + Ekip M-LIU In160
+ BEA140/XT2
+ AF116, AF140, AF146

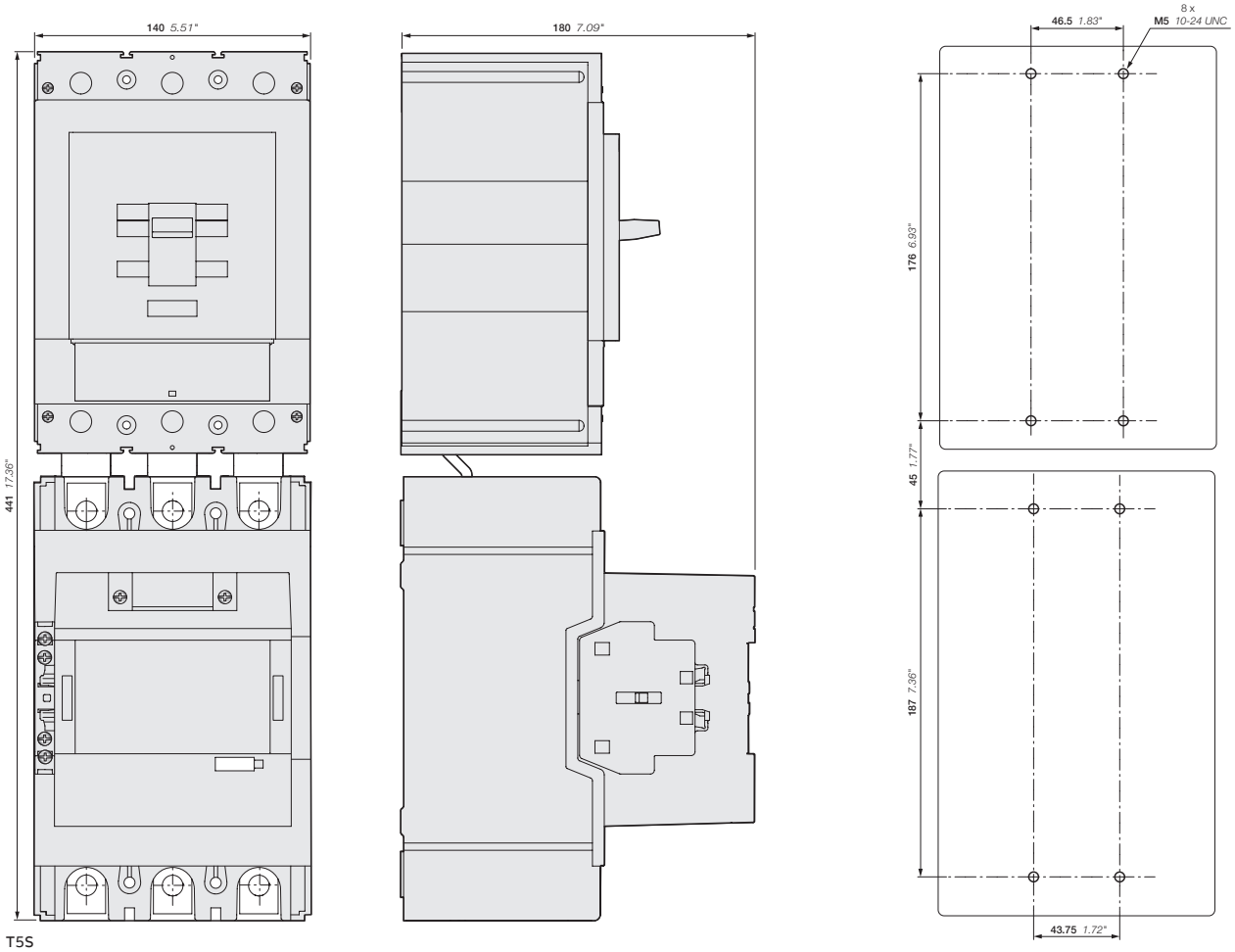



T4S
+ BEA205/T4
+ AF190, AF205

Main dimensions mm, inches

## DOL starters protected by MCCB, including motor protection

With AF contactors - Open type version in kit form

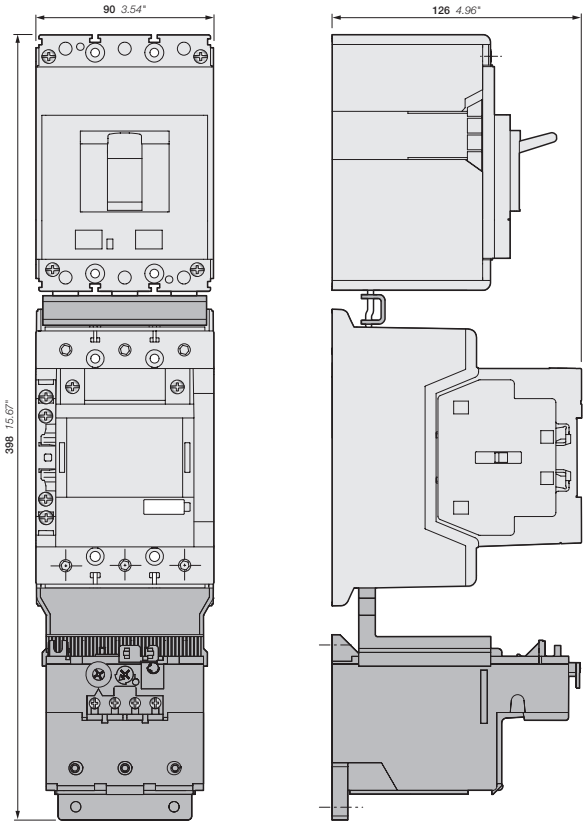



T5S
+ BEA370/T5
+ AF265, AF305, AF370

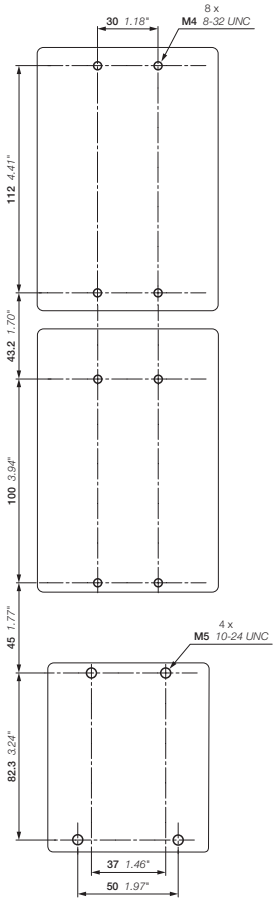
Main dimensions mm, inches

# DOL starters protected by MCCB (magnetic only) and thermal overload relays

## With AF contactors - Open type version in kit form



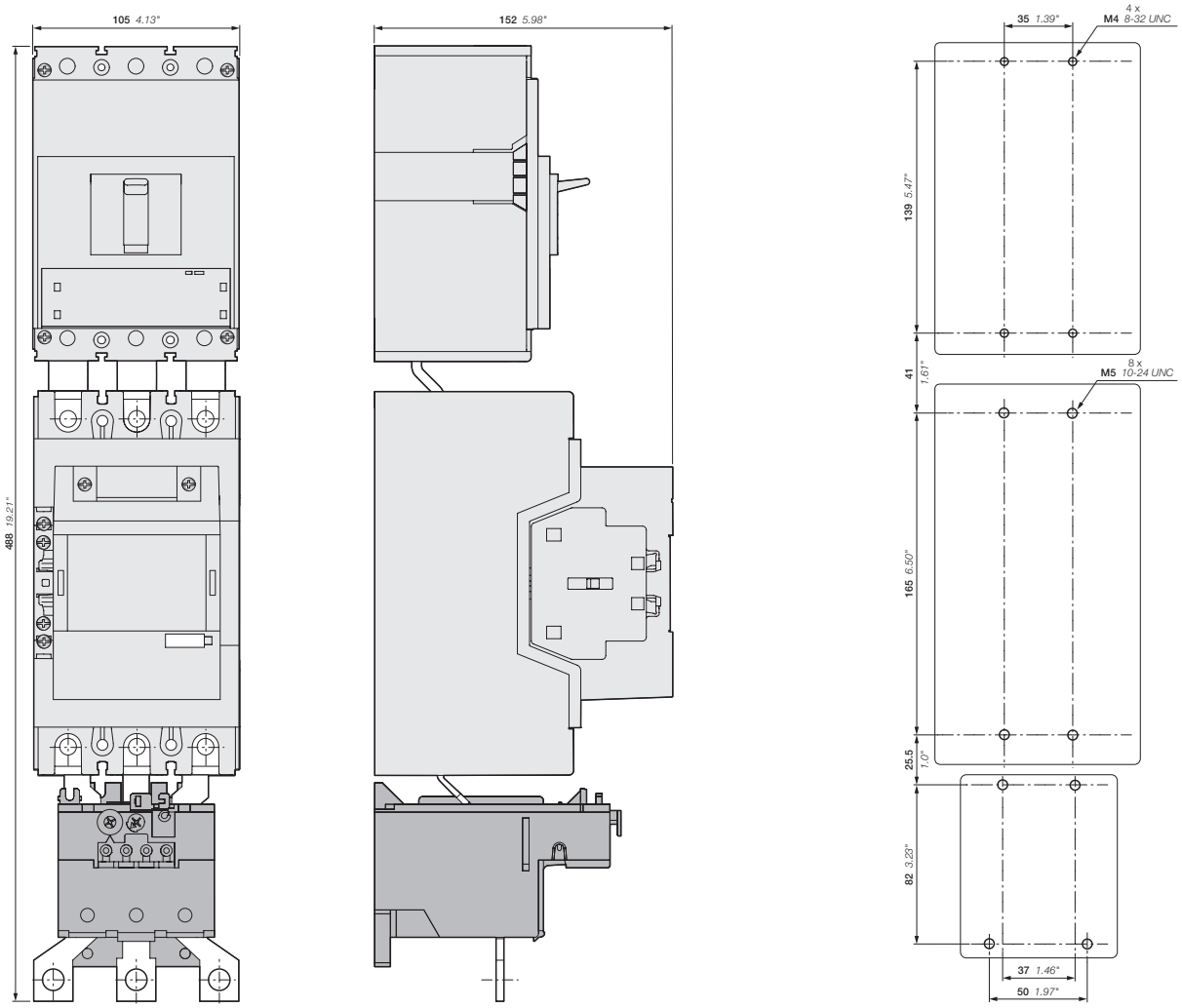

XT2S
+ BEA140/XT2
+ AF116, AF140, AF146
+ TF140 thermal overload relay




Main dimensions mm, inches

# DOL starters protected by MCCB (magnetic only) and thermal overload relays

## With AF contactors - Open type version in kit form

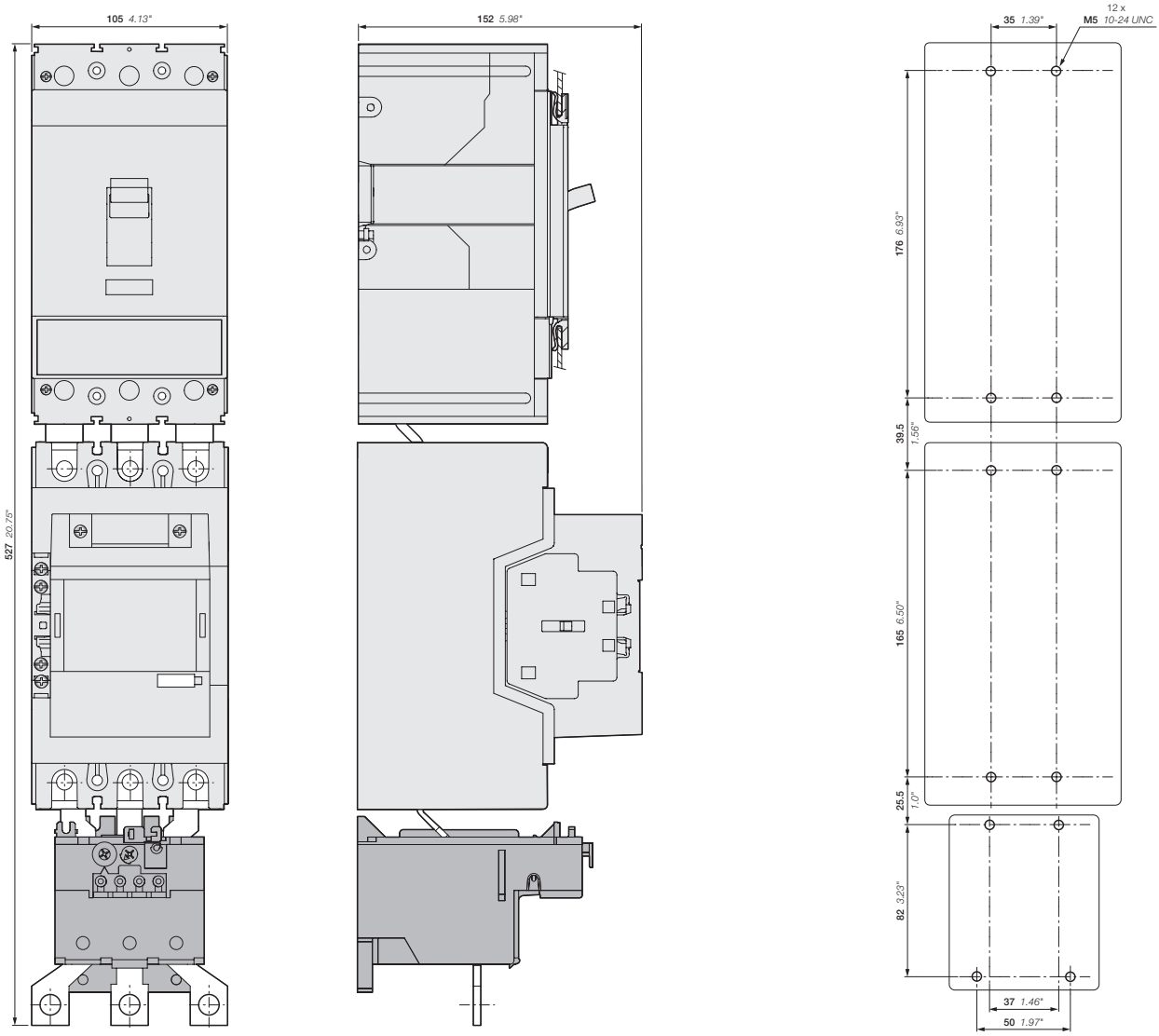



XT4S
+ BEA205/XT4
+ AF190, AF205
+ TA200DU thermal overload relay

Main dimensions mm, inches

# DOL starters protected by MCCB (magnetic only) and thermal overload relays

With AF contactors - Open type version in kit form

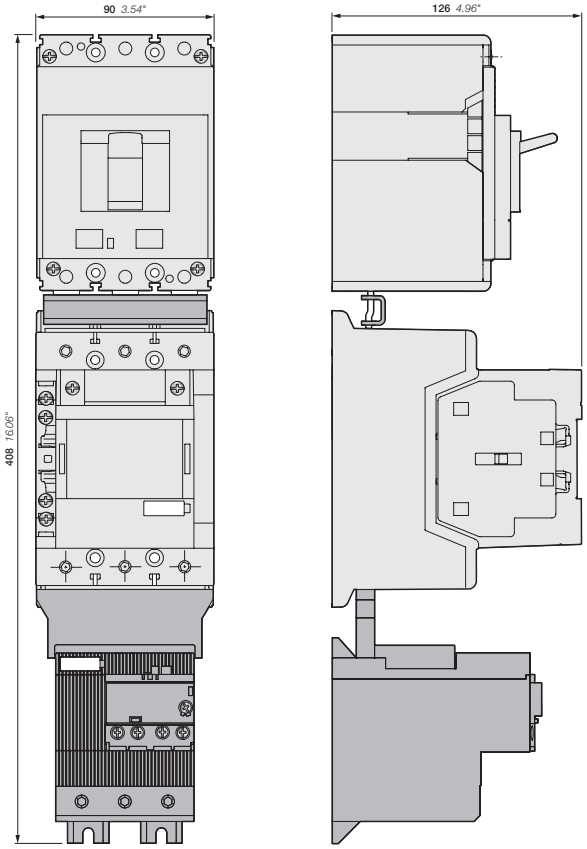



T4S
+ BEA205/T4
+ AF190, AF205
+ TA200DU thermal overload relay

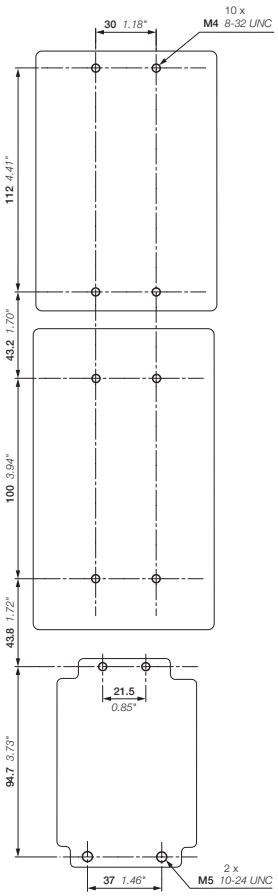
Main dimensions mm, inches

# DOL starters protected by MCCB (magnetic only) and electronic overload relays

## With AF contactors - Open type version in kit form



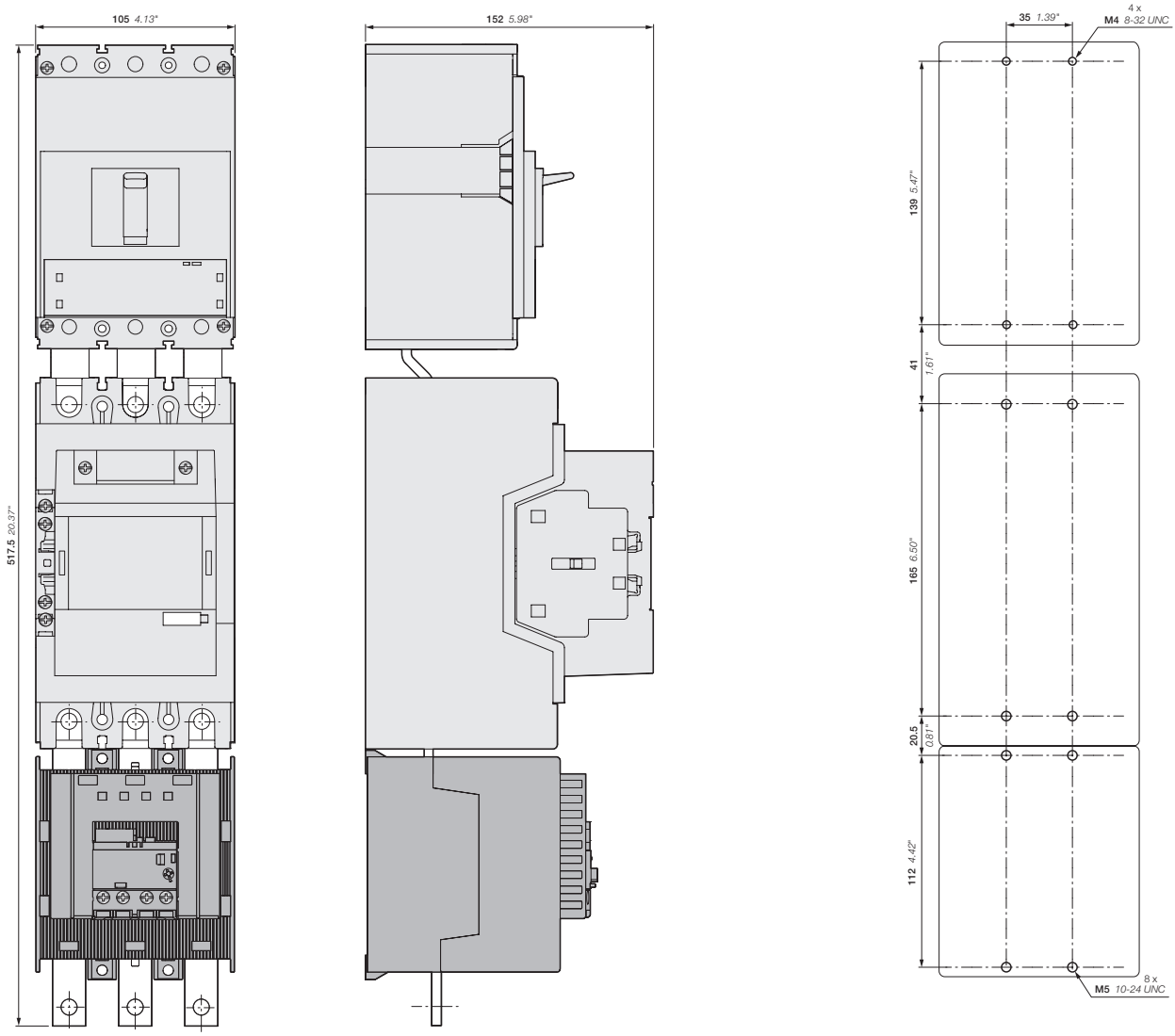

XT2S
+ BEA140/XT2
+ AF116, AF140, AF146
+ EF146 electronic overload relay




Main dimensions mm, inches

# DOL starters protected by MCCB (magnetic only) and electronic overload relays

## With AF contactors - Open type version in kit form

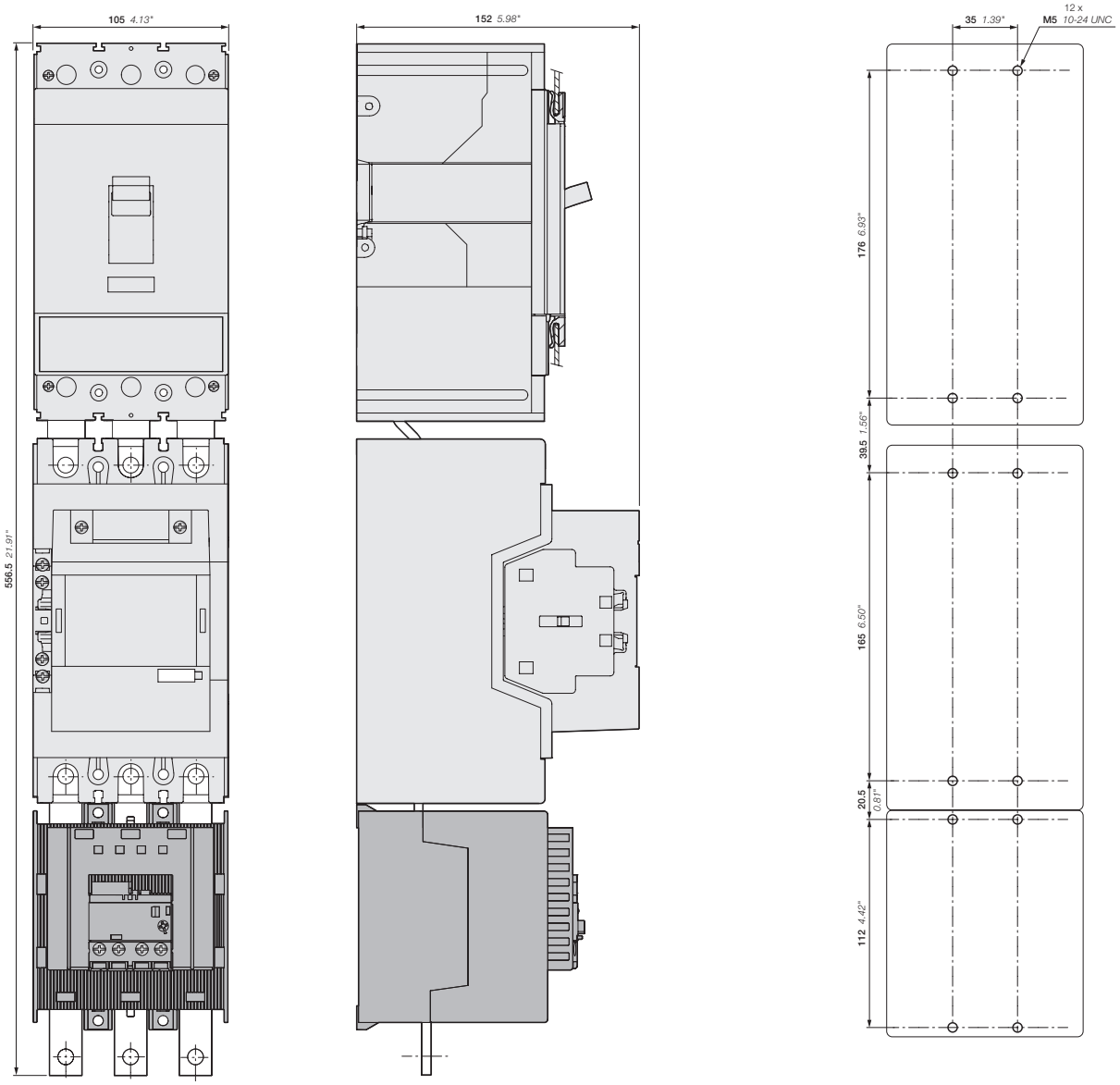



XT4S
+ BEA205/XT4
+ AF190, AF205
+ EF205 electronic overload relay

Main dimensions mm, inches

# DOL starters protected by MCCB (magnetic only) and electronic overload relays

## With AF contactors - Open type version in kit form

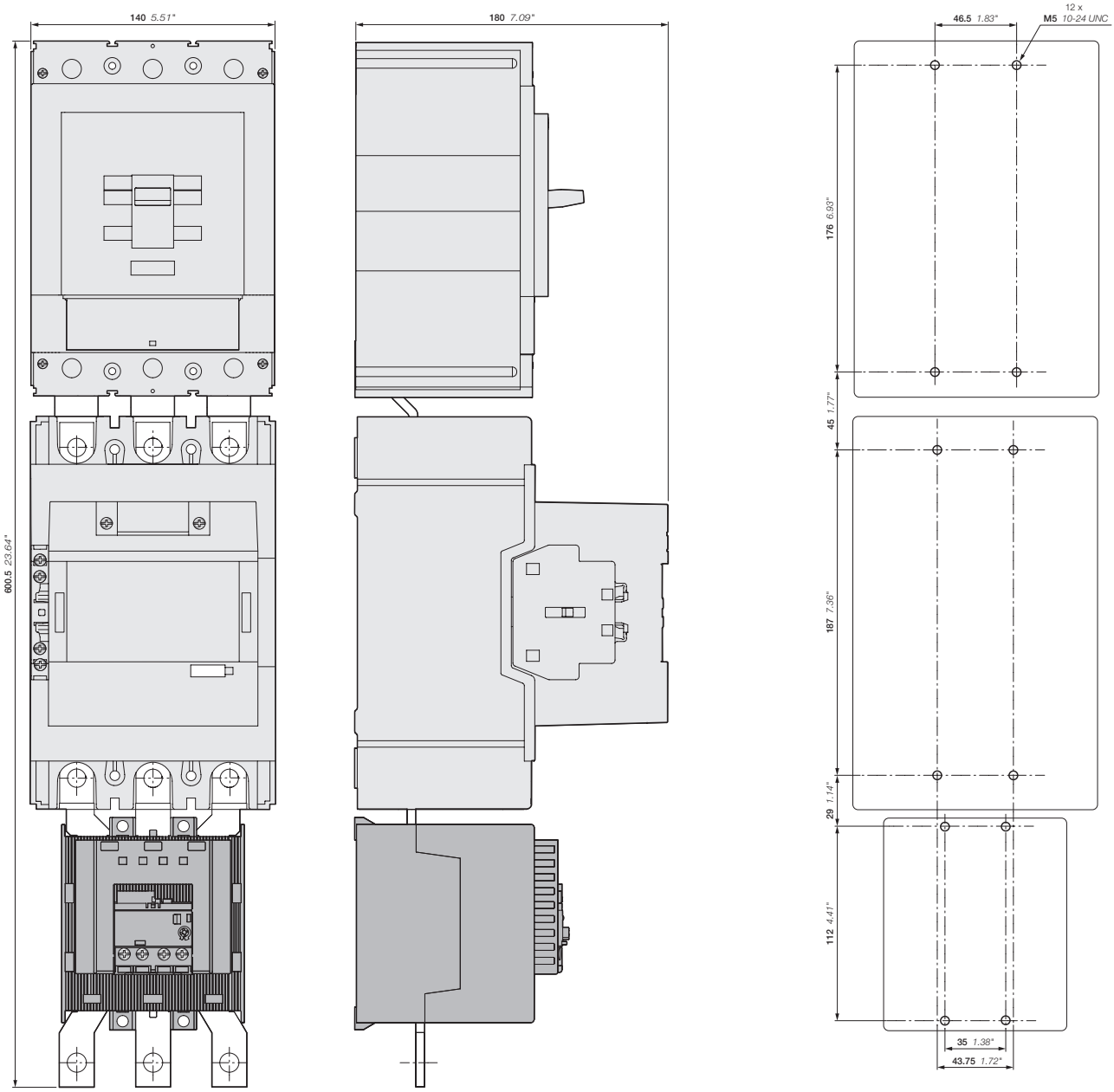



T4S
+ BEA205/T4
+ AF190, AF205
+ EF205 electronic overload relay

Main dimensions mm, inches

# DOL starters protected by MCCB (magnetic only) and electronic overload relays

With AF contactors - Open type version in kit form

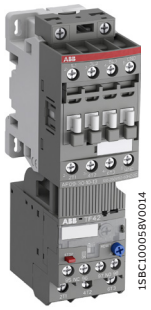



T5S
+ BEA370/T5
+ AF265, AF305, AF370
+ EF370 electronic overload relay

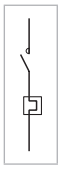
Main dimensions mm, inches

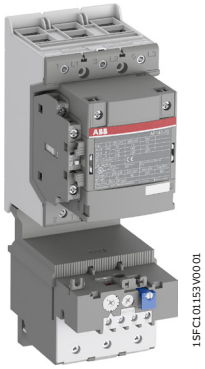
# DOL and reversing starters protected by overload relays

## With AF contactors - Open type version in kit form




AF09-30-10 + TF42

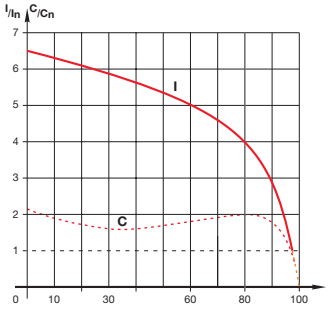





AF140-30-11 + TF140DU

### Application

Full voltage direct-on-line and reversing starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.




I = current
C = torque
In = nominal current
Cn = nominal torque

### Coordination Types

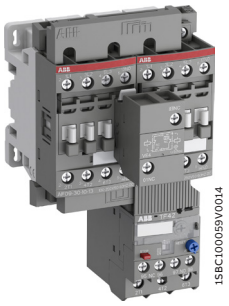
The contactor, the short-circuit protection device and the thermal overload relay control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC/EN 60947-4-1) defining the anticipated level of service continuity as follow:

**Type 1:** In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

**Type 2:** In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

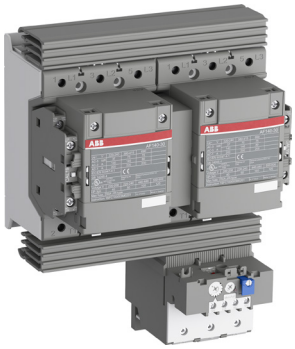
### Main Technical Data

| | |
|---|---|
| Standards | IEC/EN 60947-4-1 |
| Rated operational voltage Ue max. | 690 V - 50/60 Hz |
| Rated insulation voltage Ui | |
| acc. to IEC 60947-4-1 | 690 V |
| acc. to UL / CSA | 600 V |
| Ambient air temperature | |
| Close to the device | ≤ 60 °C (TF42: 38 A above ≤ 50 °C) |
| Degree of protection | IP20 |
| Switching frequency | Refer to "Switching frequency diagrams" page |



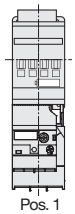

AF09-30-10 + BER16-4 + VEM4 + TF42



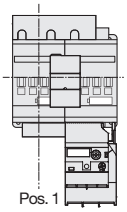



AF140-30-11 + BER140-4 + VM19 + TF140DU

### Mounting positions




Direct-on-line



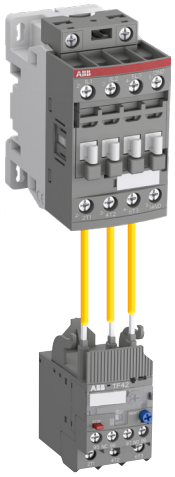

Reversing

# DOL and reversing starters protected by overload relays

## With AF contactors - Open type version in kit form

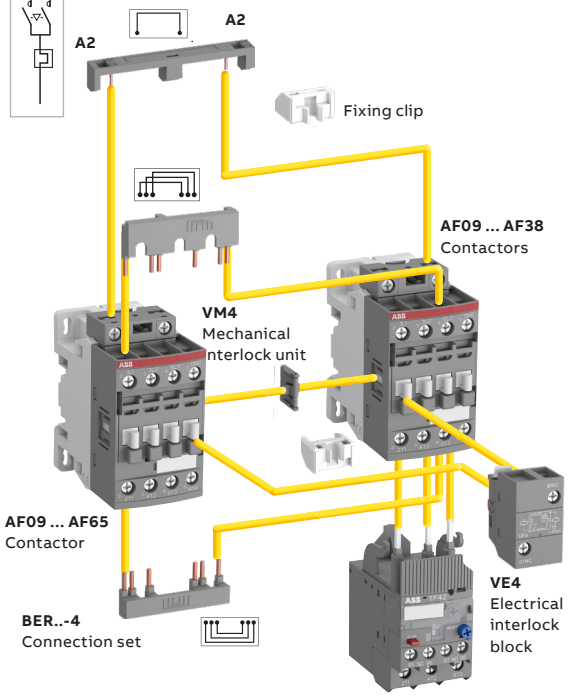
### Direct-On-Line starters

**AF09 ... AF96**
Contactor

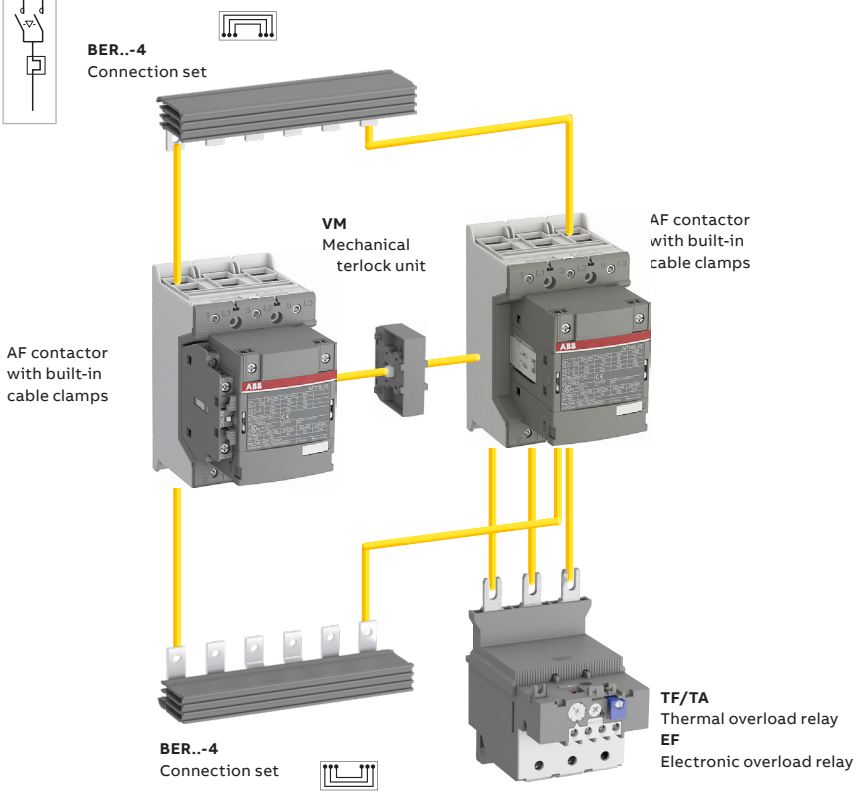


**TF**
Thermal overload relay
**EF**
Electronic overload relay

### Reversing starters for AF09 ... AF38




### Reversing starters for AF116 ... AF370




You can easily assemble a direct-on-line starter by connecting AF contactor and TF thermal overload relay or EF electronic overload relay.
You can also easily assemble reversing starter thanks to our complete range of accessories:

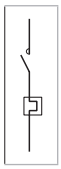
- For AF09 ... AF38, use VEM4 mechanical and electrical interlock set for reversing starter in 90 mm width, made of:
  - VM4 mechanical interlock unit including 2 fixing clips
  - VE4 electrical interlock block with A2-A2 connection.
- For AF40 ... AF370, use VM.. mechanical interlock unit and additional auxiliary contact blocks for electrical interlocking.
- BER..-4 connection set to assure a safe and simple reversing connection between both contactor main terminals.

**Select now easily and quickly your starter in the following pages** at 400 V, up to 200 kW.

For the full coordination tables, please visit our SOC tool :
https://www.lowvoltage-tools.abb.com/soc

# Direct-on-line starters protected by thermal overload relays

## With AF contactors - Open type version in kit form



**Contactors**



**Thermal overload relays**



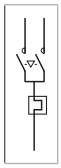
**Accessories**

| IEC AC-3, 400 V | | Control voltage Uc min. ... Uc max. (1) | | Type | Order code | Setting ranges | Type | Order code |
|---|---|---|---|---|---|---|---|---|
| Rated power kW | Rated current A | V 50/60 Hz | V DC (2) | | | A | | |
| 4 | 8.5 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 7.60...10.0 | TF42-10 | 1SAZ721201R1043 |
| | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 5.5 | 11.5 | 24...60 | 20...60 | AF12Z-30-10-21 | 1SBL156001R2110 | 10.0...13.0 | TF42-13 | 1SAZ721201R1045 |
| | | 100...250 | 100...250 | AF12-30-10-13 | 1SBL157001R1310 | | | |
| 7.5 | 15.5 | 24...60 | 20...60 | AF16Z-30-10-21 | 1SBL176001R2110 | 13.0...16.0 | TF42-16 | 1SAZ721201R1047 |
| | | 100...250 | 100...250 | AF16-30-10-13 | 1SBL177001R1310 | | | |
| 11 | 22 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | 20.0...24.0 | TF42-24 | 1SAZ721201R1051 |
| | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | |
| 15 | 29 | 24...60 | 20...60 | AF30Z-30-00-21 | 1SBL276001R2100 | 29.0...35.0 | TF42-35 | 1SAZ721201R1053 |
| | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | |
| 18.5 | 35 | 24...60 | 20...60 | AF38Z-30-00-21 | 1SBL296001R2100 | 35.0...38.0/40.0 | TF42-38 | 1SAZ721201R1055 |
| | | 100...250 | 100...250 | AF38-30-00-13 | 1SBL297001R1300 | | | |
| 18.5 | 35 | 24...60 | 20...60 | AF40-30-00-11 | 1SBL347001R1100 | 30.0...40.0 | TF65-40 | 1SAZ811201R1003 |
| | | 100...250 | 100...250 | AF40-30-00-13 | 1SBL347001R1300 | | | |
| 22 | 41 | 24...60 | 20...60 | AF52-30-00-11 | 1SBL367001R1100 | 36.00...47.0 | TF65-47 | 1SAZ811201R1004 |
| | | 100-250 | 100-250 | AF52-30-00-13 | 1SBL367001R1300 | | | |
| 30 | 55 | 24...60 | 20...60 | AF65-30-00-11 | 1SBL387001R1100 | 50.0...60.0 | TF65-60 | 1SAZ811201R1006 |
| | | 100-250 | 100-250 | AF65-30-00-13 | 1SBL387001R1300 | | | |
| 37 | 66 | 24...60 | 20...60 | AF80-30-00-11 | 1SBL397001R1100 | 57.0...68.0 | TF96-68 | 1SAZ911201R1003 |
| | | 100-250 | 100-250 | AF80-30-00-13 | 1SBL397001R1300 | | | |
| 45 | 80 | 24...60 | 20...60 | AF96-30-00-11 | 1SBL407001R1100 | 75.0..87.0 | TF96-87 | 1SAZ911201R1005 |
| | | 100-250 | 100-250 | AF96-30-00-13 | 1SBL407001R1300 | | | |
| 55 | 97 | 24...60 | 20...60 | AF116-30-11-11 | 1SFL427001R1111 | 80...110 | TF140DU-110 | 1SAZ431201R1002 |
| | | 100-250 | 100-250 | AF116-30-11-13 | 1SFL427001R1311 | | | |
| 75 | 132 | 24...60 | 20...60 | AF140-30-11-11 | 1SFL447001R1111 | 100...135 | TF140DU-135 | 1SAZ431201R1003 |
| | | 100-250 | 100-250 | AF140-30-11-13 | 1SFL447001R1311 | | | |
| 90 | 160 | 24...60 | 20...60 | AF190-30-11-11 | 1SFL487002R1111 | 130...175 | TA200DU-175 | 1SAZ421201R1005 |
| | | 100-250 | 100-250 | AF190-30-11-13 | 1SFL487002R1311 | | | |
| 110 | 195 | 24...60 | 20...60 | AF205-30-11-11 | 1SFL527002R1111 | 150...200 | TA200DU-200 | 1SAZ421201R1006 |
| | | 100-250 | 100-250 | AF205-30-11-13 | 1SFL527002R1311 | | | |

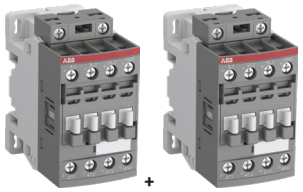
(1) For other control voltages, see "Voltage code table".
Note : for rated power above 110 kW, refer to "Starters protected by electronic overload relays".
(2) AF ... -11 not suitable for direct control by PLC-output.

# Reversing starters protected by thermal overload relays

## With AF contactors - Open type version in kit form



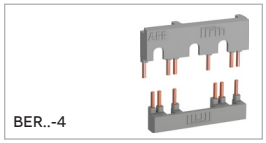
**Contactors**

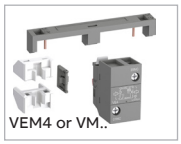


**Thermal overload relays**



**Accessories**





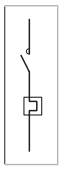


| IEC AC-3, 400 V Rated power kW | Rated current A | Control voltage Uc min. ... Uc max. (1) V 50/60 Hz | V DC | Type | Order code | Setting ranges A | Type | Order code | Type | Order code |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 8.5 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 7.60...10.0 | TF42-10 | 1SAZ721201R1043 | BER16-4 | 1SBN081311R1000 |
| | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | | VEM4 | 1SBN030111R1000 |
| 5.5 | 11.5 | 24...60 | 20...60 | AF12Z-30-10-21 | 1SBL156001R2110 | 10.0...13.0 | TF42-13 | 1SAZ721201R1045 | | |
| | | 100...250 | 100...250 | AF12-30-10-13 | 1SBL157001R1310 | | | | | |
| 7.5 | 15.5 | 24...60 | 20...60 | AF16Z-30-10-21 | 1SBL176001R2110 | 13.0...16.0 | TF42-16 | 1SAZ721201R1047 | | |
| | | 100...250 | 100...250 | AF16-30-10-13 | 1SBL177001R1310 | | | | | |
| 11 | 22 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | 20.0...24.0 | TF42-24 | 1SAZ721201R1051 | BER38-4 | 1SBN082311R1000 |
| | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | | VEM4 | 1SBN030111R1000 |
| 15 | 29 | 24...60 | 20...60 | AF30Z-30-00-21 | 1SBL276001R2100 | 29.0...35.0 | TF42-35 | 1SAZ721201R1053 | 2x CA4-10 | 1SBN010110R1010 |
| | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | | | |
| 18.5 | 35 | 24...60 | 20...60 | AF38Z-30-00-21 | 1SBL296001R2100 | 35.0...38.0/40.0 | TF42-38 | 1SAZ721201R1055 | | |
| | | 100...250 | 100...250 | AF38-30-00-13 | 1SBL297001R1300 | | | | | |
| 18.5 | 35 | 24...60 | 20...60 | AF40-30-00-11 | 1SBL347001R1100 | 30.0...40.0 | TF65-40 | 1SAZ811201R1003 | BER65-4 | 1SBN083411R1000 |
| | | 100...250 | 100...250 | AF40-30-00-13 | 1SBL347001R1300 | | | | VM96-4 | 1SBN033405T1000 |
| 22 | 41 | 24...60 | 20...60 | AF52-30-00-11 | 1SBL367001R1100 | 36.00...47.0 | TF65-47 | 1SAZ811201R1004 | 2x CA4-10 | 1SBN010110R1010 |
| | | 100...250 | 100...250 | AF52-30-00-13 | 1SBL367001R1300 | | | | 2x CA4-01 | 1SBN010110R1001 |
| 30 | 55 | 24...60 | 20...60 | AF65-30-00-11 | 1SBL387001R1100 | 50.0...60.0 | TF65-60 | 1SAZ811201R1006 | | |
| | | 100...250 | 100...250 | AF65-30-00-13 | 1SBL387001R1300 | | | | | |
| 37 | 66 | 24...60 | 20...60 | AF80-30-00-11 | 1SBL397001R1100 | 57.0...68.0 | TF96-68 | 1SAZ911201R1003 | BER96-4 | 1SBN083911R1000 |
| | | 100...250 | 100...250 | AF80-30-00-13 | 1SBL397001R1300 | | | | VM96-4 | 1SBN033405T1000 |
| 45 | 80 | 24...60 | 20...60 | AF96-30-00-11 | 1SBL407001R1100 | 75.0..87.0 | TF96-87 | 1SAZ911201R1005 | 2x CA4-10 | 1SBN010110R1010 |
| | | 100...250 | 100...250 | AF96-30-00-13 | 1SBL407001R1300 | | | | 2x CA4-01 | 1SBN010110R1001 |
| 55 | 97 | 24...60 | 20...60 | AF116-30-11-11 | 1SFL427001R1111 | 80...110 | TF140DU-110 | 1SAZ431201R1002 | BER140-4 | 1SFN084111R1000 |
| | | 100...250 | 100...250 | AF116-30-11-13 | 1SFL427001R1311 | | | | VM19 | 1SFN030300R1000 |
| 75 | 132 | 24...60 | 20...60 | AF140-30-11-11 | 1SFL447001R1111 | 100...135 | TF140DU-135 | 1SAZ431201R1003 | | |
| | | 100...250 | 100...250 | AF140-30-11-13 | 1SFL447001R1311 | | | | | |
| 90 | 160 | 24...60 | 20...60 | AF190-30-11-11 | 1SFL487002R1111 | 130...175 | TA200DU-175 | 1SAZ421201R1005 | BER205-4 | 1SFN084811R1000 |
| | | 100...250 | 100...250 | AF190-30-11-13 | 1SFL487002R1311 | | | | VM19 | 1SFN030300R1000 |
| 110 | 195 | 24...60 | 20...60 | AF205-30-11-11 | 1SFL527002R1111 | 150...200 | TA200DU-200 | 1SAZ421201R1006 | | |
| | | 100...250 | 100...250 | AF205-30-11-13 | 1SFL527002R1311 | | | | | |

(1) For other control voltages, see "Voltage code table".
Note : for rated power above 110 kW, refer to "Starters protected by electronic overload relays".
(2) AF ... -11 not suitable for direct control by PLC-output.

# Direct-on-line starters protected by electronic overload relays

## With AF contactors - Open type version in kit form



**Contactors**



**Electronic overload relays**



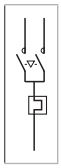
**Accessories**

| IEC AC-3, 400 V Rated power kW | Rated current A | Control voltage Uc min. ... Uc max. (1) V 50/60 Hz | V DC | Type | Order code | Setting ranges A | Type | Order code |
|---|---|---|---|---|---|---|---|---|
| 4 | 8.5 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 5.70...18.9 | EF19-18.9 | 1SAX121001R1105 |
| | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 5.5 | 11.5 | 24...60 | 20...60 | AF12Z-30-10-21 | 1SBL156001R2110 | 5.70...18.9 | EF19-18.9 | 1SAX121001R1105 |
| | | 100...250 | 100...250 | AF12-30-10-13 | 1SBL157001R1310 | | | |
| 7.5 | 15.5 | 24...60 | 20...60 | AF16Z-30-10-21 | 1SBL176001R2110 | 5.70...18.9 | EF19-18.9 | 1SAX121001R1105 |
| | | 100...250 | 100...250 | AF16-30-10-13 | 1SBL177001R1310 | | | |
| 11 | 22 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | 9.00...30.0 | EF45-30 | 1SAX221001R1101 |
| | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | |
| 15 | 29 | 24...60 | 20...60 | AF30Z-30-00-21 | 1SBL276001R2100 | 9.00...30.0 | EF45-30 | 1SAX221001R1101 |
| | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | |
| 18.5 | 35 | 24...60 | 20...60 | AF38Z-30-00-21 | 1SBL296001R2100 | 15.0...45.0 | EF45-45 | 1SAX221001R1102 |
| | | 100...250 | 100...250 | AF38-30-00-13 | 1SBL297001R1300 | | | |
| 18.5 | 35 | 24...60 | 20...60 | AF40-30-00-11 | 1SBL347001R1100 | 25.0...70.0 | EF65-70 | 1SAX331001R1101 |
| | | 100...250 | 100...250 | AF40-30-00-13 | 1SBL347001R1300 | | | |
| 22 | 41 | 24...60 | 20...60 | AF52-30-00-11 | 1SBL367001R1100 | 25.0...70.0 | EF65-70 | 1SAX331001R1101 |
| | | 100-250 | 100-250 | AF52-30-00-13 | 1SBL367001R1300 | | | |
| 30 | 55 | 24...60 | 20...60 | AF65-30-00-11 | 1SBL387001R1100 | 25.0...70.0 | EF65-70 | 1SAX331001R1101 |
| | | 100-250 | 100-250 | AF65-30-00-13 | 1SBL387001R1300 | | | |
| 37 | 66 | 24...60 | 20...60 | AF80-30-00-11 | 1SBL397001R1100 | 36...100 | EF96-100 | 1SAX341001R1101 |
| | | 100-250 | 100-250 | AF80-30-00-13 | 1SBL397001R1300 | | | |
| 45 | 80 | 24...60 | 20...60 | AF96-30-00-11 | 1SBL407001R1100 | 36...100 | EF96-100 | 1SAX341001R1101 |
| | | 100-250 | 100-250 | AF96-30-00-13 | 1SBL407001R1300 | | | |
| 55 | 97 | 24...60 | 20...60 | AF116-30-11-11 | 1SFL427001R1111 | 54...150 | EF146-150 | 1SAX351001R1101 |
| | | 100-250 | 100-250 | AF116-30-11-13 | 1SFL427001R1311 | | | |
| 75 | 132 | 24...60 | 20...60 | AF140-30-11-11 | 1SFL447001R1111 | 54...150 | EF146-150 | 1SAX351001R1101 |
| | | 100-250 | 100-250 | AF140-30-11-13 | 1SFL447001R1311 | | | |
| 90 | 160 | 24...60 | 20...60 | AF190-30-11-11 | 1SFL487002R1111 | 63...110 | EF205-110 | 1SAX531001R1101 |
| | | 100-250 | 100-250 | AF190-30-11-13 | 1SFL487002R1311 | | | |
| 110 | 195 | 24...60 | 20...60 | AF205-30-11-11 | 1SFL527002R1111 | 63...110 | EF205-110 | 1SAX531001R1101 |
| | | 100-250 | 100-250 | AF205-30-11-13 | 1SFL527002R1311 | | | |
| 132 | 230 | 24...60 | 20...60 | AF265-30-11-11 | 1SFL547002R1111 | 115...380 | EF370-380 | 1SAX611001R1101 |
| | | 100-250 | 100-250 | AF265-30-11-13 | 1SFL547002R1311 | | | |
| 160 | 280 | 24...60 | 20...60 | AF305-30-11-11 | 1SFL587002R1111 | 115...380 | EF370-380 | 1SAX611001R1101 |
| | | 100-250 | 100-250 | AF305-30-11-13 | 1SFL587002R1311 | | | |
| 200 | 350 | 24...60 | 20...60 | AF370-30-11-11 | 1SFL607002R1111 | 115...380 | EF370-380 | 1SAX611001R1101 |
| | | 100-250 | 100-250 | AF370-30-11-13 | 1SFL607002R1311 | | | |

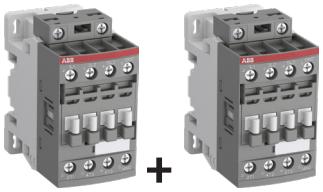
(1) For other control voltages, see "Voltage code table".
(2) AF ... -11 not suitable for direct control by PLC-output.

# Reversing starters protected by electronic overload relays

## With AF contactors - Open type version in kit form



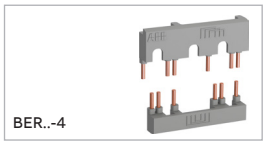
### Contactors

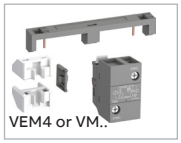


### Electronic overload relays



### Accessories







| IEC AC-3, 400 V Rated power kW | Rated current A | Control voltage Uc min. ... Uc max. (1) V 50/60 Hz | V DC | Type | Order code | Setting ranges A | Type | Order code | Type | Order code |
|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 8.5 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | 5.70...18.9 | EF19-18.9 | 1SAX111001R1105 | BER16-4 | 1SBN081311R1000 |
| | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | | VEM4 | 1SBN030111R1000 |
| 5.5 | 11.5 | 24...60 | 20...60 | AF12Z-30-10-21 | 1SBL156001R2110 | 5.70...18.9 | EF19-18.9 | 1SAX111001R1105 | | |
| | | 100...250 | 100...250 | AF12-30-10-13 | 1SBL157001R1310 | | | | | |
| 7.5 | 15.5 | 24...60 | 20...60 | AF16Z-30-10-21 | 1SBL176001R2110 | 5.70...18.9 | EF19-18.9 | 1SAX111001R1105 | | |
| | | 100...250 | 100...250 | AF16-30-10-13 | 1SBL177001R1310 | | | | | |
| 11 | 22 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | 9.00...30.0 | EF45-30 | 1SAX211001R1101 | BER38-4 | 1SBN082311R1000 |
| | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | | VEM4 | 1SBN030111R1000 |
| 15 | 29 | 24...60 | 20...60 | AF30Z-30-00-21 | 1SBL276001R2100 | 9.00...30.0 | EF45-30 | 1SAX221001R1101 | 2x CA4-10 | 1SBN010110R1010 |
| | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | | | |
| 18.5 | 35 | 24...60 | 20...60 | AF38Z-30-00-21 | 1SBL296001R2100 | 15.0...45.0 | EF45-45 | 1SAX221001R1102 | | |
| | | 100...250 | 100...250 | AF38-30-00-13 | 1SBL297001R1300 | | | | | |
| 18.5 | 35 | 24...60 | 20...60 | AF40-30-00-11 | 1SBL347001R1100 | 25.0...70.0 | EF65-70 | 1SAX331001R1101 | BER65-4 | 1SBN083411R1000 |
| | | 100...250 | 100...250 | AF40-30-00-13 | 1SBL347001R1300 | | | | VM96-4 | 1SBN033405T1000 |
| 22 | 41 | 24...60 | 20...60 | AF52-30-00-11 | 1SBL367001R1100 | 25.0...70.0 | EF65-70 | 1SAX331001R1101 | 2x CA4-10 | 1SBN010110R1010 |
| | | 100...250 | 100...250 | AF52-30-00-13 | 1SBL367001R1300 | | | | 2x CA4-01 | 1SBN010110R1001 |
| 30 | 55 | 24...60 | 20...60 | AF65-30-00-11 | 1SBL387001R1100 | 25.0...70.0 | EF65-70 | 1SAX331001R1101 | | |
| | | 100...250 | 100...250 | AF65-30-00-13 | 1SBL387001R1300 | | | | | |
| 37 | 66 | 24...60 | 20...60 | AF80-30-00-11 | 1SBL397001R1100 | 36...100 | EF96-100 | 1SAX341001R1101 | BER96-4 | 1SBN083911R1000 |
| | | 100...250 | 100...250 | AF80-30-00-13 | 1SBL397001R1300 | | | | VM96-4 | 1SBN033405T1000 |
| 45 | 80 | 24...60 | 20...60 | AF96-30-00-11 | 1SBL407001R1100 | 36...100 | EF96-100 | 1SAX341001R1101 | 2x CA4-10 | 1SBN010110R1010 |
| | | 100...250 | 100...250 | AF96-30-00-13 | 1SBL407001R1300 | | | | 2x CA4-01 | 1SBN010110R1001 |
| 55 | 97 | 24...60 | 20...60 | AF116-30-11-11 | 1SFL427001R1111 | 54...150 | EF146-150 | 1SAX351001R1101 | BER140-4 | 1SFN084111R1000 |
| | | 100...250 | 100...250 | AF116-30-11-13 | 1SFL427001R1311 | | | | VM19 | 1SFN030300R1000 |
| 75 | 132 | 24...60 | 20...60 | AF140-30-11-11 | 1SFL447001R1111 | 54...150 | EF146-150 | 1SAX351001R1101 | | |
| | | 100...250 | 100...250 | AF140-30-11-13 | 1SFL447001R1311 | | | | | |
| 90 | 160 | 24...60 | 20...60 | AF190-30-11-11 | 1SFL487002R1111 | 63...110 | EF205-110 | 1SAX531001R1101 | BER205-4 | 1SFN084811R1000 |
| | | 100...250 | 100...250 | AF190-30-11-13 | 1SFL487002R1311 | | | | VM19 | 1SFN030300R1000 |
| 110 | 195 | 24...60 | 20...60 | AF205-30-11-11 | 1SFL527002R1111 | 63...110 | EF205-110 | 1SAX531001R1101 | | |
| | | 100...250 | 100...250 | AF205-30-11-13 | 1SFL527002R1311 | | | | | |
| 132 | 230 | 24...60 | 20...60 | AF265-30-11-11 | 1SFL547002R1111 | 115...380 | EF370-380 | 1SAX611001R1101 | BER370-4 | 1SFN085411R1000 |
| | | 100...250 | 100...250 | AF265-30-11-13 | 1SFL547002R1311 | | | | VM19 | 1SFN030300R1000 |
| 160 | 280 | 24...60 | 20...60 | AF305-30-11-11 | 1SFL587002R1111 | 115...380 | EF370-380 | 1SAX611001R1101 | | |
| | | 100...250 | 100...250 | AF305-30-11-13 | 1SFL587002R1311 | | | | | |
| 200 | 350 | 24...60 | 20...60 | AF370-30-11-11 | 1SFL607002R1111 | 115...380 | EF370-380 | 1SAX611001R1101 | | |
| | | 100...250 | 100...250 | AF370-30-11-13 | 1SFL607002R1311 | | | | | |

(1) For other control voltages, see "Voltage code table".
(2) AF ... -11 not suitable for direct control by PLC-output.

# DOL and reversing starters protected by overload relays

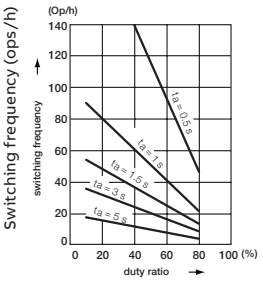
## With AF contactors - Open type version in kit form
## Switching frequency diagrams

### General

Overload relays cannot be operated at any arbitrary switching frequency in order to avoid tripping. Applications involving up to 15 operations per hour are acceptable. Higher switching frequencies are permitted if the duty ratio and the motor starting time are allowed for and if the motor's making current does not appreciably exceed 6 times the rated operating current. Please refer to the adjacent diagram for guideline values for the permitted switching frequency.

### Thermal overload relay

Intermittent periodic duty




Duty ratio (%)

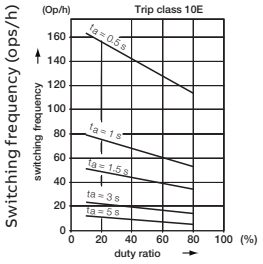
ta: motor starting time

**Example:**
Starting time of the motor: 1 second - Duty ratio: 40 % means a permitted switching frequency of max. 60 operating cycles per hour.

### Electronic overload relay

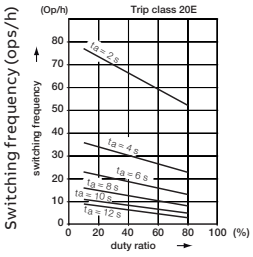
Intermittent periodic duty

Trip class 10E



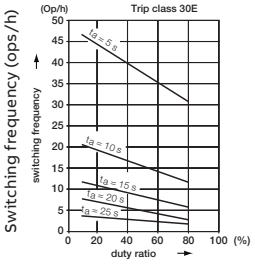

Duty ratio (%)

Trip class 20E




Duty ratio (%)

Trip class 30E




Duty ratio (%)

ta: motor starting time

**Exemple for trip class 10E:**
Starting time of the motor: 1 second. Duty ratio: 60 % means a permitted switching frequency of max. 60 operating cycles per hour, for a motor breaking current not exceeding 6 x In.

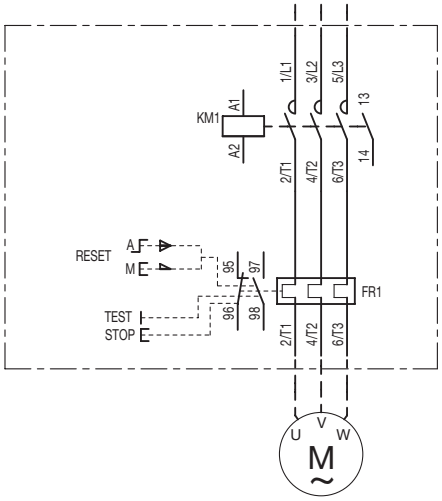
# DOL and reversing starters protected by overload relays

With AF contactors - Open type version in kit form

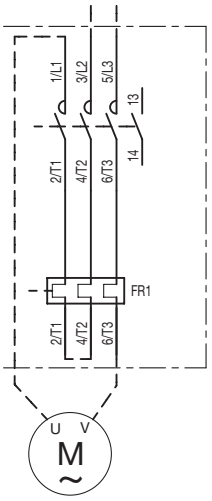
Wiring diagrams

### Direct-on-line starters

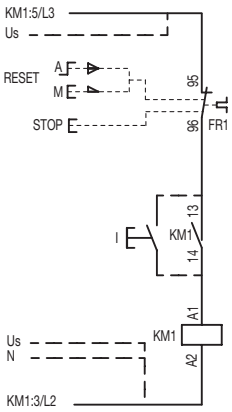
Power circuit




1-phase

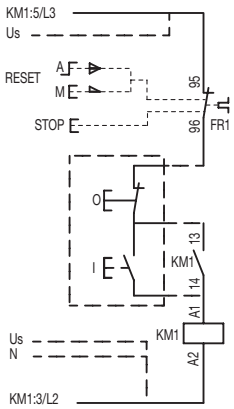



AC or DC local control



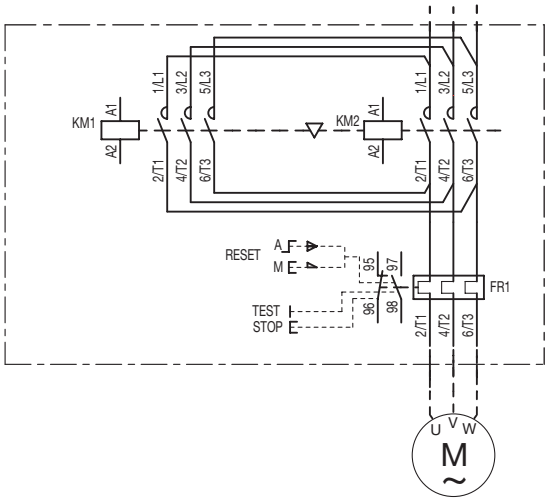

Note: coil Uc 12-20 V DC : A1+, A2-

AC or DC remote control

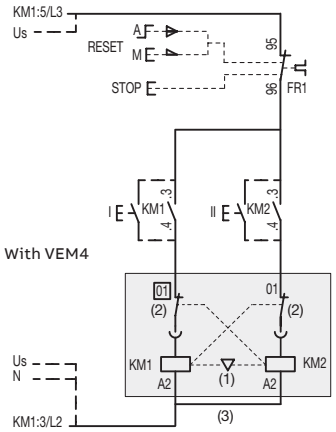



### Reversing starters

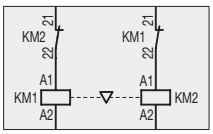
Power circuit



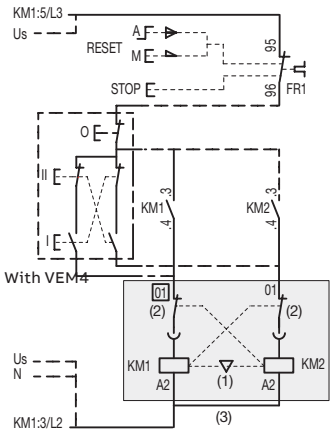

AC or DC local control



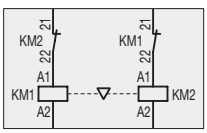

With VM




AC or DC remote control



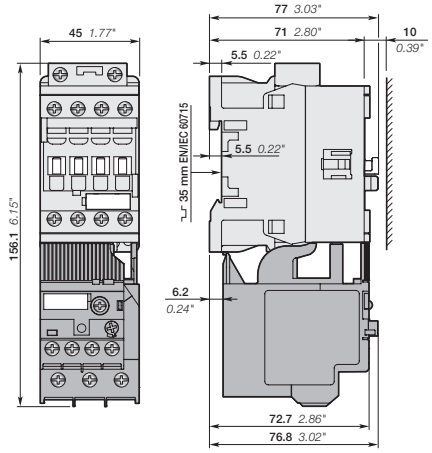

With VM



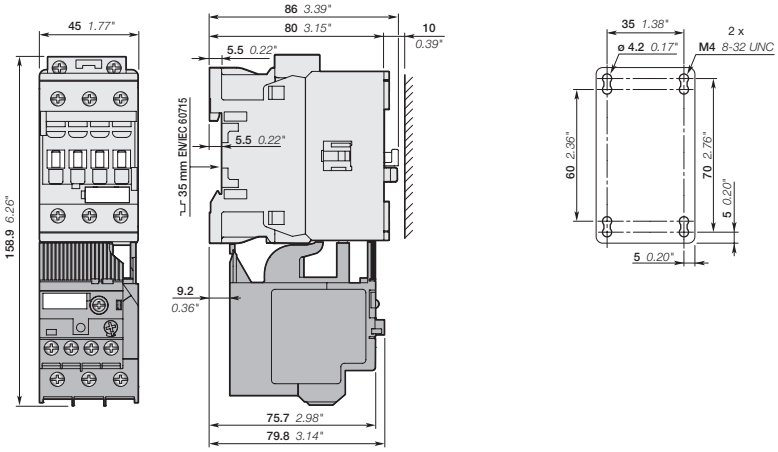

Note: - VEM4 = VM4 (1) + VE4 (2) with A2-A2 (3) connection
(Except for coil Uc 12-20 V DC : use VM4 with CA4).
- coil Uc 12-20 V DC : A1+, A2-

# DOL starters protected by thermal overload relays

## With AF contactors - open type version in kit form

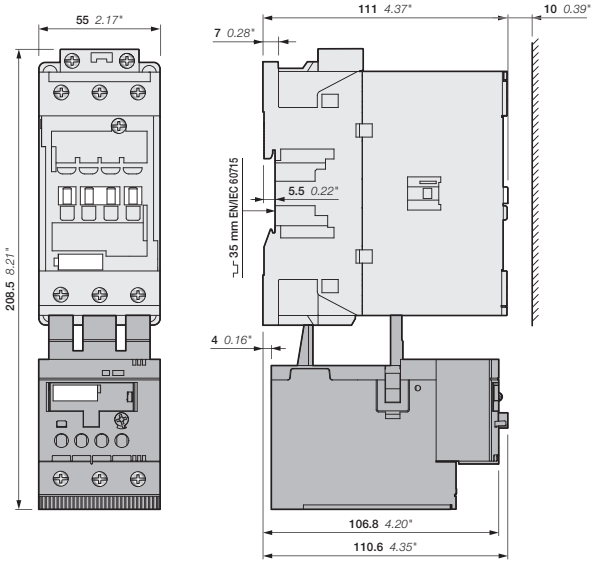



AF09, AF12, AF16
+ TF42 thermal overload relay

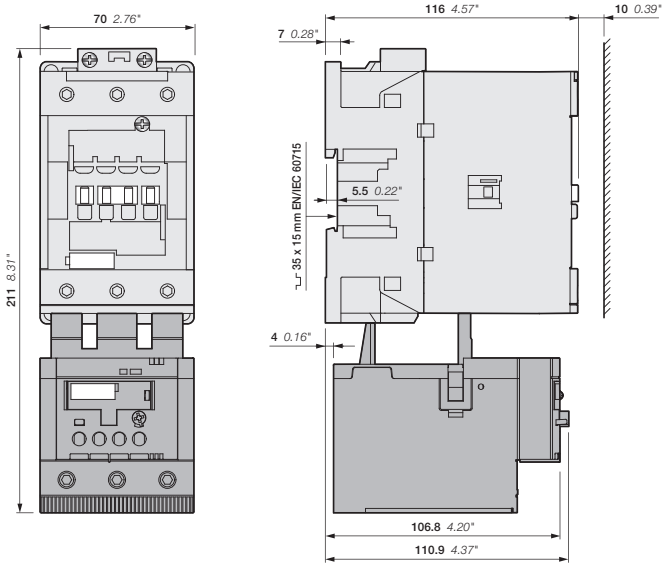



AF26, AF30, AF38
+ TF42 thermal overload relay

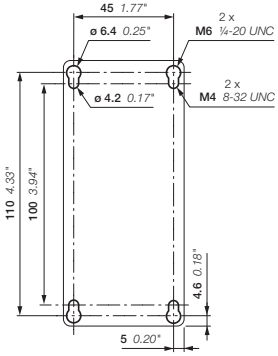
Note: contactor lateral distance to grounded component 2 mm 0.08" min.



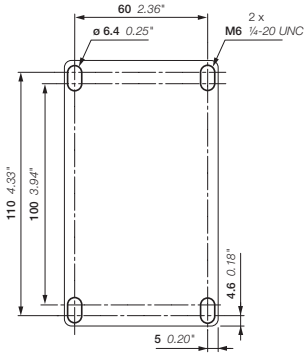

AF40, AF52, AF65
+ TF65 thermal overload relay




AF80, AF96
+ TF96 thermal overload relay




AF40, AF52, AF65
+ TF65 thermal overload relay

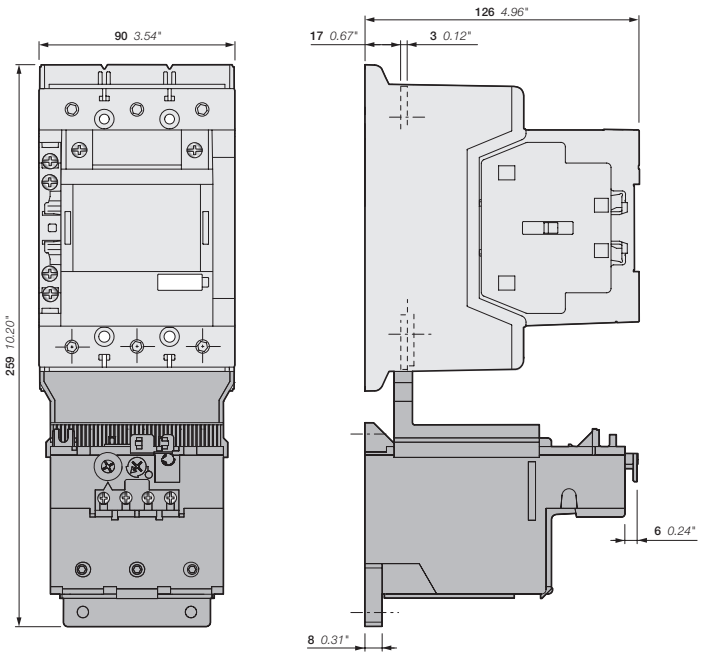



AF80, AF96
+ TF96 thermal overload relay

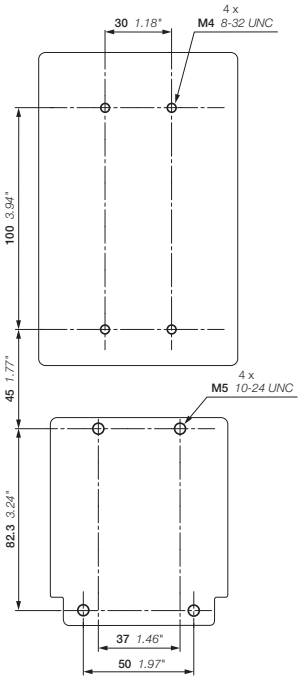
Main dimensions mm, inches

# DOL starters protected by thermal overload relays

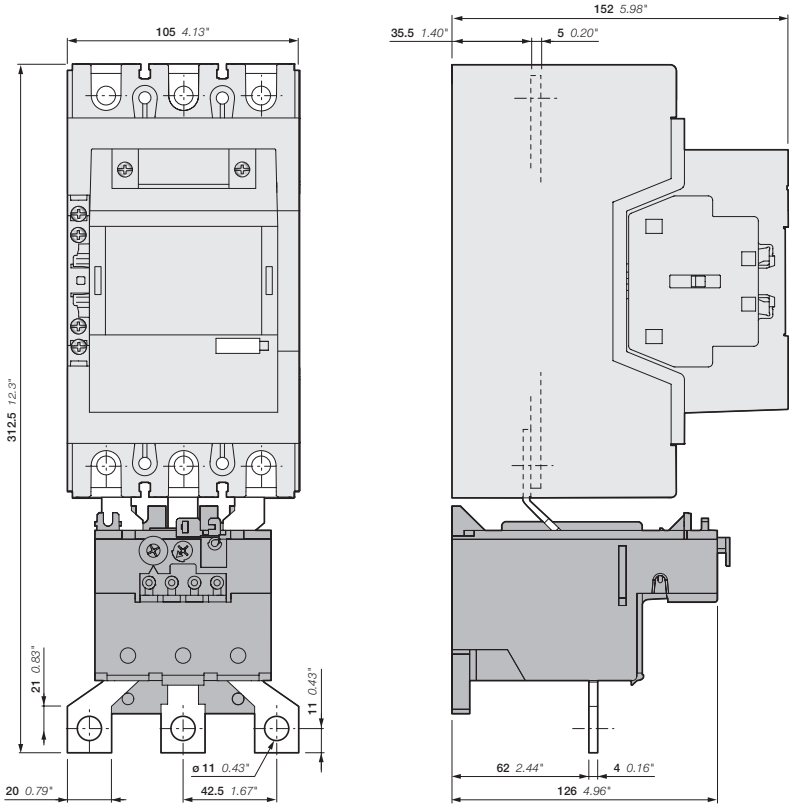
## With AF contactors - open type version in kit form



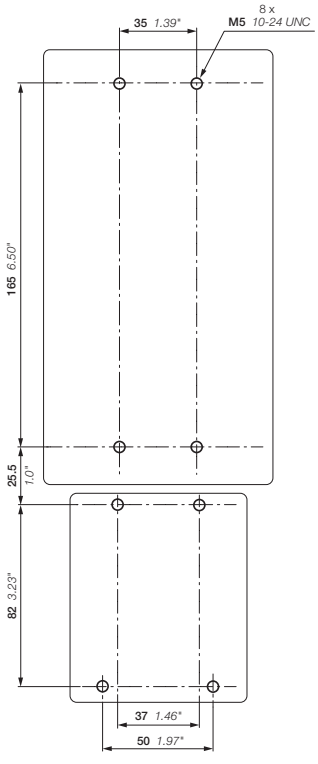

AF116, AF140-30-11(B)
+ TF140 thermal overload relay




AF116, AF140-30-11(B)
+ TF140 thermal overload relay




AF190, AF205-30-11
+ TA200DU thermal overload relay

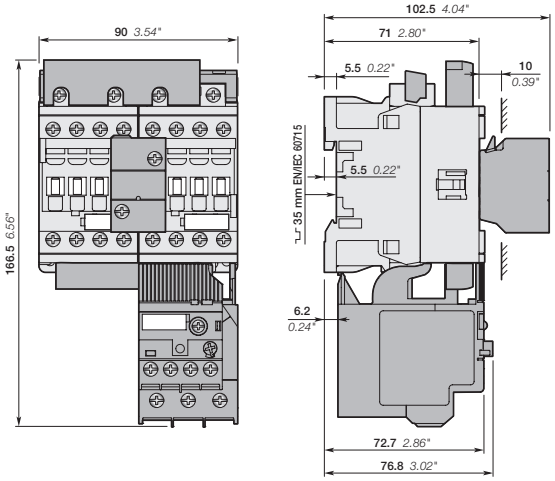



AF190, AF205
+ TA200DU thermal overload relay

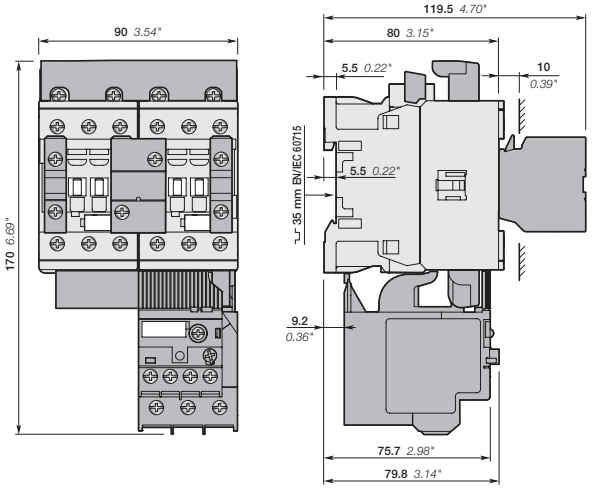
Main dimensions mm, inches

# Reversing starters protected by thermal overload relays

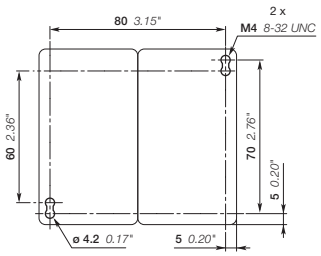
## With AF contactors - open type version in kit form




AF09, AF12, AF16
+ BER16-4, VEM4
+ TF42 thermal overload relay




AF26, AF30, AF38
+ BER38-4, VEM4, CA4-10
+ TF42 thermal overload relay




AF09, AF12, AF16, AF26, AF30, AF38

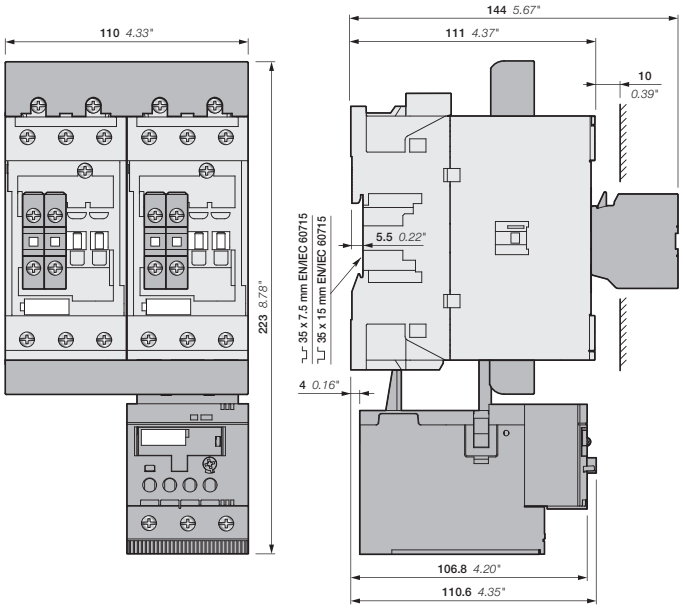
Note: contactor lateral distance to grounded component 2 mm 0.08" min.



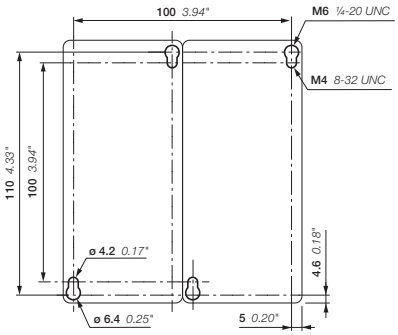
Main dimensions mm, inches

# Reversing starters protected by thermal overload relays

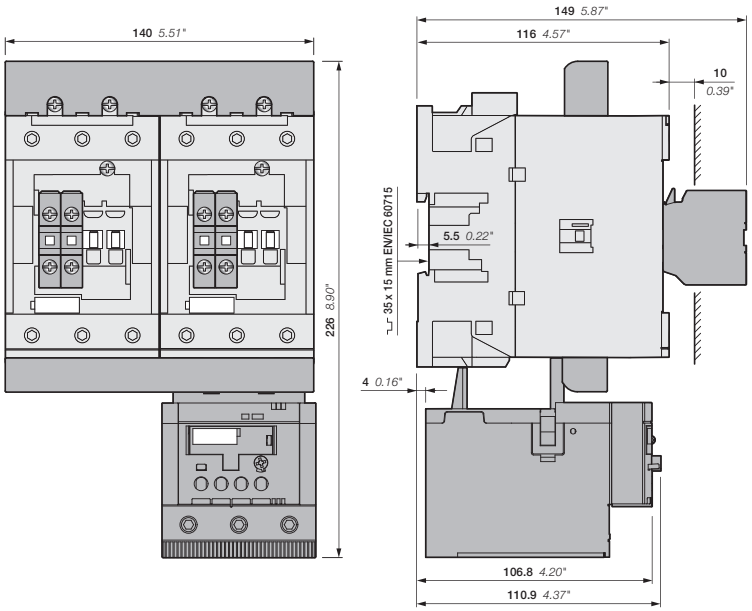
## With AF contactors - open type version in kit form



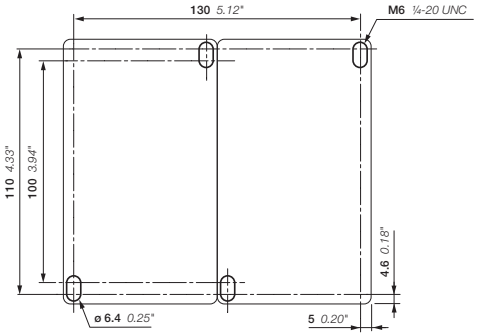

AF40, AF52, AF65
+ BER65-4, VM96-4
+ TF65 thermal overload relay




AF40, AF52, AF65
+ BER65-4, VM96-4
+ TF65 thermal overload relay




AF80, AF96
+ BER96-4, VM96-4
+ TF96 thermal overload relay

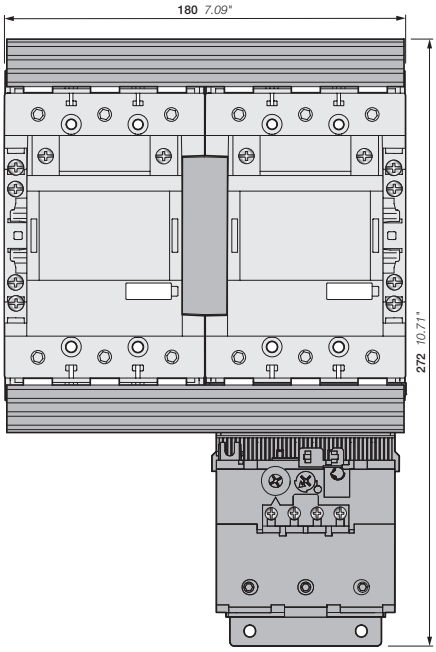


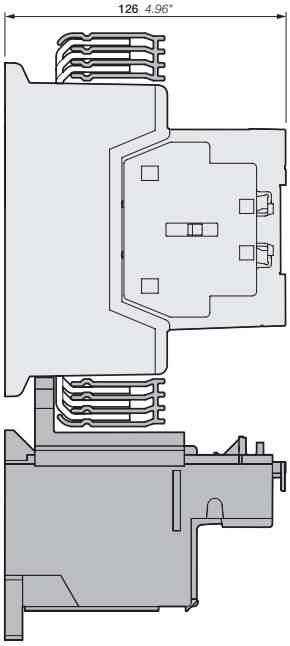

AF80, AF96
+ BER96-4, VM96-4
+ TF96 thermal overload relay

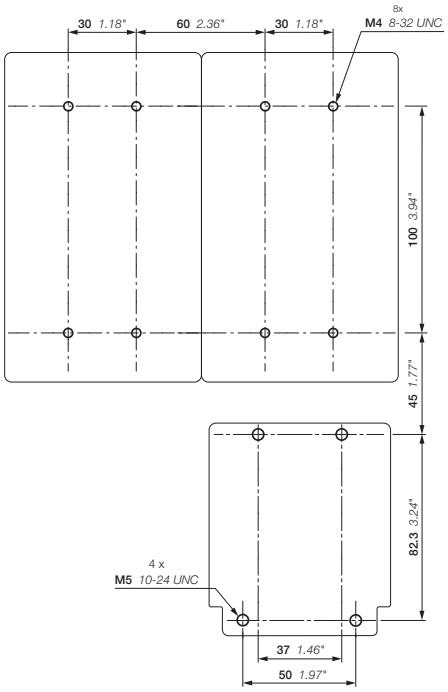
Main dimensions mm, inches

# Reversing starters protected by thermal overload relays

## With AF contactors - open type version in kit form



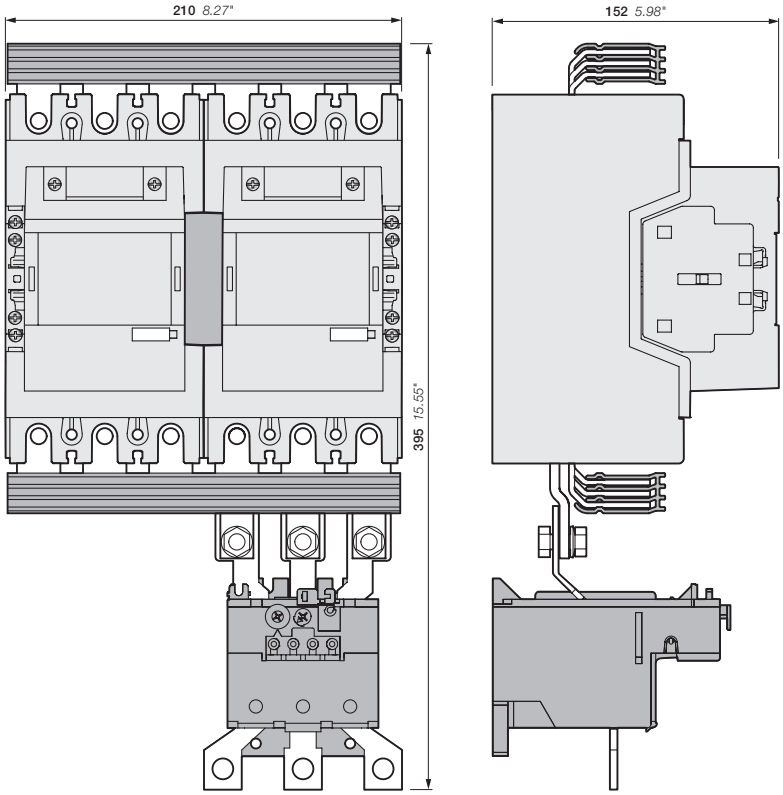



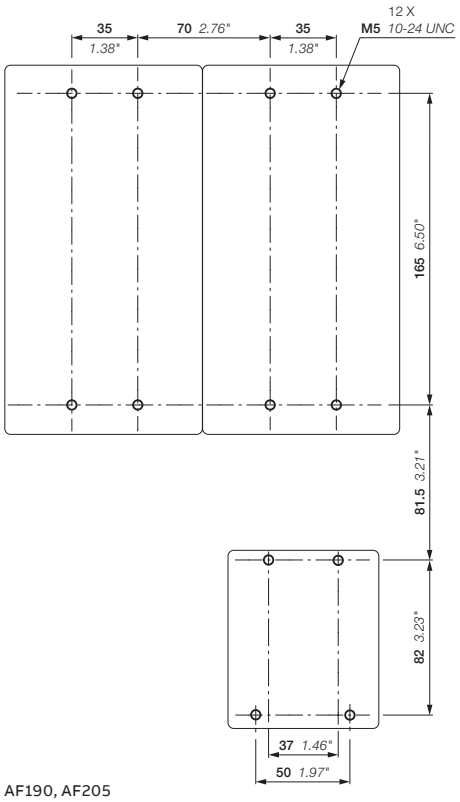

AF116, AF140, AF146
+ BER140-4, VM19
+ TF140 thermal overload relay

Main dimensions mm, inches

# Reversing starters protected by thermal overload relays

## With AF contactors - open type version in kit form



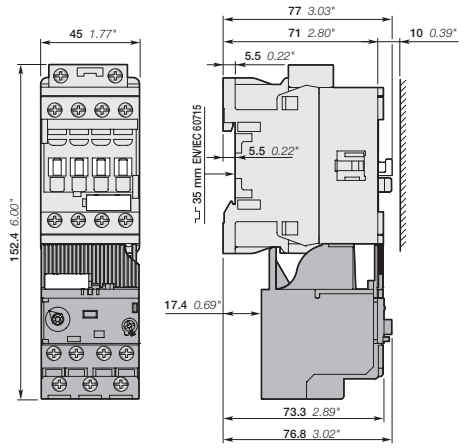




AF190, AF205
+ BER205-4, VM19
+ TA200DU thermal overload relay

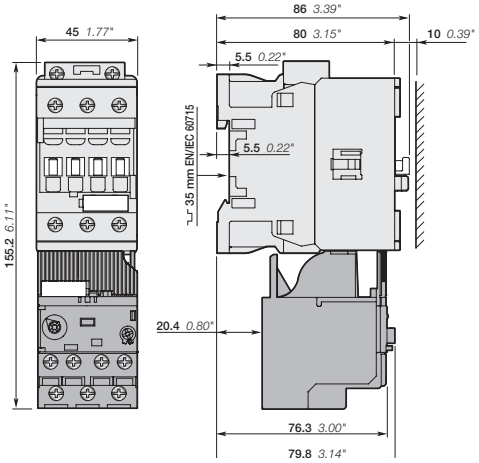
Main dimensions mm, inches

# DOL starters protected by electronic overload relays

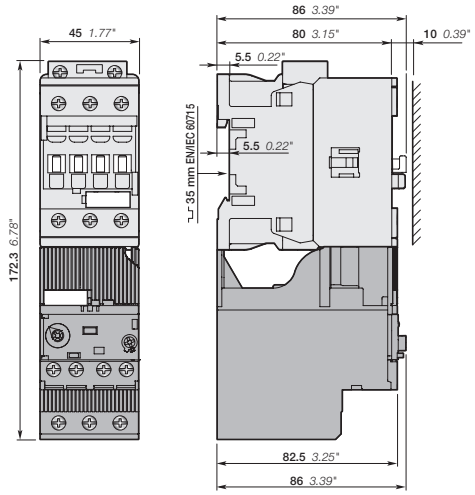
## With AF contactors - open type version in kit form



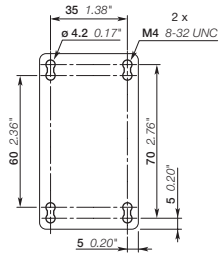

AF09, AF12, AF16
+ EF19 electronic overload relay




AF26, AF30, AF38
+ EF19 electronic overload relay




AF26, AF30, AF38
+ EF45 electronic overload relay




AF09, AF12, AF16, AF26, AF30, AF38
+ EF electronic overload relay

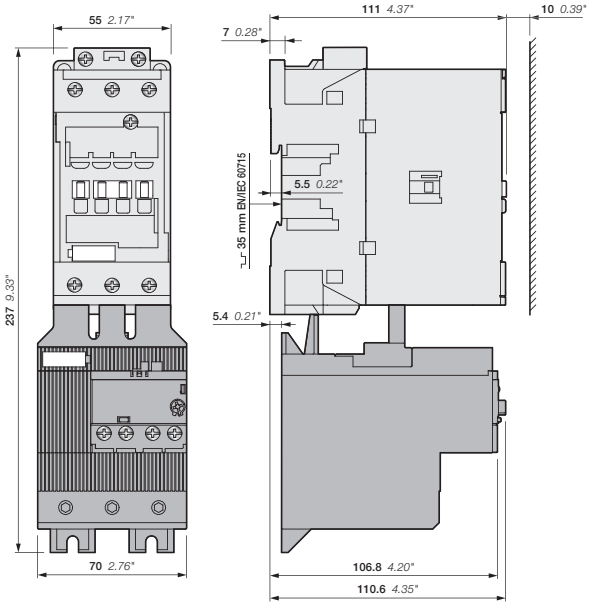
Note: contactor lateral distance to grounded component 2 mm 0.08" min.



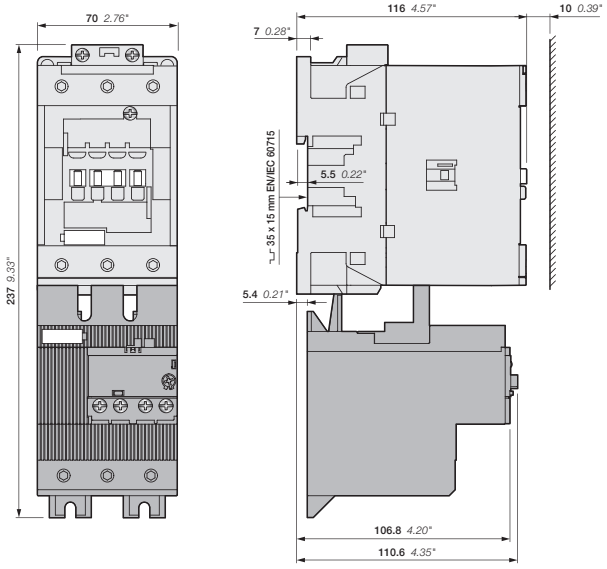
Main dimensions mm, inches

# DOL starters protected by electronic overload relays

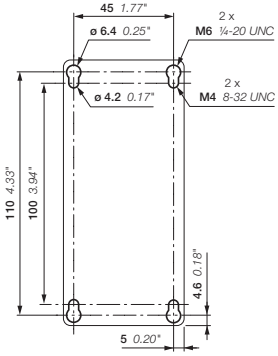
## With AF contactors - open type version in kit form



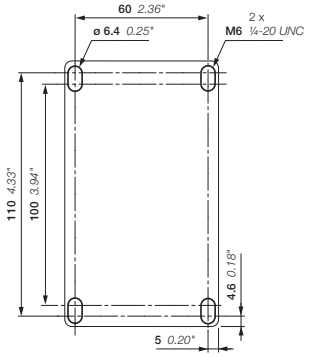

AF40, AF52, AF65
+ EF65 electronic overload relay




AF80, AF96
+ EF96 electronic overload relay




AF40, AF52, AF65
+ EF65 electronic overload relay

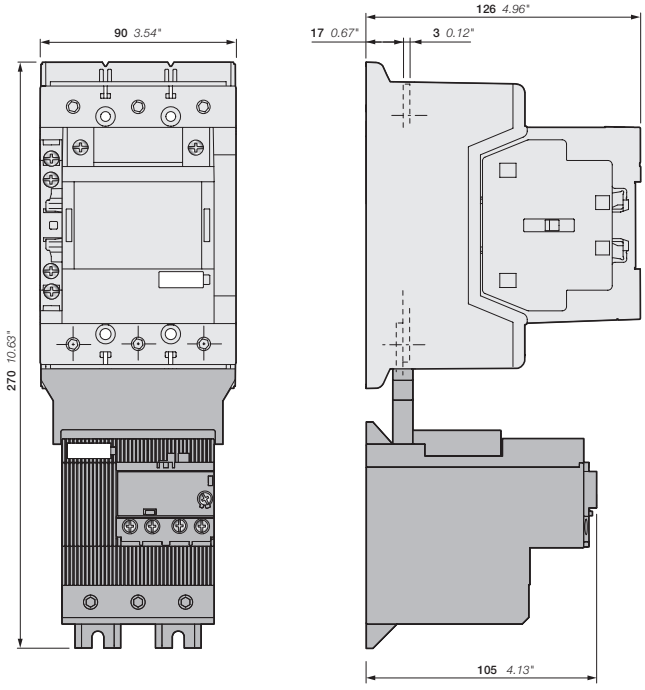



AF80, AF96
+ EF96 electronic overload relay

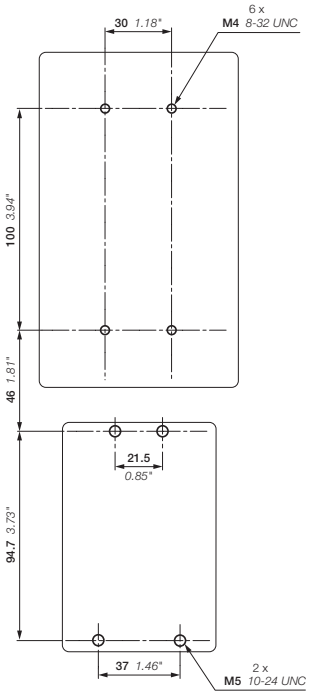
Main dimensions mm, inches

# DOL starters protected by electronic overload relays

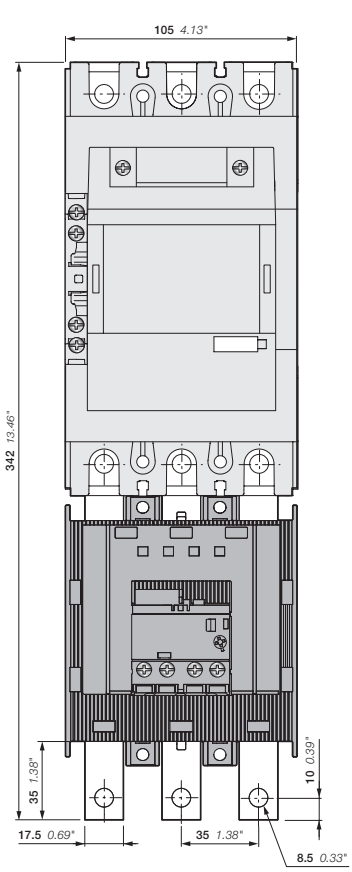
## With AF contactors - open type version in kit form

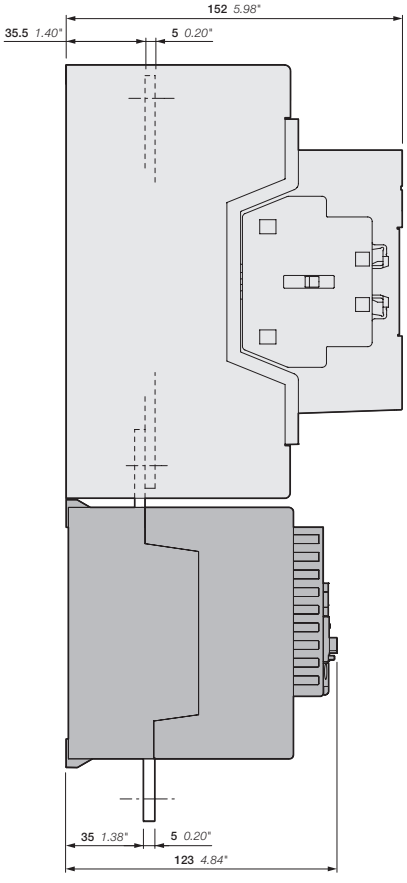



AF116, AF140, AF146-30-11(B)
+ EF146 electronic overload relay

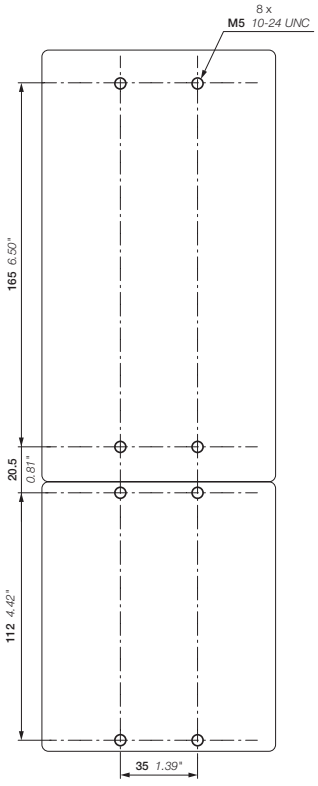



AF116, AF140, AF146-30-11(B)
+ EF146 electronic overload relay




AF190, AF205-30-11
+ EF205 electronic overload relay

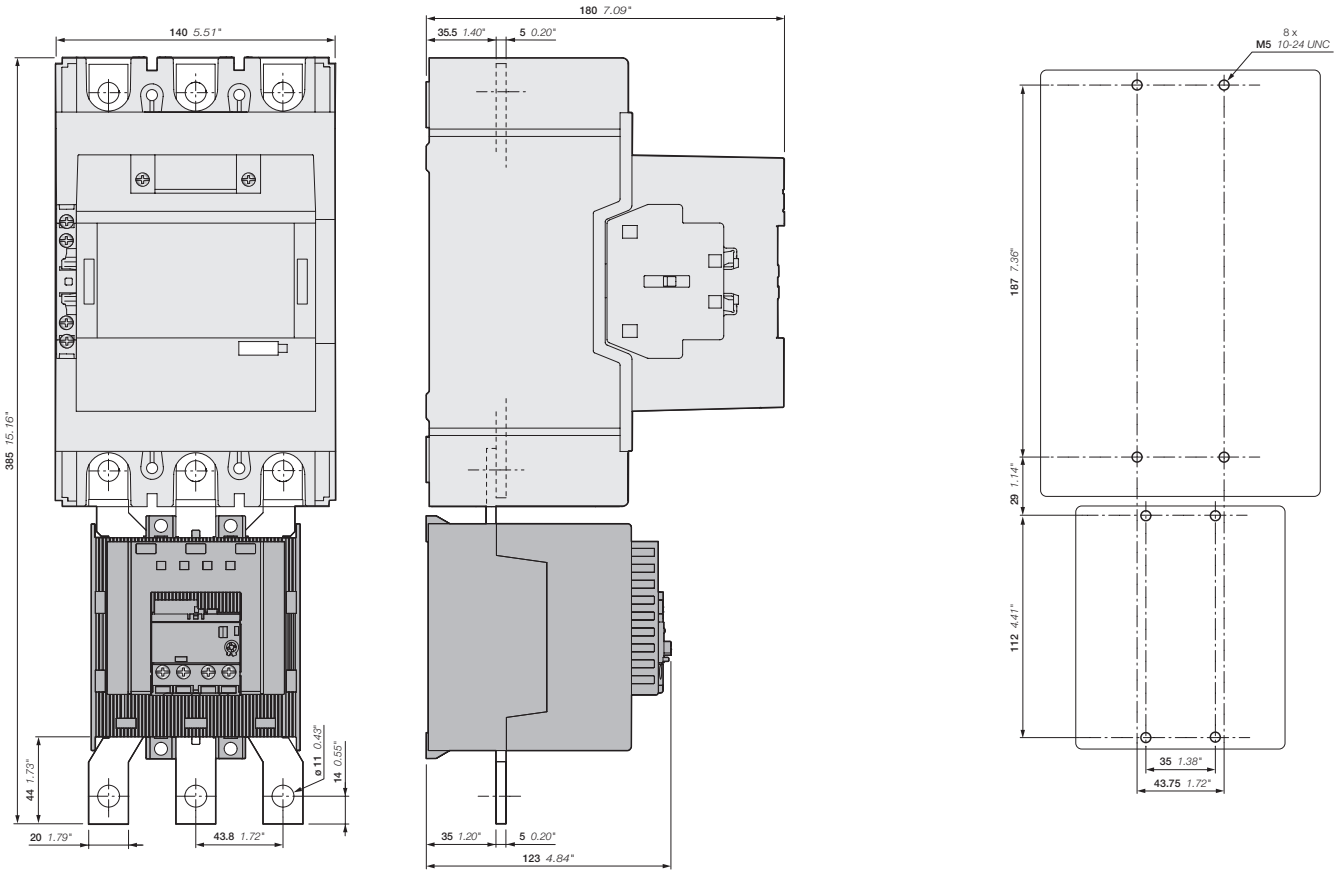



AF190, AF205
+ EF205 electronic overload relay

Main dimensions mm, inches

# DOL starters protected by electronic overload relays

## With AF contactors - open type version in kit form

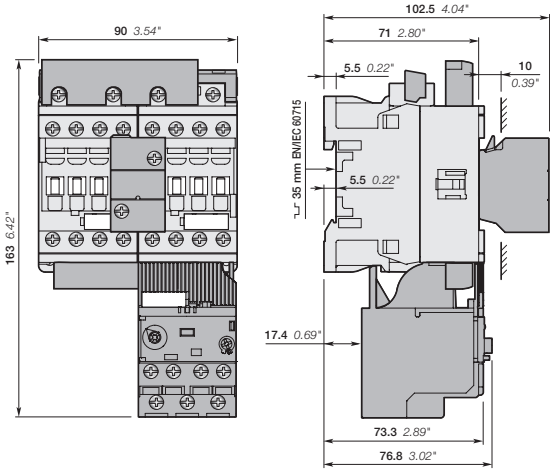



AF265, AF305, AF370-30-11
+ EF370 electronic overload relay

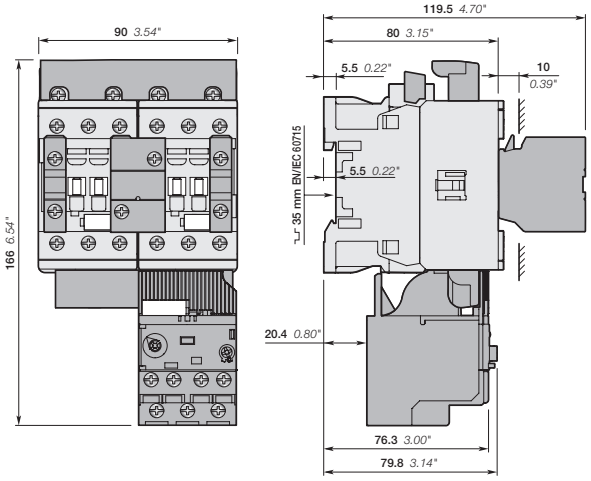
Main dimensions mm, inches

# Reversing starters protected by electronic overload relays

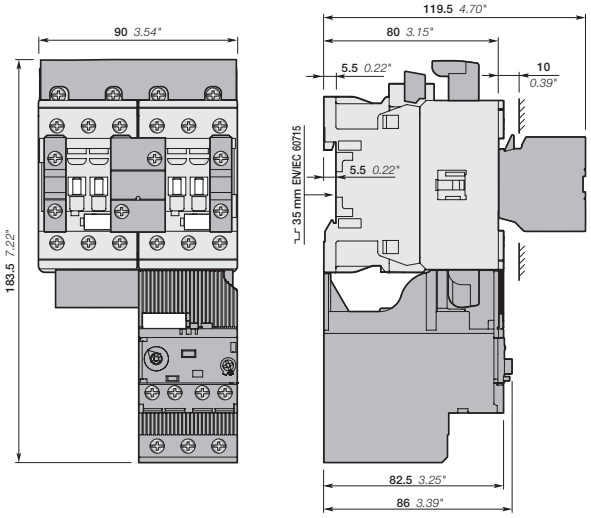
## With AF contactors - open type version in kit form



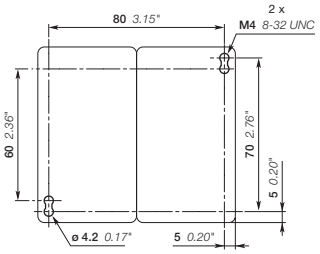

AF09, AF12, AF16
+ BER16-4, VEM4
+ EF19 electronic overload relay




AF26, AF30, AF38
+ BER38-4, VEM4, CA4-10
+ EF19 electronic overload relay




AF26, AF30, AF38
+ BER38-4, VEM4, CA4-10
+ EF45 electronic overload relay




AF09, AF12, AF16, AF26, AF30, AF38

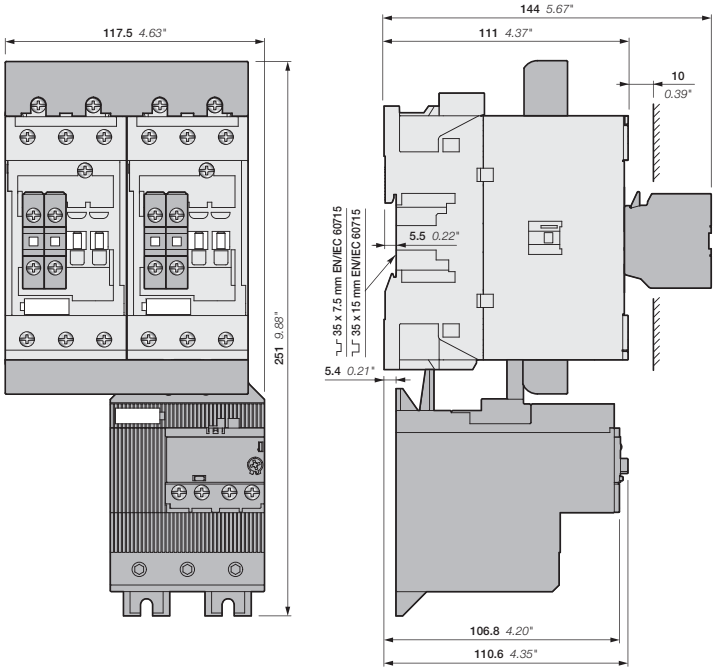
Note: contactor lateral distance to grounded component 2 mm 0.08" min.



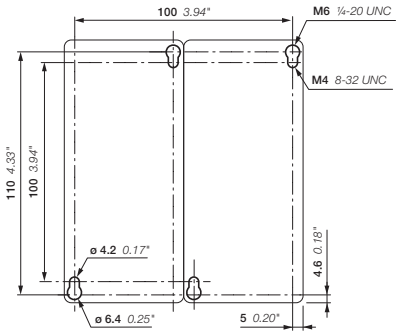
Main dimensions mm, inches

# Reversing starters protected by electronic overload relays

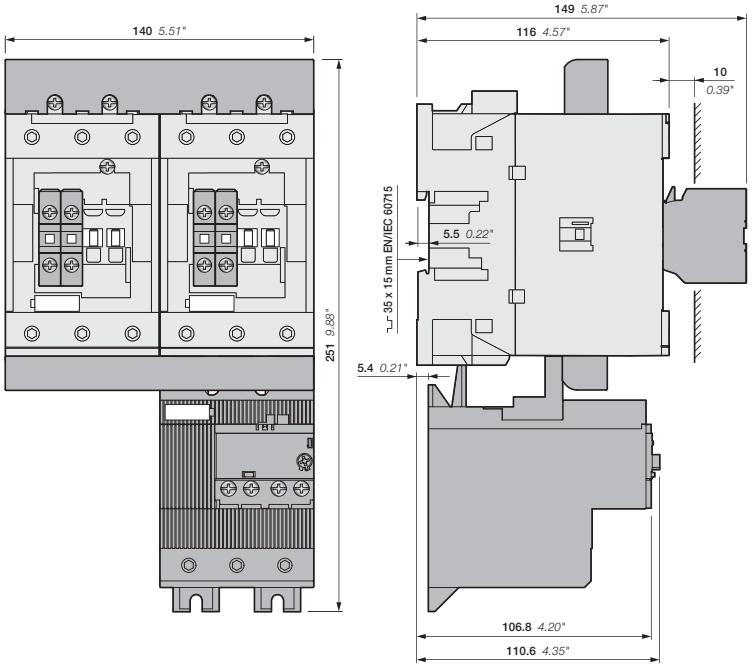
## With AF contactors - open type version in kit form



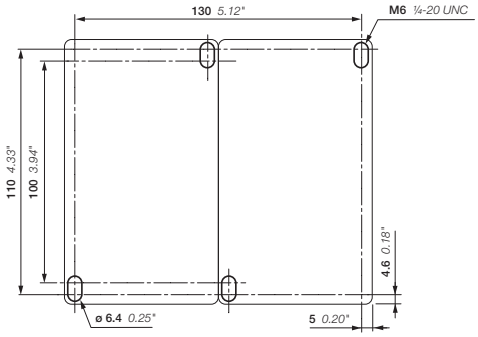

AF40, AF52, AF65
+ BER65-4, VM96-4
+ EF65 electronic overload relay




AF40, AF52, AF65
+ BER65-4, VM96-4
+ EF65 electronic overload relay




AF80, AF96
+ BER96-4, VM96-4
+ EF96 electronic overload relay

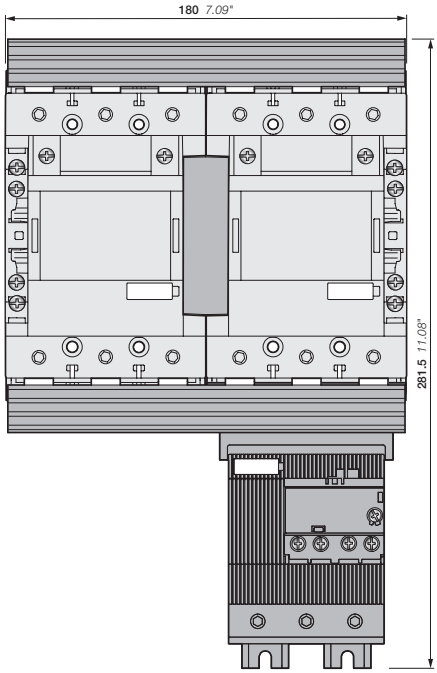


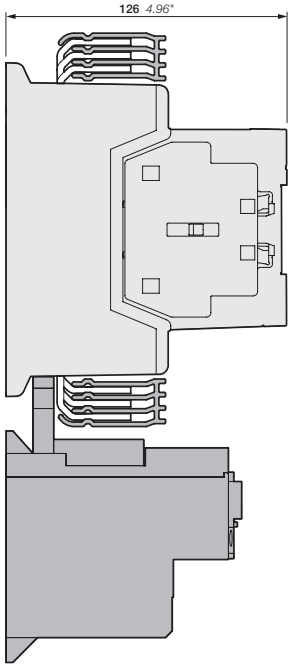

AF80, AF96
+ BER96-4, VM96-4
+ EF96 electronic overload relay

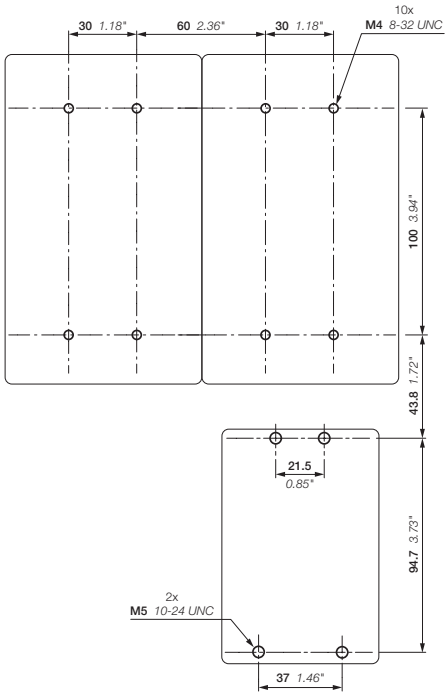
Main dimensions mm, inches

# Reversing starters protected by electronic overload relays

## With AF contactors - open type version in kit form



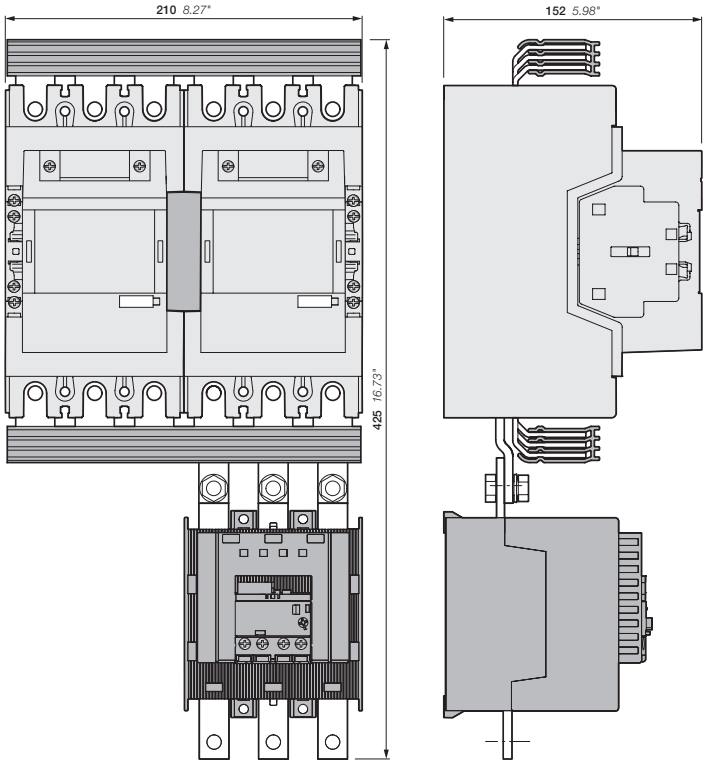



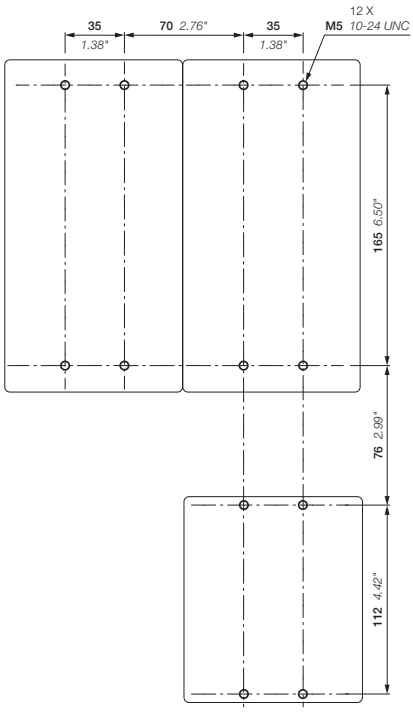

AF116, AF140, AF146
+ BER140-4, VM19
+ EF146 electronic overload relay

Main dimensions mm, inches

# Reversing starters protected by electronic overload relays

With AF contactors - open type version in kit form



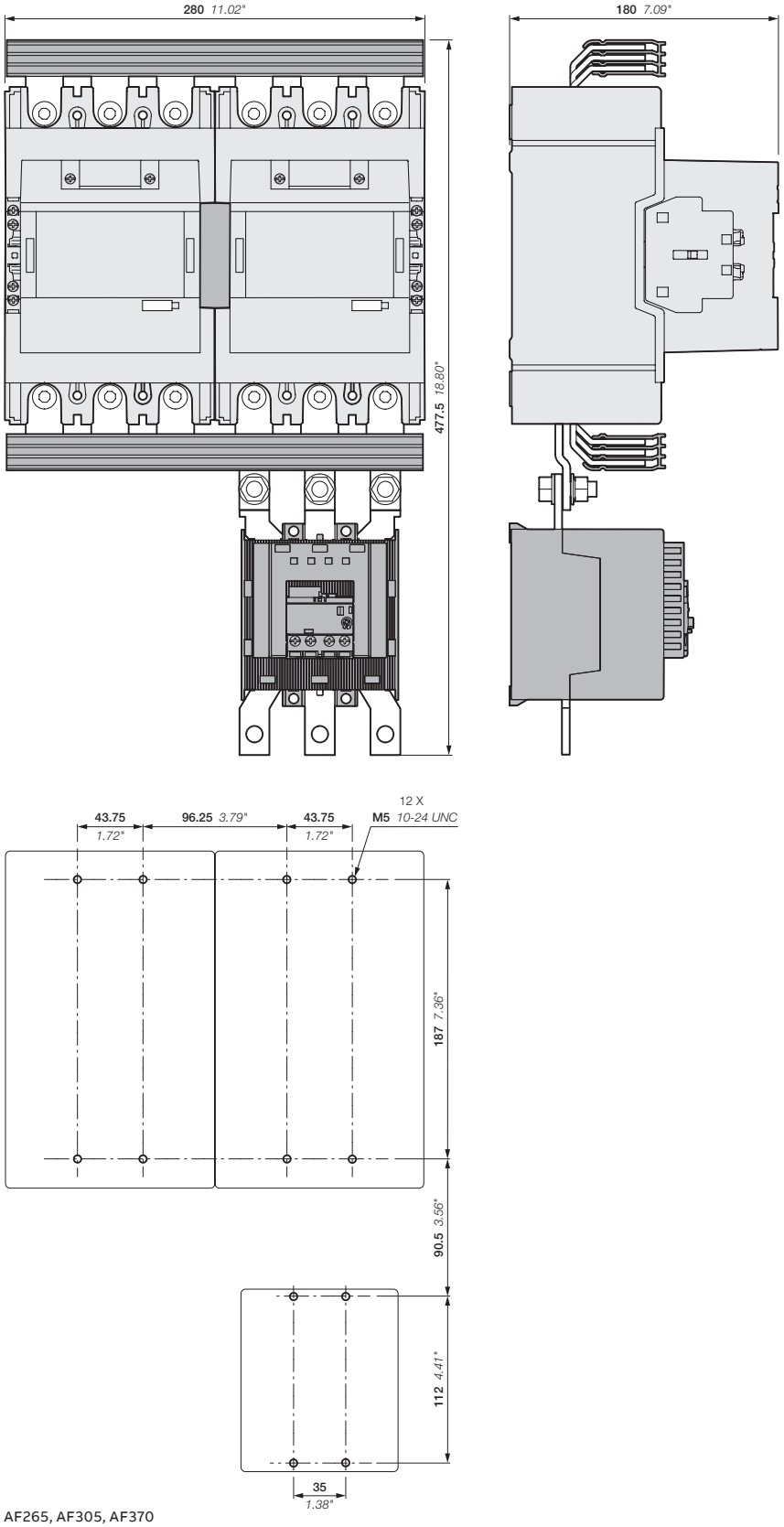




AF190, AF205
+ BER205-4, VM19
+ EF205 electronic overload relay

Main dimensions mm, inches

## Reversing starters protected by electronic overload relays

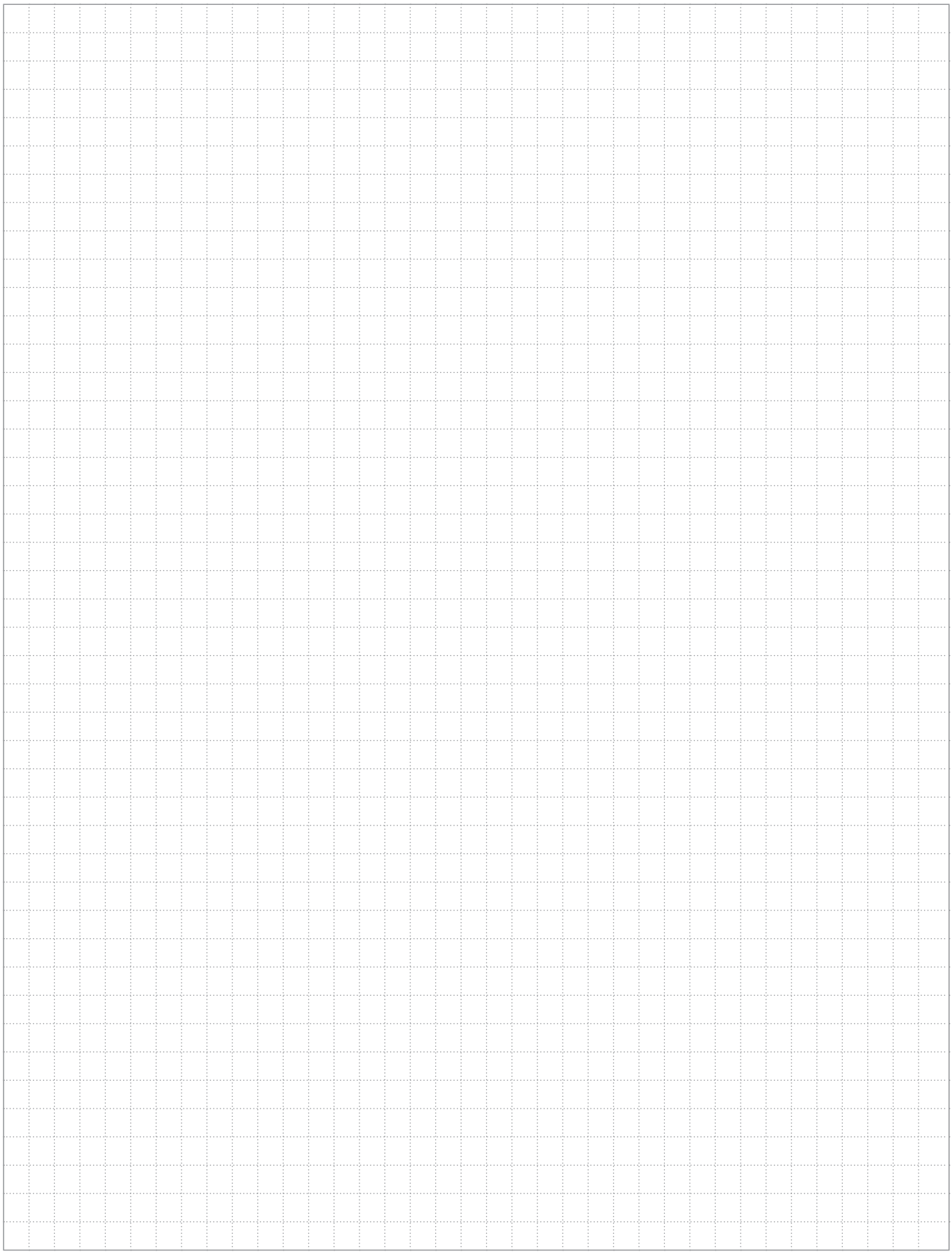
With AF contactors - open type version in kit form




AF265, AF305, AF370
+ BER370-4, VM19
+ EF370 electronic overload relay

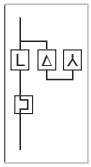
Main dimensions mm, inches

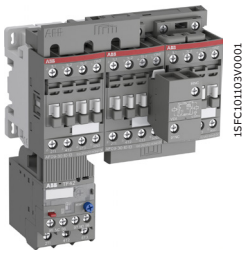
# Notes



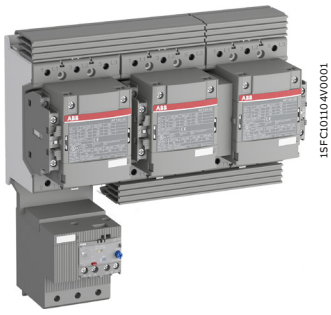
# Star-delta starters protected by overload relays

## With AF contactors - Open type version in kit form





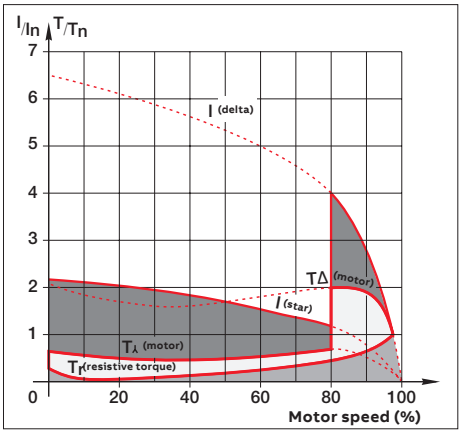

AF16-30-10 + AF16-30-10 +
AF09-30-10 + BEY16-4 + VEM4 + TF42




AF140-30-11 + AF140-30-11 +
AF140-30-11 + BEY140-4 + VM19 + EF146

### Application

Star-delta starting is the most common method to reduce the starting current of a motor. This system can be used on all the squirrel cage motors, which are normally used in delta connection. In this type of starting, it is recommended to choose motors having high starting torque i.e. much higher than the resistive torque in order to reach sufficient high speed when the motor is connected in star.




I = current
T = torque

In = nominal current
Tn = nominal torque

**When starting:**

- Inrush current is reduced to a third of direct starting current
- Motor torque is reduced to a third or even less of direct starting torque.

Transient current is generated when switching from star to delta connection.
During the initial starting phase ("star" connection), the resistive torque of the driven load must remain, irrespective of speed, less than the "star" motor torque until "star-delta" switching occurs.
This starting mode is therefore ideal for machines having high starting torque such as pumps, centrifugal compressors, wood-working machines...

### Precaution

- Motor nominal voltage in delta connection must be equal to that of the mains. Example: a motor for 400 V star-delta starting must be designed for 400 V in "delta" connection. Its usual designation is "400 V / 690 V motor". The motor must be constructed with 6 terminal windings
- In order to prevent a high current peak, at least 85 % of nominal speed must be reached before switching from star to delta

### Sequence

**Starting is a three-stage process:**

**1st stage:** "Star" connection - Press the "On" button on the control circuit to close the KM2 "Star" contactor. The KM1 "line" contactor then closes and the motor starts. Countdown of programmed starting time (6 to 10 s) then begins.

**2nd stage:** "Star" to "Delta" switching - when programmed starting time is over, the KM2 "Star" contactor opens.

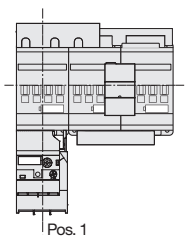
**3rd stage:** "Delta" connection - Thanks to AF contactors, a transition time (or dwelling time) of 50 ms is already integrated between the opening of the "star" contactor and closing of the "delta" contactor.

**Conclusion:** An on-delay timer without dwelling time (e.g.: CT-ERS.21S or TEF4-ON) is enough to countdown the programmed starting time (6 to 10 s) during "Star connection". The use of a star-delta timer including a dwelling time is not permitted.

### Main Technical Data

| | |
|---|---|
| Standards | IEC/EN 60947-4-1 |
| Rated operational voltage Ue max. | 690 V - 50/60 Hz |
| Rated insulation voltage Ui | |
| acc. to IEC 60947-4-1 | 690 V |
| acc. to UL / CSA | 600 V |
| Ambient air temperature | |
| Close to the device | ≤ 60 °C (TF42: 38 A above ≤ 50 °C) |
| Degree of protection | IP20 |
| Switching frequency | Refer to "Switching frequency diagrams" page |

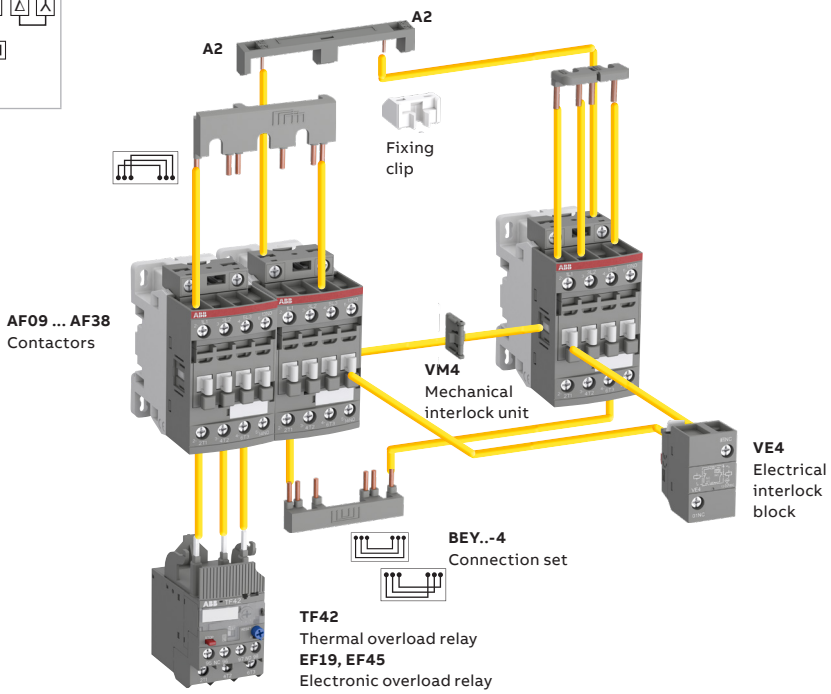
**Mounting positions**



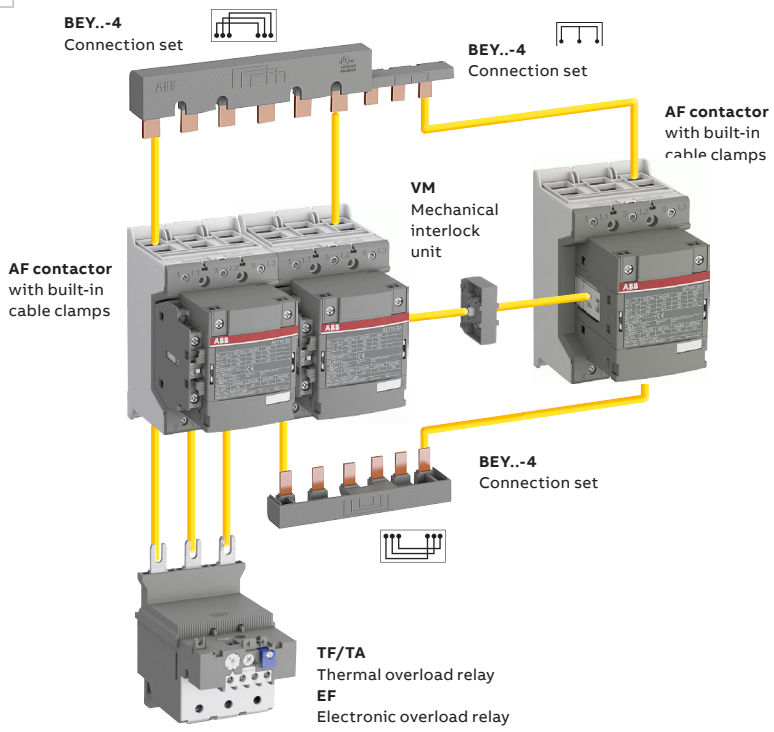
# Star-delta starters protected by overload relays

## With AF contactors - Open type version in kit form

### Star-delta starters for AF09 ... AF38




### Star-delta starters for AF116 ... AF370




You can easily assemble star-delta starter thanks to our complete range of accessories:

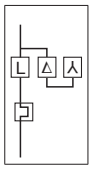
- For AF09 ... AF38, use VEM4 mechanical and electrical interlock set without increasing starter width, made of:
  - VM4 mechanical interlock unit and 2 fixing clips
  - VE4 electrical interlock block with A2-A2 connection.
- For AF40 ... AF370, use VM.. mechanical interlock unit and additional auxiliary contact blocks for electrical interlocking.
- BEY..-4 connection set to assure a safe and simple connection between both contactor main terminals.

**Select now easily and quickly your starter in the following page**s at 400 V, up to 200 kW.

For the full coordination tables, please visit our SOC tool : https://www.lowvoltage-tools.abb.com/soc

# Star-delta starters protected by thermal overload relays

With AF contactors - Open type version in kit form



**Line contactor KM1**



**Delta contactor KM3**



**Star contactor KM2**



| IEC | | Control voltage Uc min. ... Uc max. (1) | | Type | Order code | Type | Order code | Type | Order code |
|---|---|---|---|---|---|---|---|---|---|
| AC-3 Rated power 400 V kW | Rated current 400 V A | V 50/60 Hz | V DC | | | | | | |
| 7.5 | 15.5 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | AF09Z-30-10-21 | 1SBL136001R2110 | AF09Z-30-10-21 | 1SBL136001R2110 |
| | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | AF09-30-10-13 | 1SBL137001R1310 | AF09-30-10-13 | 1SBL137001R1310 |
| 11 | 22 | 24...60 | 20...60 | AF12Z-30-10-21 | 1SBL156001R2110 | AF12Z-30-10-21 | 1SBL156001R2110 | AF09Z-30-10-21 | 1SBL136001R2110 |
| | | 100...250 | 100...250 | AF12-30-10-13 | 1SBL157001R1310 | AF12-30-10-13 | 1SBL157001R1310 | AF09-30-10-13 | 1SBL137001R1310 |
| 15 | 29 | 24...60 | 20...60 | AF16Z-30-10-21 | 1SBL176001R2110 | AF16Z-30-10-21 | 1SBL176001R2110 | AF09Z-30-10-21 | 1SBL136001R2110 |
| | | 100...250 | 100...250 | AF16-30-10-13 | 1SBL177001R1310 | AF16-30-10-13 | 1SBL177001R1310 | AF09-30-10-13 | 1SBL137001R1310 |
| 18.5 | 35 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 |
| | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | AF26-30-00-13 | 1SBL237001R1300 | AF26-30-00-13 | 1SBL237001R1300 |
| 22 | 41 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 |
| | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | AF26-30-00-13 | 1SBL237001R1300 | AF26-30-00-13 | 1SBL237001R1300 |
| 25 | 47 | 24...60 | 20...60 | AF30Z-30-00-21 | 1SBL276001R2100 | AF30Z-30-00-21 | 1SBL276001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 |
| | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | AF30-30-00-13 | 1SBL277001R1300 | AF26-30-00-13 | 1SBL237001R1300 |
| 37 | 66 | 24...60 | 20...60 | AF40-30-00-11 | 1SBL347001R1100 | AF40-30-00-11 | 1SBL347001R1100 | AF40-30-00-11 | 1SBL347001R1100 |
| | | 100...250 | 100...250 | AF40-30-00-13 | 1SBL347001R1300 | AF40-30-00-13 | 1SBL347001R1300 | AF40-30-00-13 | 1SBL347001R1300 |
| 45 | 80 | 24...60 | 20...60 | AF52-30-00-11 | 1SBL367001R1100 | AF52-30-00-11 | 1SBL367001R1100 | AF40-30-00-11 | 1SBL347001R1100 |
| | | 100...250 | 100...250 | AF52-30-00-13 | 1SBL367001R1300 | AF52-30-00-13 | 1SBL367001R1300 | AF40-30-00-13 | 1SBL347001R1300 |
| 55 | 97 | 24...60 | 20...60 | AF65-30-00-11 | 1SBL387001R1100 | AF65-30-00-11 | 1SBL387001R1100 | AF40-30-00-11 | 1SBL347001R1100 |
| | | 100...250 | 100...250 | AF65-30-00-13 | 1SBL387001R1300 | AF65-30-00-13 | 1SBL387001R1300 | AF40-30-00-13 | 1SBL347001R1300 |
| 75 | 132 | 24...60 | 20...60 | AF80-30-00-11 | 1SBL397001R1100 | AF80-30-00-11 | 1SBL397001R1100 | AF52-30-00-11 | 1SBL367001R1100 |
| | | 100...250 | 100...250 | AF80-30-00-13 | 1SBL397001R1300 | AF80-30-00-13 | 1SBL397001R1300 | AF52-30-00-13 | 1SBL367001R1300 |
| 90 | 160 | 24...60 | 20...60 | AF96-30-00-11 | 1SBL407001R1100 | AF96-30-00-11 | 1SBL407001R1100 | AF65-30-00-11 | 1SBL387001R1100 |
| | | 100...250 | 100...250 | AF96-30-00-13 | 1SBL407001R1300 | AF96-30-00-13 | 1SBL407001R1300 | AF65-30-00-13 | 1SBL387001R1300 |
| 110 | 195 | 24...60 | 20...60 | AF116-30-11-11 | 1SFL427001R1111 | AF116-30-11-11 | 1SFL427001R1111 | AF116-30-11-11 (4) | 1SFL427001R1111 |
| | | 100...250 | 100...250 | AF116-30-11-13 | 1SFL427001R1311 | AF116-30-11-13 | 1SFL427001R1311 | AF116-30-11-13 | 1SFL427001R1311 |
| 132 | 230 | 24...60 | 20...60 | AF140-30-11-11 | 1SFL447001R1111 | AF140-30-11-11 | 1SFL447001R1111 | AF116-30-11-11 | 1SFL427001R1111 |
| | | 100...250 | 100...250 | AF140-30-11-13 | 1SFL447001R1311 | AF140-30-11-13 | 1SFL447001R1311 | AF116-30-11-13 | 1SFL427001R1311 |
| 160 | 280 | 24...60 | 20...60 | AF190-30-11-11 | 1SFL487002R1111 | AF190-30-11-11 | 1SFL487002R1111 | AF140-30-11-11 | 1SFL447001R1111 |
| | | 100...250 | 100...250 | AF190-30-11-13 | 1SFL487002R1311 | AF190-30-11-13 | 1SFL487002R1311 | AF140-30-11-13 | 1SFL447001R1311 |

## Thermal overload relays (2)



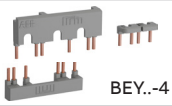
## Electronic timers (3)



CT-ERS.21S TEF4-ON

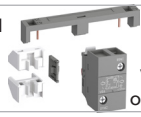
## Accessories

Connection sets



BEY..-4

Mechanical and interlock set



VEM4 or VM..

## Auxiliary contact blocks

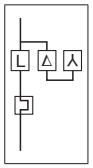


CA4-10
CA4-01

| Setting ranges A | Type | Order code | Type | Order code | Type | Order code | Type | Order code |
|---|---|---|---|---|---|---|---|---|
| 7.60...10.0 | TF42-10 | 1SAZ721201R1043 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY16-4<br>VEM4 | 1SBN081313R2000<br>1SBN030111R1000 | - | - |
| 10.0...13.0 | TF42-13 | 1SAZ721201R1045 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY16-4<br>VEM4 | 1SBN081313R2000<br>1SBN030111R1000 | - | - |
| 16.0...20.0 | TF42-20 | 1SAZ721201R1049 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY16-4<br>VEM4 | 1SBN081313R2000<br>1SBN030111R1000 | - | - |
| 20.0...24.0 | TF42-24 | 1SAZ721201R1051 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY38-4<br>VEM4 | 1SBN082713R2000<br>1SBN030111R1000 | KM1 : 1 x CA4-10<br>KM2 : 1 x CA4-10 | 1SBN010110R1010<br>1SBN010110R1010 |
| 20.0...24.0 | TF42-24 | 1SAZ721201R1051 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY38-4<br>VEM4 | 1SBN082713R2000<br>1SBN030111R1000 | KM1 : 1 x CA4-10<br>KM2 : 1 x CA4-10 | 1SBN010110R1010<br>1SBN010110R1010 |
| 24.0...29.0 | TF42-29 | 1SAZ721201R1052 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY38-4<br>VEM4 | 1SBN082713R2000<br>1SBN030111R1000 | KM1 : 1 x CA4-10<br>KM2 : 1 x CA4-10 | 1SBN010110R1010<br>1SBN010110R1010 |
| 30.0...40.0 | TF65-40 | 1SAZ811201R1003 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY65-4<br>VM96-4 | 1SBN083413R2000<br>1SBN033405T1000 | KM1 : 1 x CA4-10 (3)<br>KM2 : 1 x CA4-10<br>1 x CA4-01<br>KM3 : 1 x CA4-01 | 1SBN010110R1010<br>1SBN010110R1010<br>1SBN010110R1001<br>1SBN010110R1001 |
| 36.0...47.0 | TF65-47 | 1SAZ811201R1004 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY65-4<br>VM96-4 | 1SBN083413R2000<br>1SBN033405T1000 | KM1 : 1 x CA4-10 (3)<br>KM2 : 1 x CA4-10<br>1 x CA4-01<br>KM3 : 1 x CA4-01 | 1SBN010110R1010<br>1SBN010110R1010<br>1SBN010110R1001<br>1SBN010110R1001 |
| 50.0...60.0 | TF65-60 | 1SAZ811201R1006 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY65-4<br>VM96-4 | 1SBN083413R2000<br>1SBN033405T1000 | KM1 : 1 x CA4-10 (3)<br>KM2 : 1 x CA4-10<br>1 x CA4-01<br>KM3 : 1 x CA4-01 | 1SBN010110R1010<br>1SBN010110R1010<br>1SBN010110R1001<br>1SBN010110R1001 |
| 65.0...78.0 | TF96-78 | 1SAZ911201R1004 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY96-4<br>VM96-4 | 1SBN083913R2000<br>1SBN033405T1000 | KM1 : 1 x CA4-10 (3)<br>KM2 : 1 x CA4-10<br>1 x CA4-01<br>KM3 : 1 x CA4-01 | 1SBN010110R1010<br>1SBN010110R1010<br>1SBN010110R1001<br>1SBN010110R1001 |
| 84.0...96.0 | TF96-96 | 1SAZ911201R1006 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY96-4<br>VM96-4 | 1SBN083913R2000<br>1SBN033405T1000 | KM1 : 1 x CA4-10 (3)<br>KM2 : 1 x CA4-10<br>1 x CA4-01<br>KM3 : 1 x CA4-01 | 1SBN010110R1010<br>1SBN010110R1010<br>1SBN010110R1001<br>1SBN010110R1001 |
| 100...135 | TF140DU-135 | 1SAZ431201R1003 | CT-ERS.21S | 1SVR730100R0300 | BEY140-4<br>VM19 | 1SFN084413R1000<br>1SFN030300R1000 | - | - |
| 100...135 | TF140DU-135 | 1SAZ431201R1003 | CT-ERS.21S | 1SVR730100R0300 | BEY140-4<br>VM19 | 1SFN084413R1000<br>1SFN030300R1000 | - | - |
| 130...175 | TA200DU-175 | 1SAZ421201R1005 | CT-ERS.21S | 1SVR730100R0300 | BEY190-4<br>VM140/190 | 1SFN084813R1000<br>1SFN034403R1000 | - | - |

# Star-delta starters protected by electronic overload relays

## With AF contactors - Open type version in kit form



**Line contactor KM1**



**Delta contactor KM3**



**Star contactor KM2**



| IEC AC-3 Rated power 400 V kW | Rated current 400 V A | Control voltage Uc min. ... Uc max. (1) V 50/60 Hz | V DC | Type | Order code | Type | Order code | Type | Order code |
|---|---|---|---|---|---|---|---|---|---|
| 7.5 | 15.5 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | AF09Z-30-10-21 | 1SBL136001R2110 | AF09Z-30-10-21 | 1SBL136001R2110 |
| | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | AF09-30-10-13 | 1SBL137001R1310 | AF09-30-10-13 | 1SBL137001R1310 |
| 11 | 22 | 24...60 | 20...60 | AF12Z-30-10-21 | 1SBL156001R2110 | AF12Z-30-10-21 | 1SBL156001R2110 | AF09Z-30-10-21 | 1SBL136001R2110 |
| | | 100...250 | 100...250 | AF12-30-10-13 | 1SBL157001R1310 | AF12-30-10-13 | 1SBL157001R1310 | AF09-30-10-13 | 1SBL137001R1310 |
| 15 | 29 | 24...60 | 20...60 | AF16Z-30-10-21 | 1SBL176001R2110 | AF16Z-30-10-21 | 1SBL176001R2110 | AF09Z-30-10-21 | 1SBL136001R2110 |
| | | 100...250 | 100...250 | AF16-30-10-13 | 1SBL177001R1310 | AF16-30-10-13 | 1SBL177001R1310 | AF09-30-10-13 | 1SBL137001R1310 |
| 18.5 | 35 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 |
| | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | AF26-30-00-13 | 1SBL237001R1300 | AF26-30-00-13 | 1SBL237001R1300 |
| 22 | 41 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 |
| | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | AF26-30-00-13 | 1SBL237001R1300 | AF26-30-00-13 | 1SBL237001R1300 |
| 25 | 47 | 24...60 | 20...60 | AF30Z-30-00-21 | 1SBL276001R2100 | AF30Z-30-00-21 | 1SBL276001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 |
| | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | AF30-30-00-13 | 1SBL277001R1300 | AF26-30-00-13 | 1SBL237001R1300 |
| 37 | 66 | 24...60 | 20...60 | AF40-30-00-11 | 1SBL347001R1100 | AF40-30-00-11 | 1SBL347001R1100 | AF40-30-00-11 | 1SBL347001R1100 |
| | | 100...250 | 100...250 | AF40-30-00-13 | 1SBL347001R1300 | AF40-30-00-13 | 1SBL347001R1300 | AF40-30-00-13 | 1SBL347001R1300 |
| 45 | 80 | 24...60 | 20...60 | AF52-30-00-11 | 1SBL367001R1100 | AF52-30-00-11 | 1SBL367001R1100 | AF40-30-00-11 | 1SBL347001R1100 |
| | | 100...250 | 100...250 | AF52-30-00-13 | 1SBL367001R1300 | AF52-30-00-13 | 1SBL367001R1300 | AF40-30-00-13 | 1SBL347001R1300 |
| 55 | 97 | 24...60 | 20...60 | AF65-30-00-11 | 1SBL387001R1100 | AF65-30-00-11 | 1SBL387001R1100 | AF40-30-00-11 | 1SBL347001R1100 |
| | | 100...250 | 100...250 | AF65-30-00-13 | 1SBL387001R1300 | AF65-30-00-13 | 1SBL387001R1300 | AF40-30-00-13 | 1SBL347001R1300 |
| 75 | 132 | 24...60 | 20...60 | AF80-30-00-11 | 1SBL397001R1100 | AF80-30-00-11 | 1SBL397001R1100 | AF52-30-00-11 | 1SBL367001R1100 |
| | | 100...250 | 100...250 | AF80-30-00-13 | 1SBL397001R1300 | AF80-30-00-13 | 1SBL397001R1300 | AF52-30-00-13 | 1SBL367001R1300 |
| 90 | 160 | 24...60 | 20...60 | AF96-30-00-11 | 1SBL407001R1100 | AF96-30-00-11 | 1SBL407001R1100 | AF65-30-00-11 | 1SBL387001R1100 |
| | | 100...250 | 100...250 | AF96-30-00-13 | 1SBL407001R1300 | AF96-30-00-13 | 1SBL407001R1300 | AF65-30-00-13 | 1SBL387001R1300 |
| 110 | 195 | 24...60 | 20...60 | AF116-30-11-11 | 1SFL427001R1111 | AF116-30-11-11 | 1SFL427001R1111 | AF116-30-11-11 (4) | 1SFL427001R1111 |
| | | 100...250 | 100...250 | AF116-30-11-13 | 1SFL427001R1311 | AF116-30-11-13 | 1SFL427001R1311 | AF116-30-11-13 | 1SFL427001R1311 |
| 132 | 230 | 24...60 | 20...60 | AF140-30-11-11 | 1SFL447001R1111 | AF140-30-11-11 | 1SFL447001R1111 | AF116-30-11-11 | 1SFL427001R1111 |
| | | 100...250 | 100...250 | AF140-30-11-13 | 1SFL447001R1311 | AF140-30-11-13 | 1SFL447001R1311 | AF116-30-11-13 | 1SFL427001R1311 |
| 160 | 280 | 24...60 | 20...60 | AF190-30-11-11 | 1SFL487002R1111 | AF190-30-11-11 | 1SFL487002R1111 | AF140-30-11-11 | 1SFL447001R1111 |
| | | 100...250 | 100...250 | AF190-30-11-13 | 1SFL487002R1311 | AF190-30-11-13 | 1SFL487002R1311 | AF140-30-11-13 | 1SFL447001R1311 |
| 200 | 350 | 24...60 | 20...60 | AF205-30-11-11 | 1SFL527002R1111 | AF205-30-11-11 | 1SFL527002R1111 | AF190-30-11-11 | 1SFL487002R1111 |
| | | 100...250 | 100...250 | AF205-30-11-13 | 1SFL527002R1311 | AF205-30-11-13 | 1SFL527002R1311 | AF190-30-11-13 | 1SFL487002R1311 |
| 250 | 430 | 24...60 | 20...60 | AF265-30-11-11 | 1SFL547002R1111 | AF265-30-11-11 | 1SFL547002R1111 | AF205-30-11-11 | 1SFL527002R1111 |
| | | 100...250 | 100...250 | AF265-30-11-13 | 1SFL547002R1311 | AF265-30-11-13 | 1SFL547002R1311 | AF205-30-11-13 | 1SFL527002R1311 |
| 315 | 540 | 24...60 | 20...60 | AF370-30-11-11 | 1SFL607002R1111 | AF370-30-11-11 | 1SFL607002R1111 | AF265-30-11-11 | 1SFL547002R1111 |
| | | 100...250 | 100...250 | AF370-30-11-13 | 1SFL607002R1311 | AF370-30-11-13 | 1SFL607002R1311 | AF265-30-11-13 | 1SFL547002R1311 |
| 355 | 610 | 24...60 | 20...60 | AF370-30-11-11 | 1SFL607002R1111 | AF370-30-11-11 | 1SFL607002R1111 | AF305-30-11-11 | 1SFL587002R1111 |
| | | 100...250 | 100...250 | AF370-30-11-13 | 1SFL607002R1311 | AF370-30-11-13 | 1SFL607002R1311 | AF305-30-11-13 | 1SFL587002R1311 |

(1) AF09 ... AF370: ambient temperature ≤ 60 °C.
(2) The setting current value is: nominal motor current x 0.58. Overload relay type given for 400 V - AC-3.
For other voltage, select overload relay type according to required nominal motor current x 0.58.
(3) On-delay timer without dwelling-time (e.g.: side-mounted CT-ERS.21S or front-mounted TEF4-ON) is enough to countdown the programmed starting time during "Star connection". In case of use of front-mounted TEF4-ON on-delay timer, mount on KM1 contactor AF26 ... AF96 a side-mounted CAL4-11 auxiliary contact block instead of CA4-10 auxiliary contact block.
(4) AF80 can also be used, but no connection set and mechanical interlock is available for this combination.

## Electronic overload relays (2)



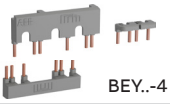
## Electronic timers (3)



CT-ERS.21S TEF4-ON

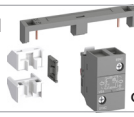
## Accessories

Connection sets



BEY..-4

Mechanical and interlock set



VEM4 or VM..

## Auxiliary contact blocks



CA4-10
CA4-01

| Setting ranges A | Type | Order code | Type | Order code | Type | Order code | Type | Order code |
|---|---|---|---|---|---|---|---|---|
| 5.70...18.9 | EF19-18.9 | 1SAX121001R1105 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY16-4<br>VEM4 | 1SBN081313R2000<br>1SBN030111R1000 | - | - |
| 5.70...18.9 | EF19-18.9 | 1SAX121001R1105 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY16-4<br>VEM4 | 1SBN081313R2000<br>1SBN030111R1000 | - | - |
| 5.70...18.9 | EF19-18.9 | 1SAX121001R1105 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY16-4<br>VEM4 | 1SBN081313R2000<br>1SBN030111R1000 | - | - |
| 9.00...30.0 | EF45-30 | 1SAX221001R1101 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY38-4<br>VEM4 | 1SBN082713R2000<br>1SBN030111R1000 | KM1 : 1 x CA4-10<br>KM2 : 1 x CA4-10 | 1SBN010110R1010<br>1SBN010110R1010 |
| 9.00...30.0 | EF45-30 | 1SAX221001R1101 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY38-4<br>VEM4 | 1SBN082713R2000<br>1SBN030111R1000 | KM1 : 1 x CA4-10<br>KM2 : 1 x CA4-10 | 1SBN010110R1010<br>1SBN010110R1010 |
| 9.00...30.0 | EF45-30 | 1SAX221001R1101 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY38-4<br>VEM4 | 1SBN082713R2000<br>1SBN030111R1000 | KM1 : 1 x CA4-10<br>KM2 : 1 x CA4-10 | 1SBN010110R1010<br>1SBN010110R1010 |
| 25...70 | EF65-70 | 1SAX331001R1101 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY65-4<br>VM96-4 | 1SBN083413R2000<br>1SBN033405T1000 | KM1 : 1 x CA4-10 (3)<br>KM2 : 1 x CA4-10<br>1 x CA4-01<br>KM3 : 1 x CA4-01 | 1SBN010110R1010<br>1SBN010110R1010<br>1SBN010110R1001<br>1SBN010110R1001 |
| 25...70 | EF65-70 | 1SAX331001R1101 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY65-4<br>VM96-4 | 1SBN083413R2000<br>1SBN033405T1000 | KM1 : 1 x CA4-10 (3)<br>KM2 : 1 x CA4-10<br>1 x CA4-01<br>KM3 : 1 x CA4-01 | 1SBN010110R1010<br>1SBN010110R1010<br>1SBN010110R1001<br>1SBN010110R1001 |
| 25...70 | EF65-70 | 1SAX331001R1101 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY65-4<br>VM96-4 | 1SBN083413R2000<br>1SBN033405T1000 | KM1 : 1 x CA4-10 (3)<br>KM2 : 1 x CA4-10<br>1 x CA4-01<br>KM3 : 1 x CA4-01 | 1SBN010110R1010<br>1SBN010110R1010<br>1SBN010110R1001<br>1SBN010110R1001 |
| 36...100 | EF96-100 | 1SAX341001R1101 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY96-4<br>VM96-4 | 1SBN083913R2000<br>1SBN033405T1000 | KM1 : 1 x CA4-10 (3)<br>KM2 : 1 x CA4-10<br>1 x CA4-01<br>KM3 : 1 x CA4-01 | 1SBN010110R1010<br>1SBN010110R1010<br>1SBN010110R1001<br>1SBN010110R1001 |
| 36...100 | EF96-100 | 1SAX341001R1101 | CT-ERS.21S<br>or TEF4-ON | 1SVR730100R0300<br>1SBN020112R1000 | BEY96-4<br>VM96-4 | 1SBN083913R2000<br>1SBN033405T1000 | KM1 : 1 x CA4-10 (3)<br>KM2 : 1 x CA4-10<br>1 x CA4-01<br>KM3 : 1 x CA4-01 | 1SBN010110R1010<br>1SBN010110R1010<br>1SBN010110R1001<br>1SBN010110R1001 |
| 54...150 | EF146-150 | 1SAX351001R1101 | CT-ERS.21S | 1SVR730100R0300 | BEY140-4<br>VM19 | 1SFN084413R1000<br>1SFN030300R1000 | - | - |
| 54...150 | EF146-150 | 1SAX351001R1101 | CT-ERS.21S | 1SVR730100R0300 | BEY140-4<br>VM19 | 1SFN084413R1000<br>1SFN030300R1000 | - | - |
| 63...210 | EF205-210 | 1SAX531001R1101 | CT-ERS.21S | 1SVR730100R0300 | BEY190-4<br>VM140/190 | 1SFN084813R1000<br>1SFN034403R1000 | - | - |
| 63...210 | EF205-210 | 1SAX531001R1101 | CT-ERS.21S | 1SVR730100R0300 | BEY205-4<br>VM19 | 1SFN085213R1000<br>1SFN030300R1000 | - | - |
| 115...380 | EF370-380 | 1SAX611001R1101 | CT-ERS.21S | 1SVR730100R0300 | BEY265-4<br>VM205/265 | 1SFN085413R1000<br>1SFN035203R1000 | - | - |
| 115...380 | EF370-380 | 1SAX611001R1101 | CT-ERS.21S | 1SVR730100R0300 | BEY370-4<br>VM19 | 1SFN085813R1000<br>1SFN030300R1000 | - | - |
| 115...380 | EF370-380 | 1SAX611001R1101 | CT-ERS.21S | 1SVR730100R0300 | BEY370-4<br>VM19 | 1SFN085813R1000<br>1SFN030300R1000 | - | - |

# Star-delta starters protected by overload relays

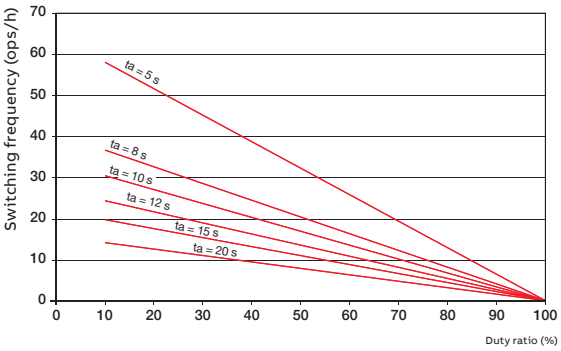
## With AF contactors - Open type version in kit form
## Switching frequency diagrams

**General**

Switching frequency/hour, according to acceleration time and load factor. Respect of the following conditions enables utilization of the starter without excessive overheating of the connections or nuisance tripping of the thermal overload relay.

**Thermal overload relay**

Intermittent periodic duty




ta: motor starting time

**Example:**

Starting time of the motor: 7 second (use 8s curve) - Duty ratio: 63 % means a permitted switching frequency of max. 15 operating cycles per hour.

This corresponds to a 4 minute operating cycle (15 starts/hr) with 7 seconds acceleration, 2.5 minutes operation and 1.5 minutes rest.

**Electronic overload relay :** please consult us

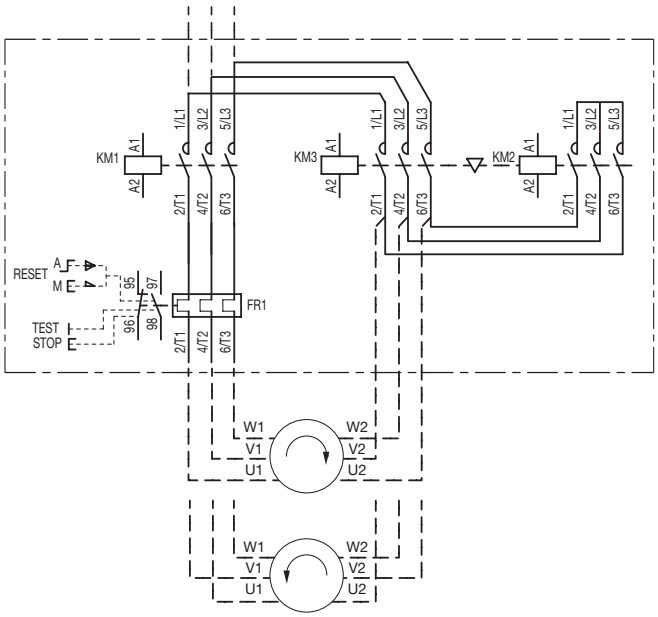
# Star-delta starters protected by overload relays

With AF contactors - Open type version in kit form

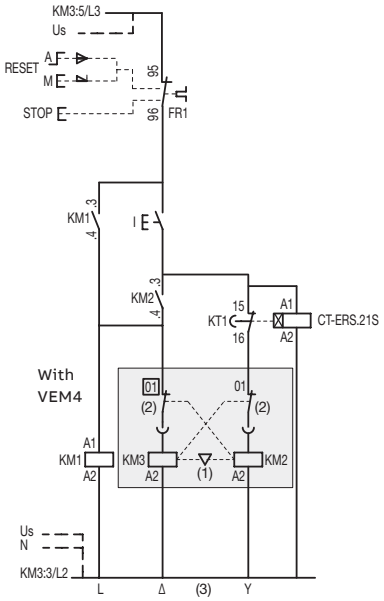
Wiring diagrams with CT-ERS.21S timer

## Star-delta starters

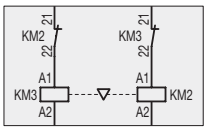
Power circuit



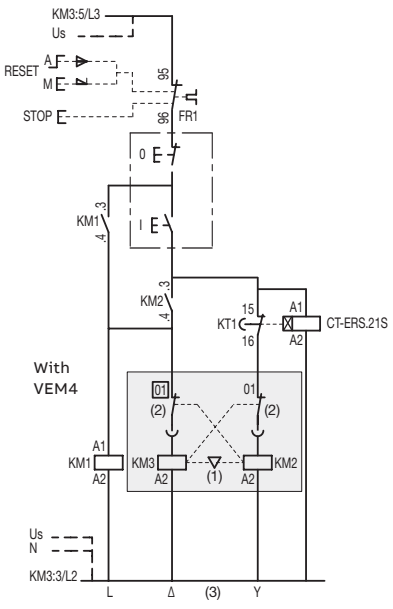

AC or DC local control with CT-ERS.21S timer



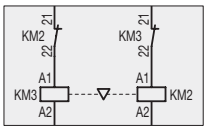

With VM




AC or DC remote control with CT-ERS.21S timer




With VM



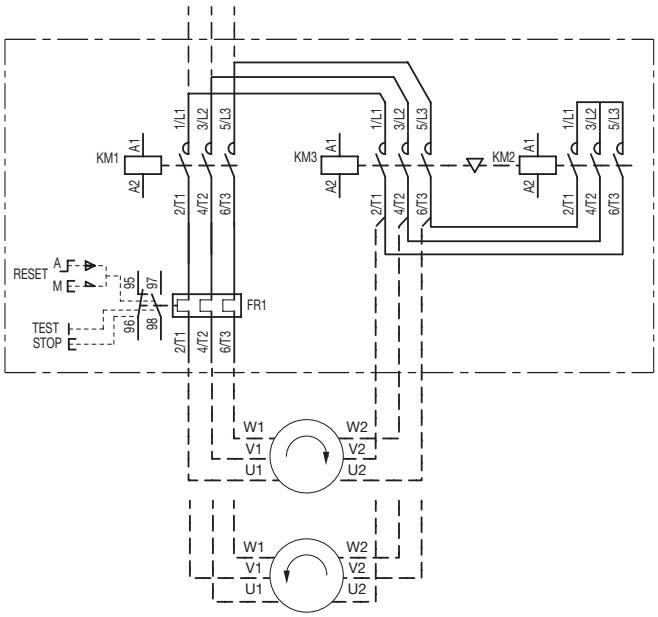

Note: - VEM4 = VM4 (1) + VE4 (2) with A2-A2 (3) connection
(Except for coil Uc 12-20 V DC : use VM4 with CA4).
- coil Uc 12-20 V DC : A1+, A2-

# Star-delta starters protected by overload relays

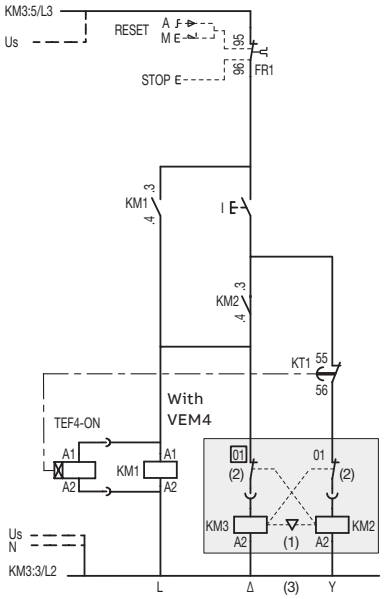
## With AF contactors - Open type version in kit form
## Wiring diagrams with TEF4-ON timer

### Star-delta starters

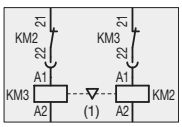
Power circuit



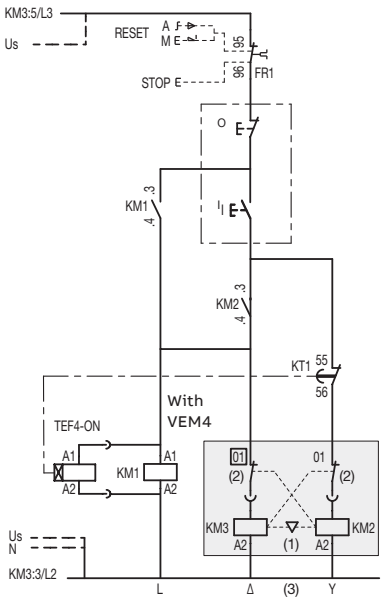

AC or DC local control with TEF4-ON timer
Uc = 24...240 V 50/60 Hz or DC



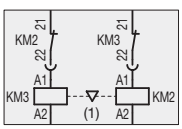

With VM




AC or DC remote control with TEF4-ON timer
Uc = 24...240 V 50/60 Hz or DC



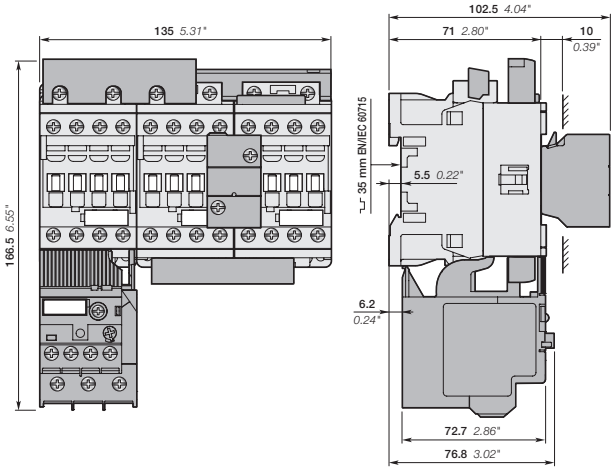

With VM



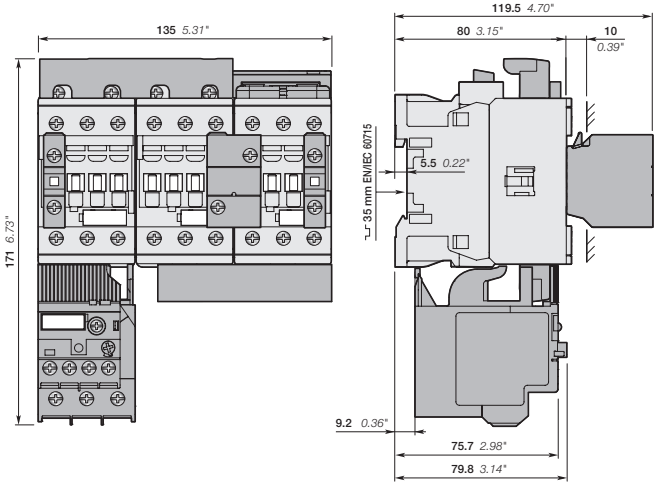

Note: VEM4 = VM4 (1) + VE4 (2) with A2-A2 (3) connection

# Star-delta starters protected by thermal overload relays

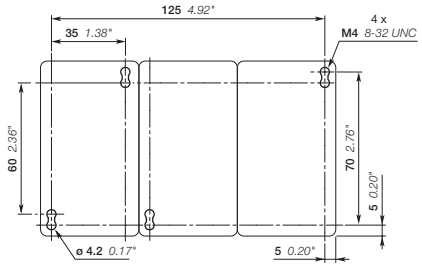
## With AF contactors - Open type version in kit form




AF09, AF12, AF16
+ BEY16-4, VEM4
+ TF42 thermal overload relay




AF26, AF30, AF38
+ BEY38-4, VEM4, CA4-10
+ TF42 thermal overload relay

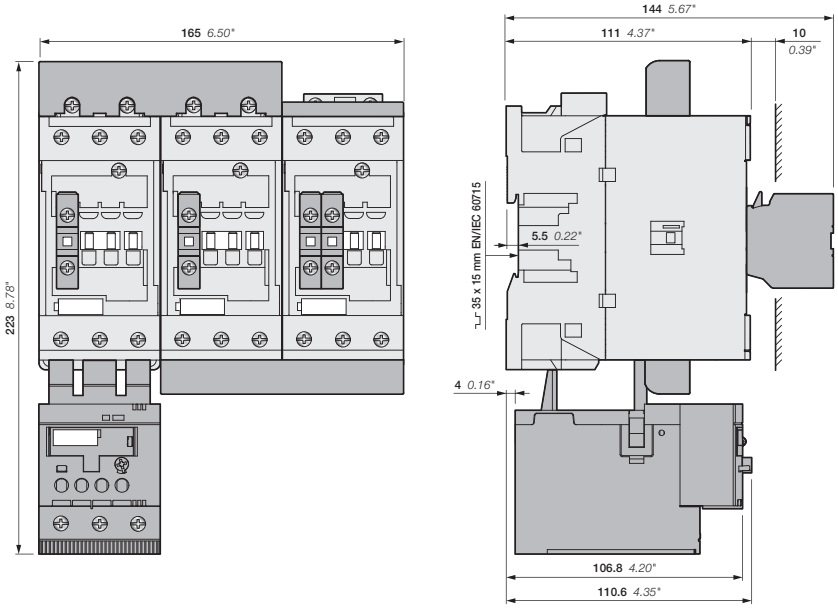



Note: contactor lateral distance to grounded component 2 mm 0.08" min.

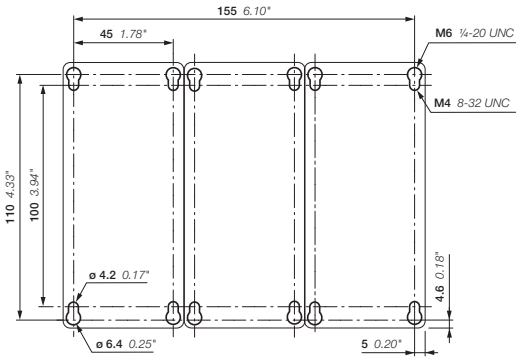
Main dimensions mm, inches

# Star-delta starters protected by thermal overload relays

## With AF contactors - Open type version in kit form



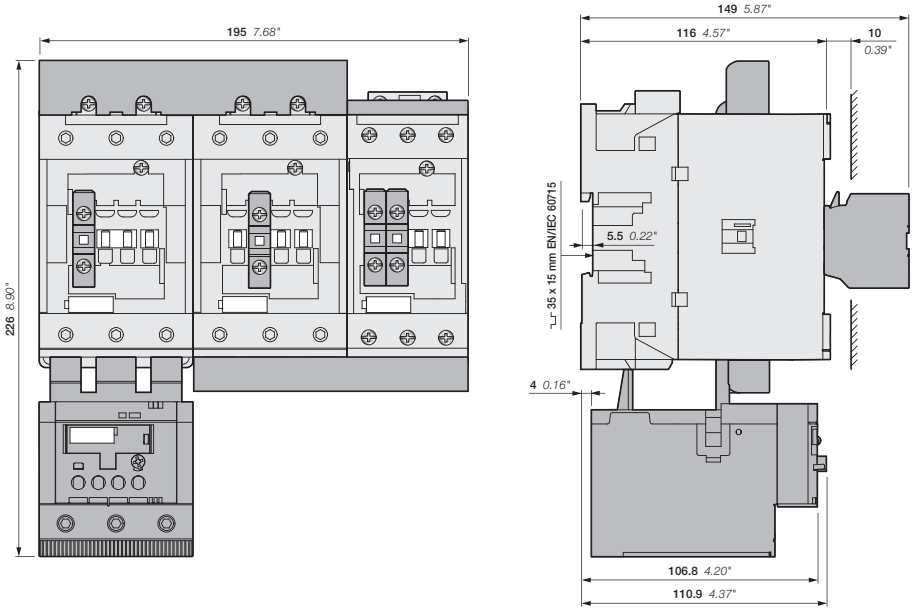

AF40, AF52, AF65
+ BEY65-4, VM96-4, CA4-10, CA4-01
+ TF65 thermal overload relay



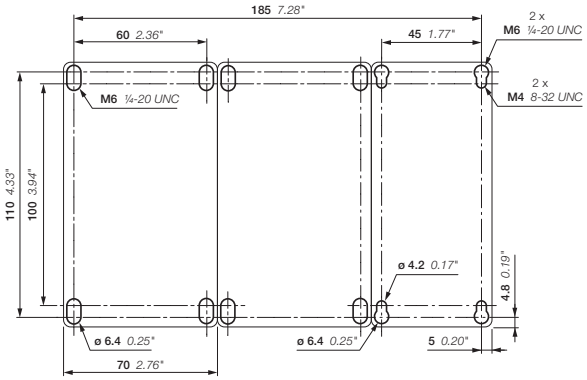

Main dimensions mm, inches

# Star-delta starters protected by thermal overload relays

## With AF contactors - Open type version in kit form



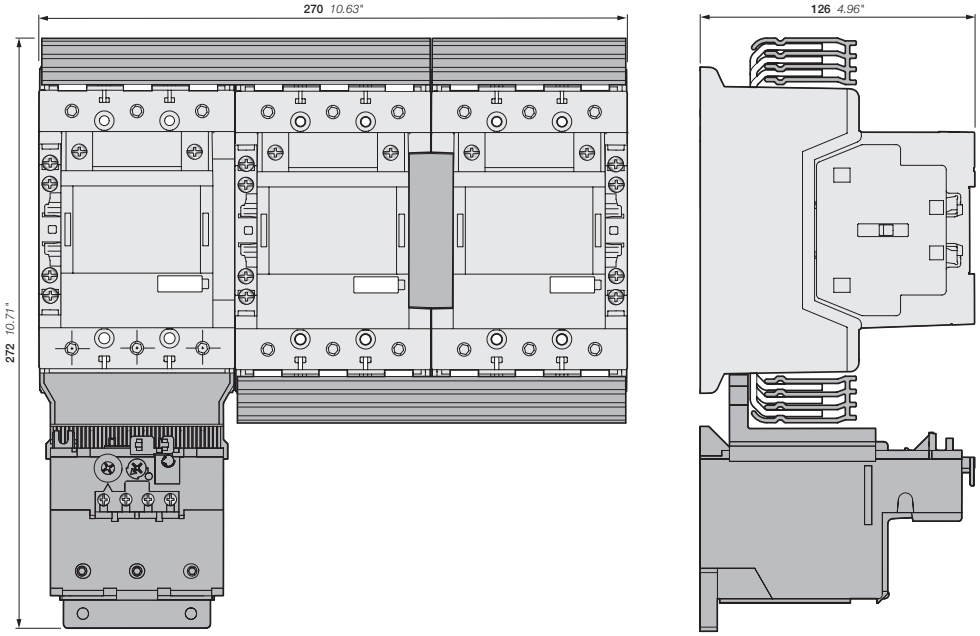

Line, Delta: AF80, AF96
+ Star: AF52, AF65
+ BEY96-4, VM96-4, CA4-10, CA4-01
+ TF96 thermal overload relay



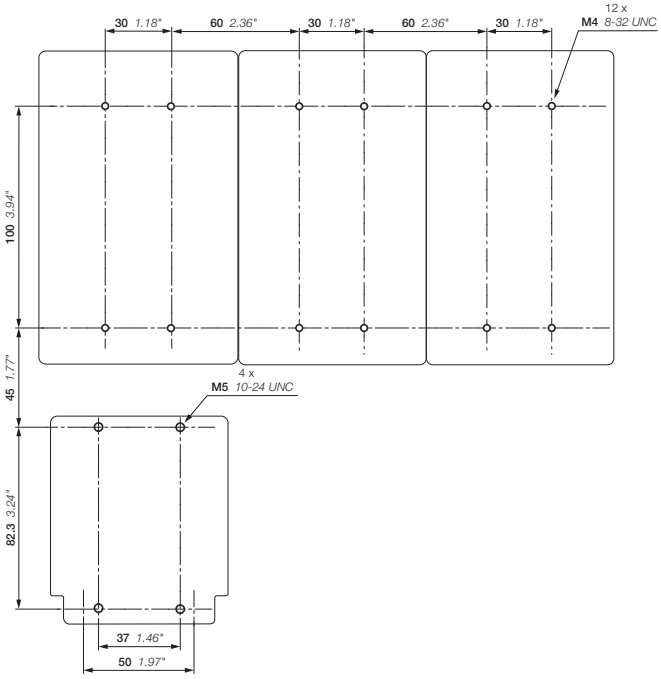

Main dimensions mm, inches

# Star-delta starters protected by thermal overload relays

## With AF contactors - Open type version in kit form



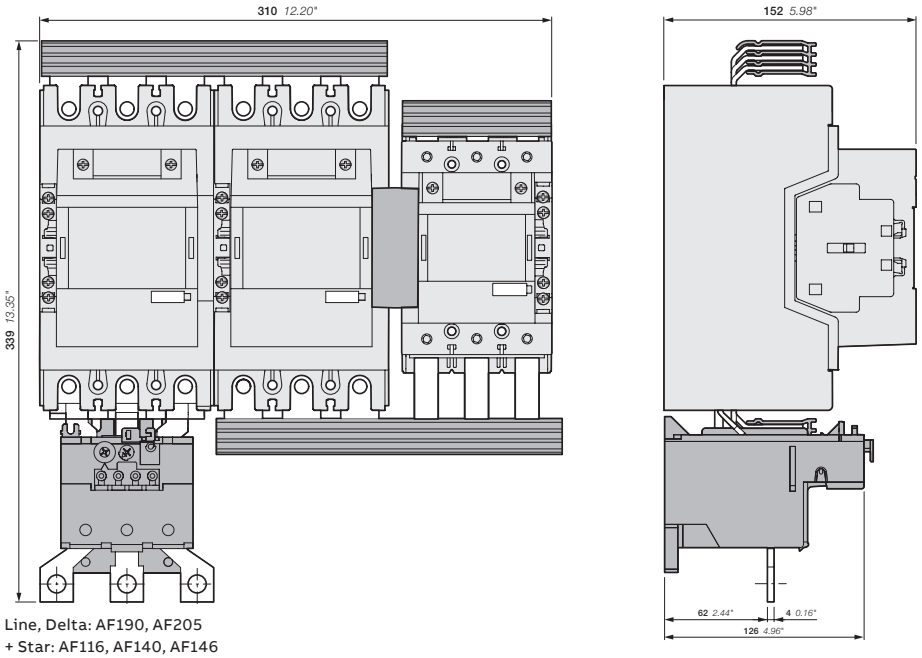

AF116, AF140, AF146
+ BEY140-4, VM19
+ TF140 thermal overload relay



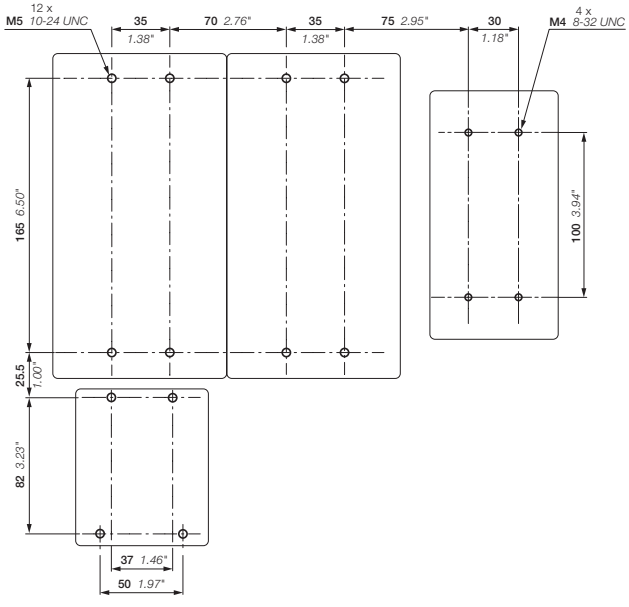

Main dimensions mm, inches

# Star-delta starters protected by thermal overload relays

## With AF contactors - Open type version in kit form



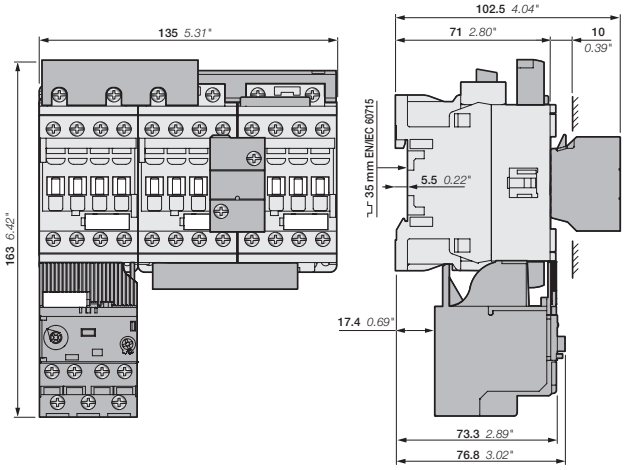

Line, Delta: AF190, AF205
+ Star: AF116, AF140, AF146
+ BEY190-4, VM140/190
+ TA200 thermal overload relay



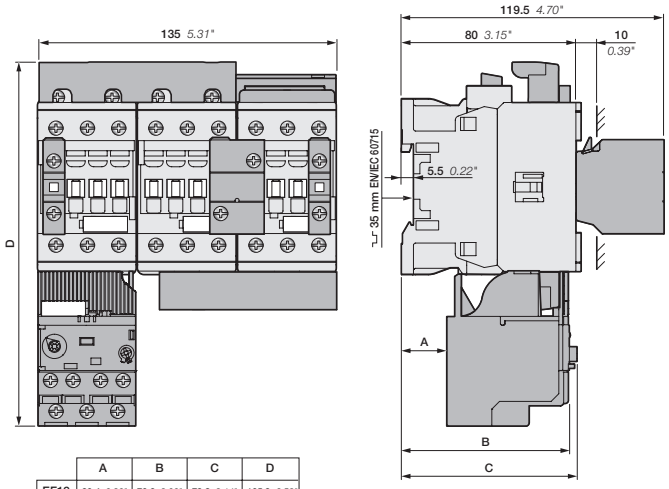

Main dimensions mm, inches

# Star-delta starters protected by electronic overload relays

## With AF contactors - Open type version in kit form

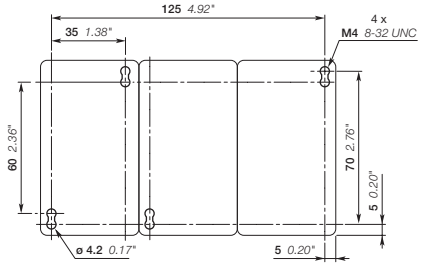



AF09, AF12, AF16
+ BEY16-4, VEM4
+ EF19 electronic overload relay




| | A | B | C | D |
|---|---|---|---|---|
| EF19 | 20.4 0.80" | 76.3 3.00" | 79.8 3.14" | 165.9 6.53" |
| EF45 | 0 0.00" | 82.5 3.25" | 86 3.39" | 183.5 7.22" |

AF26, AF30, AF38
+ BEY38-4, VEM4, CA4-10
+ EF19/EF45 electronic overload relay

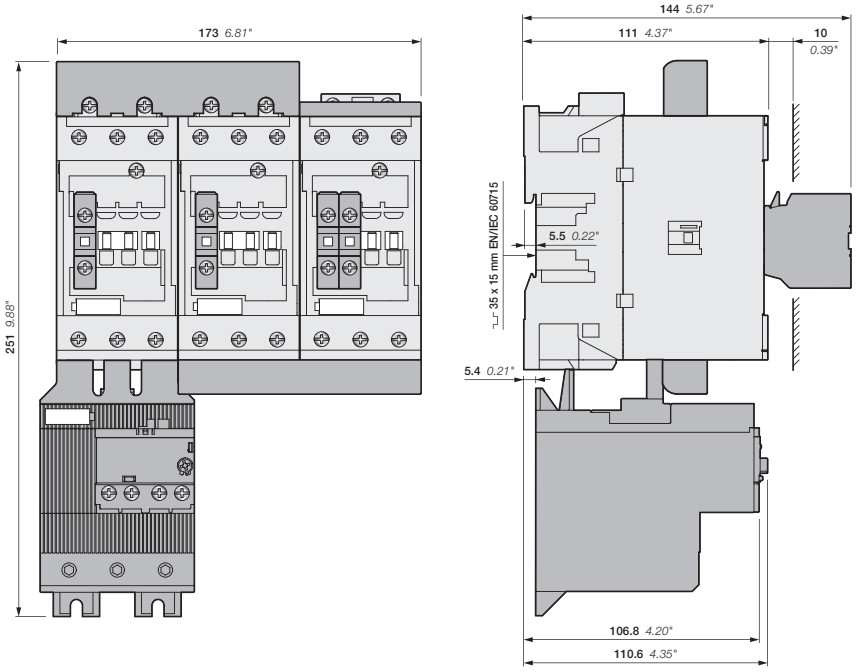



Note: contactor lateral distance to grounded component 2 mm 0.08" min.

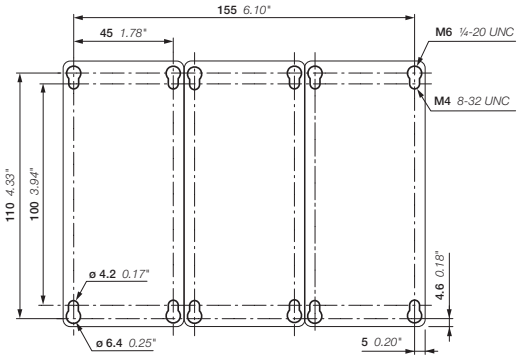
Main dimensions mm, inches

# Star-delta starters protected by electronic overload relays

## With AF contactors - Open type version in kit form



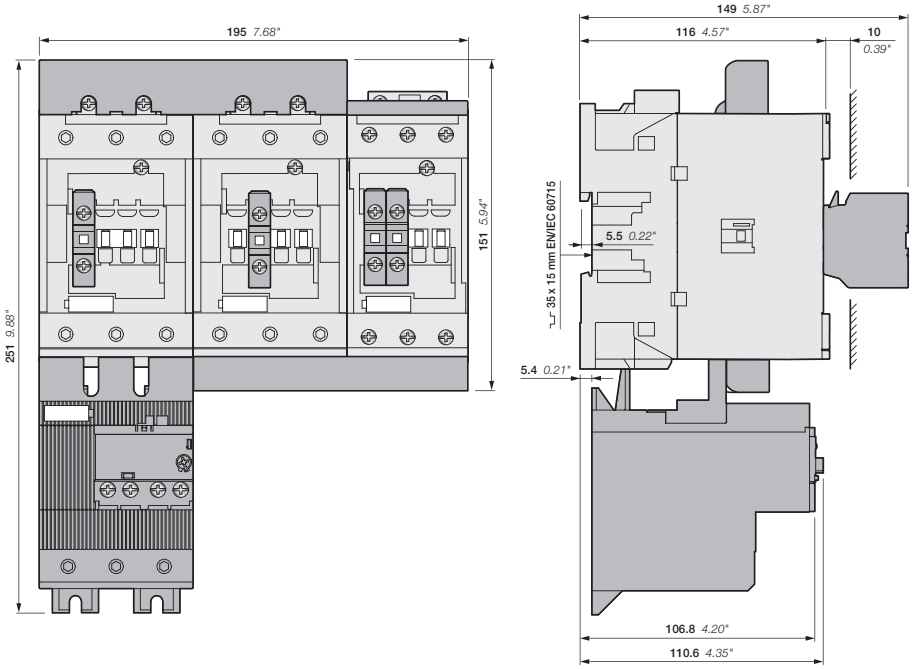

AF40, AF52, AF65
+ BEY65-4, VM96-4, CA4-10, CA4-01
+ EF65 electronic overload relay



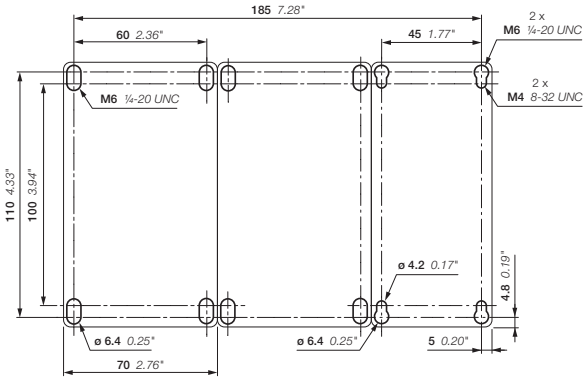

Main dimensions mm, inches

# Star-delta starters protected by electronic overload relays

## With AF contactors - Open type version in kit form



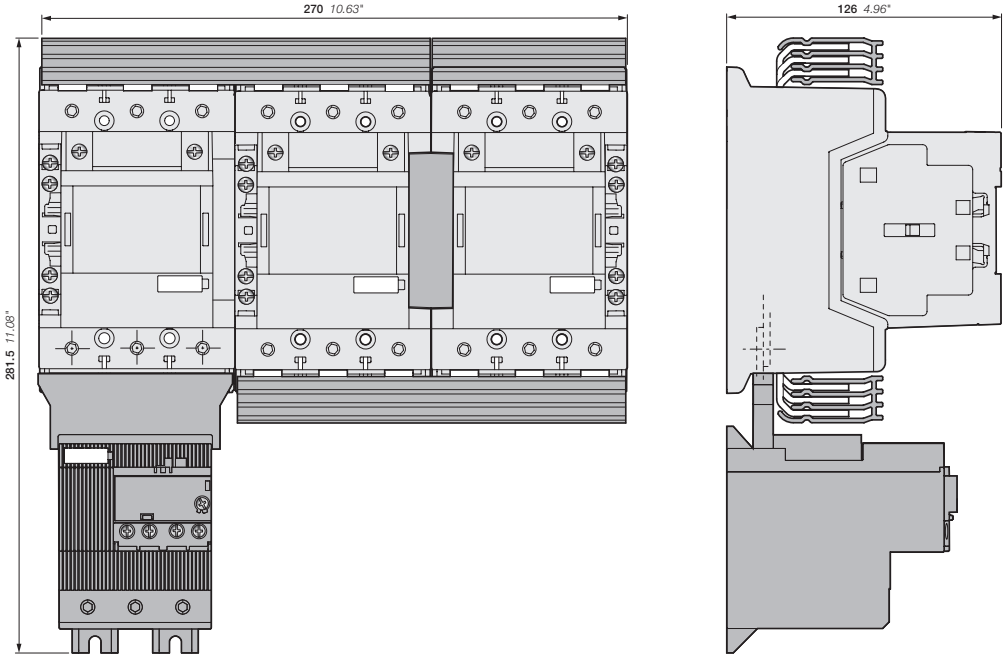

Line, Delta: AF80, AF96
+ Star: AF52, AF65
+ BEY96-4, VM96-4, CA4-10, CA4-01
+ EF96 electronic overload relay



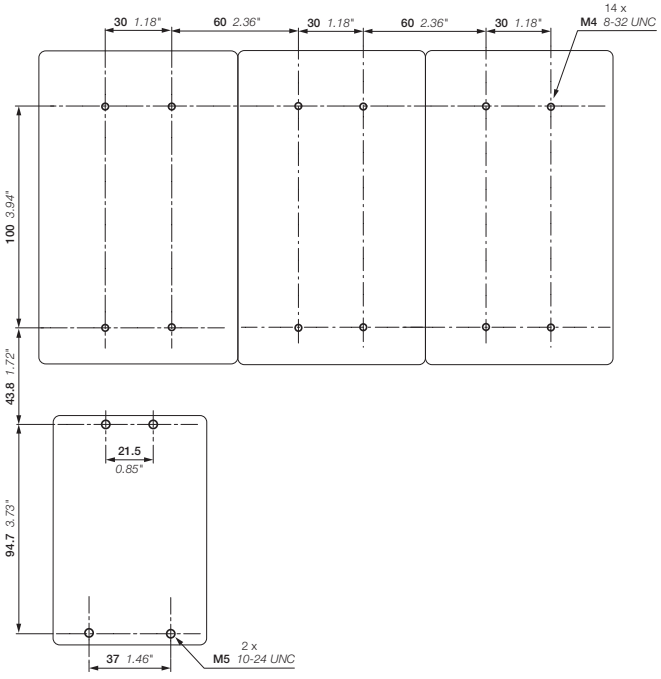

Main dimensions mm, inches

# Star-delta starters protected by electronic overload relays

## With AF contactors - Open type version in kit form



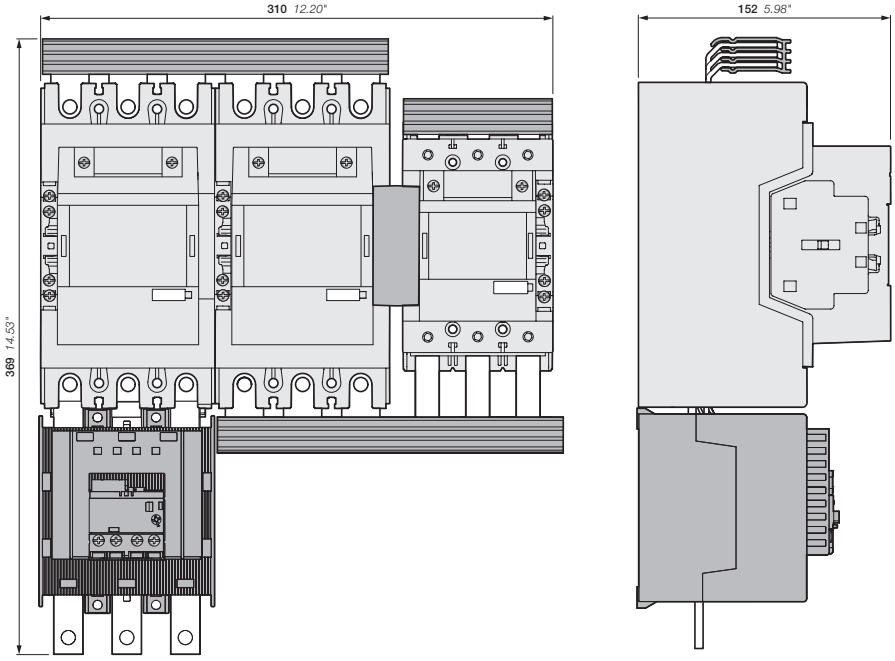

AF116, AF140, AF146
+ BEY140-4, VM19
+ EF146 electronic overload relay



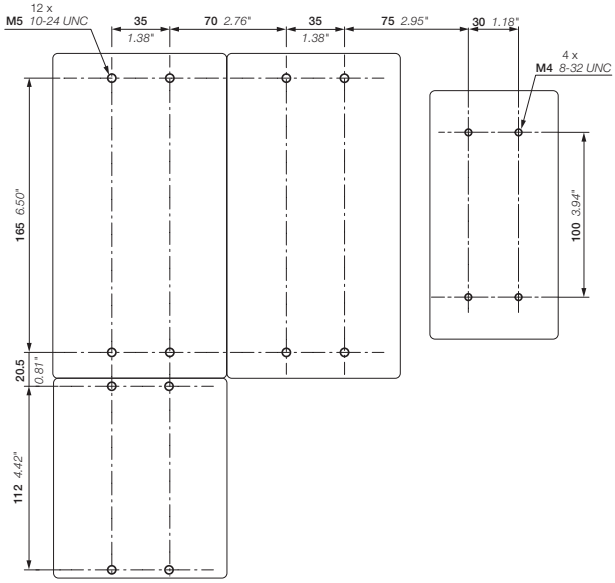

Main dimensions mm, inches

# Star-delta starters protected by electronic overload relays

## With AF contactors - Open type version in kit form



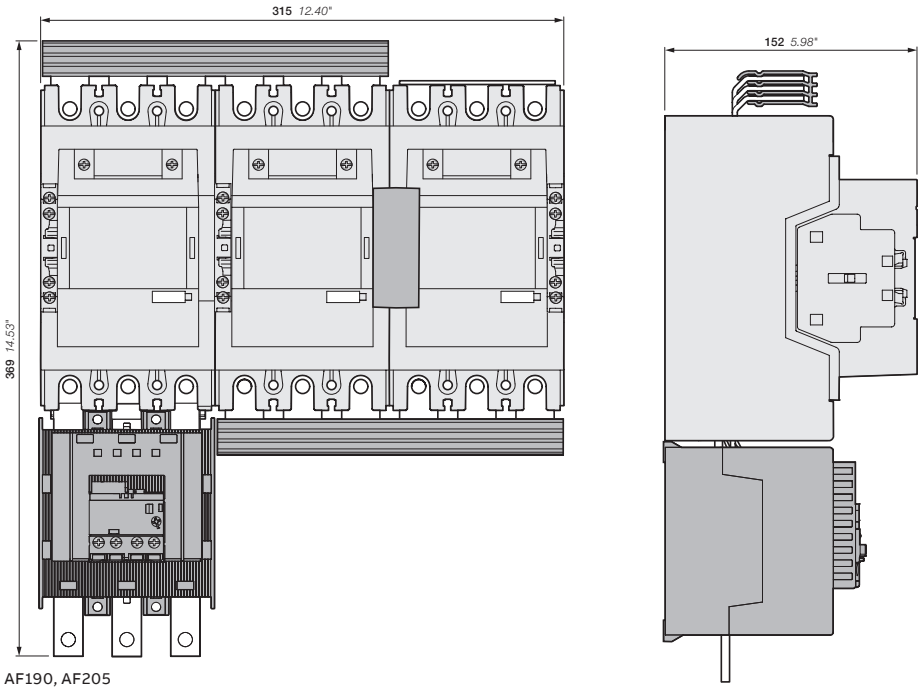

Line, Delta: AF190, AF205
+ Star: AF116, AF140, AF146
+ BEY190-4, VM140/190
+ EF205 electronic overload relay



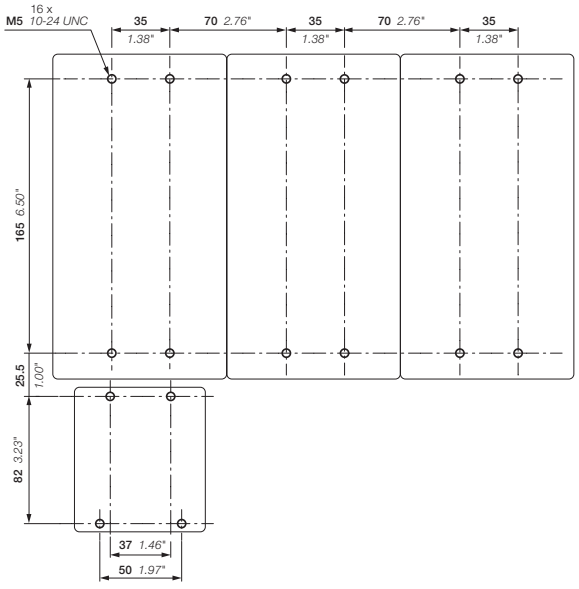

Main dimensions mm, inches

# Star-delta starters protected by electronic overload relays

With AF contactors - Open type version in kit form



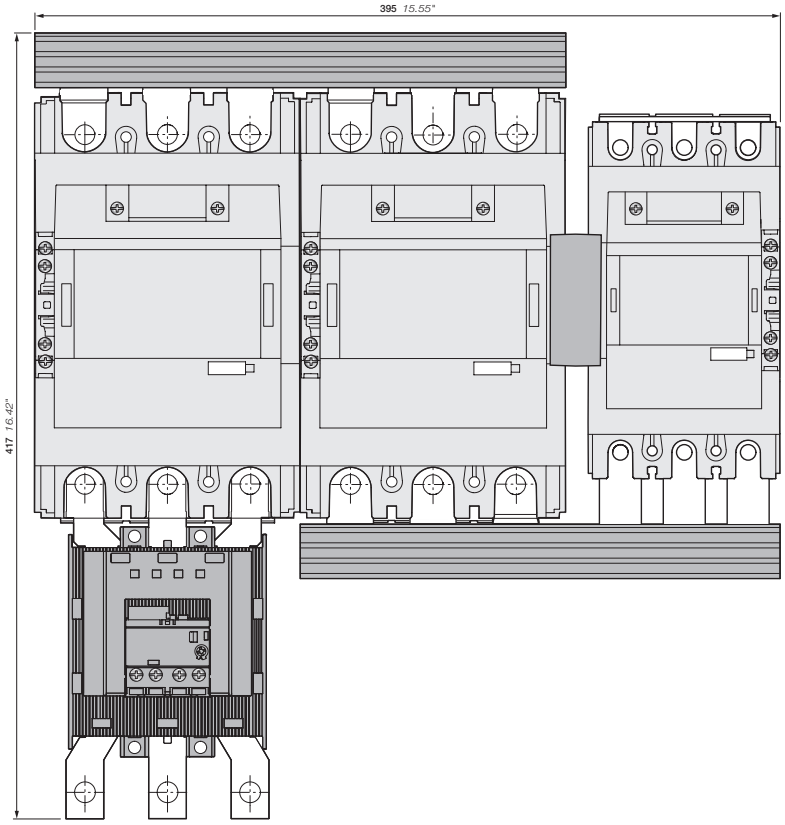

AF190, AF205
+ BEY205-4, VM19
+ EF205 electronic overload relay

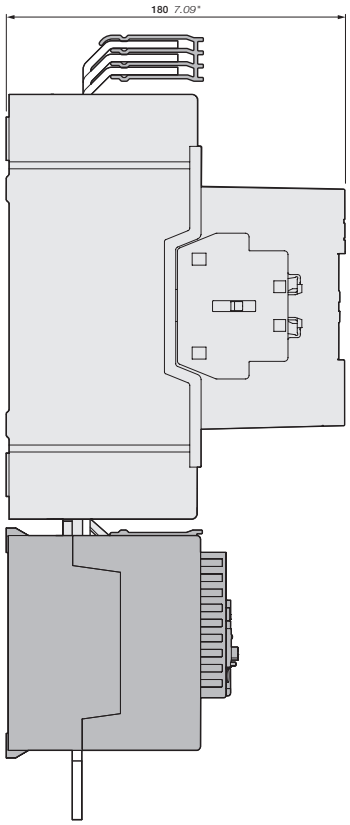



Main dimensions mm, inches

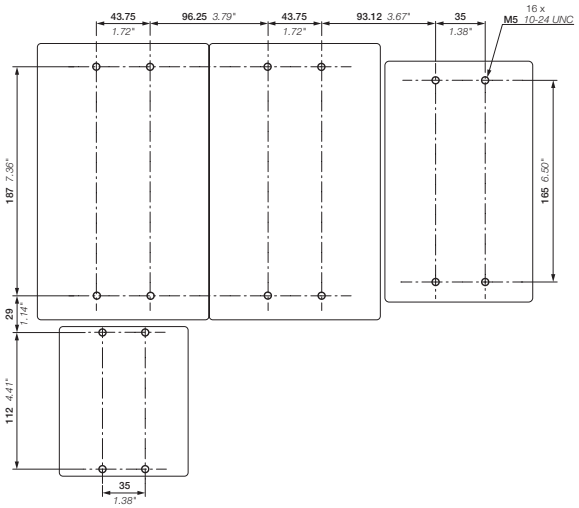
# Star-delta starters protected by electronic overload relays

## With AF contactors - Open type version in kit form



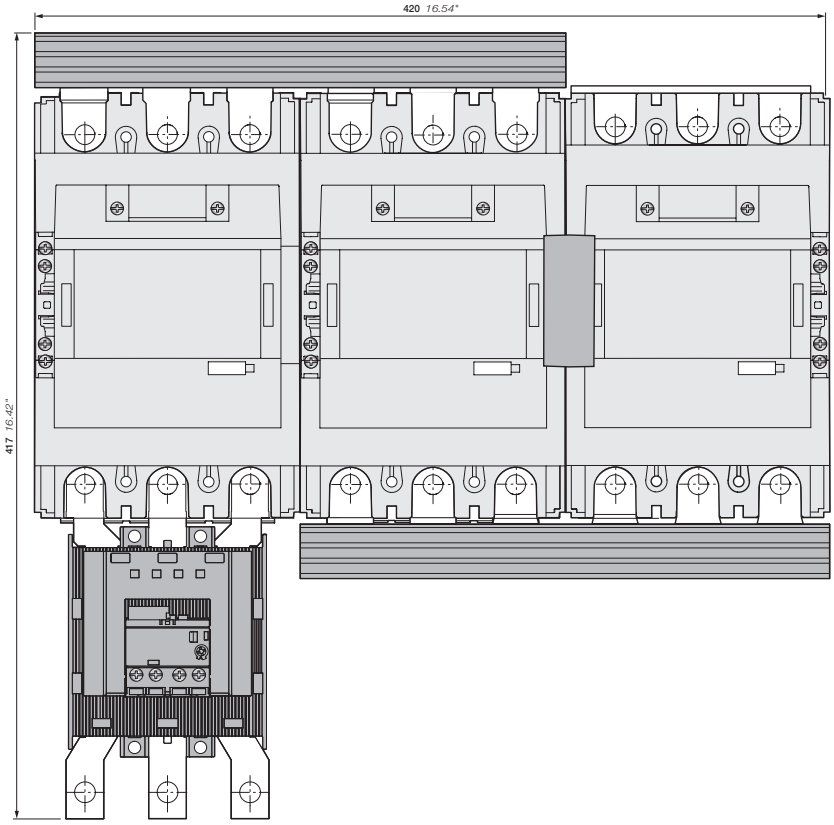

Line, Delta: AF265, AF305, AF370
+ Star: AF190, AF205
+ BEY265-4, VM205/265
+ EF370 electronic overload relay

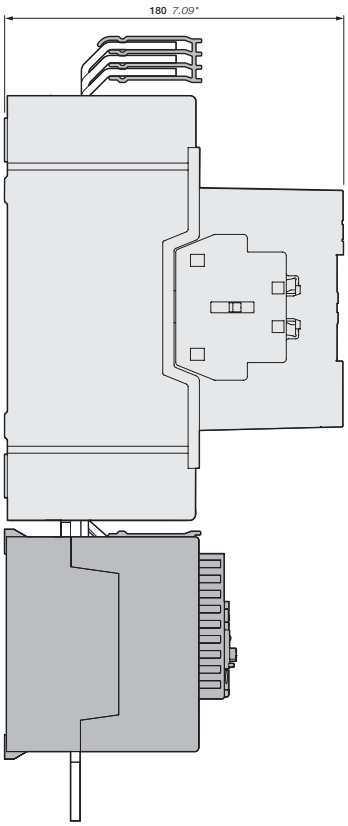



Main dimensions mm, inches

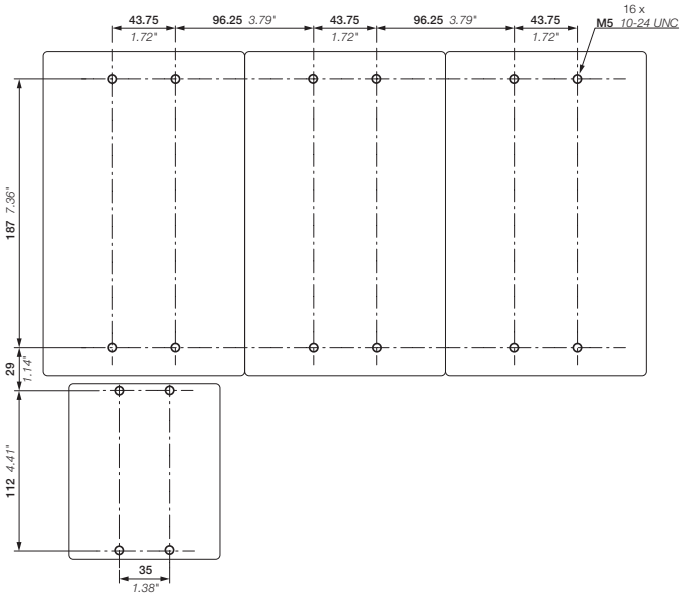
# Star-delta starters protected by electronic overload relays

## With AF contactors - Open type version in kit form




AF265, AF305, AF370
+ BEY370-4, VM19
+ EF370 electronic overload relay




Main dimensions mm, inches



**For direct product details information, use product type or order code, ex:**

www.abb.com/productdetails/**1SBL137001R1310**

# Certifications and approvals
## General technical data


**14/**2 **Certifications and approvals**

**General technical data**

**14/**10 Coordination with short-circuit protection devices
**14/**13 Standards, specifications and certifying organizations
**14/**15 Terms and technical definitions
**14/**18 Standards and utilization categories
**14/**20 North American standards and utilization categories
**14/**21 Degrees of protection
**14/**22 Climatic withstand of devices

# Certifications and approvals

Designed according to the appropriate specifications, the devices in this catalogue have been built and tested. They can be used in most countries without any further certifications.
Some countries, however, require certification according to their own national standards. In other cases, the Marine for example, approvals ratifying that particular specifications have been met are necessary.
The table below shows the approvals and certifications for different devices.
The following documents may be obtained on request:

- Certificates of conformity
- Certificates of certification or approval.

The use of certified devices does not exonerate the equipment supplier from complying with the legal specifications of the country concerned.

**Explanation of symbols:**

■ **Standard design approved**, the company labels bear the certification mark when this is required.

| | Certifications | | | | Approvals: ship classification societies | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mark** | | | | | | | | | | | | | |
| **Abbreviation** | cULus | CCC | EAC | KC | BV | DNV | LR | RINa | ABS | RMRS | CCS | ClassNK | PRS |
| **Approved in** | North America | China | Russia | Korea | France | | Gr.Britain | Italy | USA | Russia | China shipping | Japan | Poland |
| **3-pole contactors with screw terminals** | | | | | | | | | | | | | |
| **4 to 7.5 KW** | | | | | | | | | | | | | |
| AC operated AS09, AS12, AS16 | ■ E312527 | ■ | | | | | | | | | | | |
| DC operated ASL09, ASL12, ASL16 | ■ E312527 | ■ | | | | | | | | | | | |
| **4 to 45 kW** | | | | | | | | | | | | | |
| AC / DC operated AF09, AF12, AF16, AF26, AF30, AF38 | ■ E312527 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | |
| AC / DC operated AF40, AF52, AF65, AF80, AF96 | ■ E312527 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | |
| **55 to 200 kW** | | | | | | | | | | | | | |
| AC / DC operated (1, 2) AF116, AF140, AF146 | ■ E36588 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| AC / DC operated (1, 2) AF190, AF205, AF265, AF305, AF370 | ■ E36588 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| **200 to 560 kW** | | | | | | | | | | | | | |
| AC / DC operated AF400, AF460, AF580, AF750 | ■ E36588 | ■ | ■ | | ■ coming next | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| AC / DC operated AF1250 | ■ E73397 | ■ | ■ | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| AC / DC operated AF1350, AF1650 | ■ E36588 | ■ | ■ | | ■ coming next | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| AC / DC operated AF2050 | ■ E73397 | ■ | ■ | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| AC / DC operated AF2650, AF2850 | ■ E73397 | ■ | ■ | | | | ■ | ■ | | ■ | ■ | ■ | ■ |
| **4-pole contactors with screw terminals** | | | | | | | | | | | | | |
| **25 to 125 A, AC-1** | | | | | | | | | | | | | |
| AC / DC operated AF09, AF16, AF26, AF38 | ■ E319322 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | |
| AC / DC operated AF40, AF52, AF80 | ■ E312527 | ■ | ■ | ■ | | ■ | | ■ | ■ | | | ■ | |
| **160 to 525 A, AC-1** | | | | | | | | | | | | | |
| AC / DC operated AF116, AF140, AF190, AF205, AF265, AF305, AF370 | ■ E73397 | ■ | ■ | ■ (1) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| **800 to 1000 A AC-1** | | | | | | | | | | | | | |
| AC operated EK550 | ■ E36588 | ■ | ■ | | | | | | | | | | |
| AC operated EK1000 | | ■ | ■ | | | | | | | | | | |
| DC operated EK550 | ■ E36588 | ■ | ■ | | | | | | | | | | |
| DC operated EK1000 | | ■ | ■ | | | | | | | | | | |

(1) AF116 ... AF265 only. KC only applicable to devices up to 300 A. (2) Marine approvals for AF116 ... AF370 with built-in PLC interface.
All AF contactors are (RCM) marked.

# Certifications and approvals

| | Certifications | | | | Approvals: ship classification societies | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mark** | | | | | | | | | | | | | |
| **Abbreviation** | cULus | CCC | EAC | KC | BV | DNV | LR | RINa | ABS | RMRS | CCS | ClassNK | PRS |
| **Approved in** | North America | China | Russia | Korea | France | | Gr.Britain | Italy | USA | Russia | China shipping | Japan | Poland |
| **DC switching contactors** | | | | | | | | | | | | | |
| AC operated GA75 | ■ E319322 UL & CSA certified | ■ | | | | | | | | | | | |
| DC operated GAE75 | ■ E319322 UL & CSA certified | ■ | | | | | | | | | | | |
| DC operated GF875...GF1325 | ■ | ■ | ■ Under approval | | ■ | ■ | ■ | | ■ | | | | |
| AC / DC operated GAF185 ... GAF300 | ■ E73397 | ■ | ■ | | | | | | | | | | |
| AC / DC operated GAF460, GAF750, GAF1250, GAF1650, GAF2050 | ■ E73397 | ■ | ■ | | | | | | | | | | |
| **Capacitor switching contactors** | | | | | | | | | | | | | |
| AC operated UA16 | ■ E312527 UL certified only | ■ | ■ | | | | | | | | | | |
| AC operated UA26 ... UA75 | ■ E312527 UL certified only | ■ | ■ | | | | | | | | | | |
| AC operated UA95, UA110 | ■ E36588 | ■ | ■ | | | | | | | | | | |
| AC operated UA16..RA | ■ E312527 UL certified only | ■ | ■ | | | | | | | | | | |
| AC operated UA26..RA ... UA75..RA | ■ E312527 UL & CSA certified | ■ | ■ | | | | | | | | | | |
| AC operated UA95..RA, UA110..RA | ■ E36588 | | ■ | | | | | | | | | | |
| **Contactor relays with screw terminals** | | | | | | | | | | | | | |
| AC operated 4-pole, 8-pole - NS.. | ■ E252354 | ■ | | | | | | | | | | | |
| DC operated 4-pole, 8- pole - NSL.. | ■ E252354 | ■ | | | | | | | | | | | |

All GAF and NF contactors are (RCM) marked.

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **3-pole contactors with spring terminals** | | | | | | | | | | | | | |
| **4 to 7.5 KW** | | | | | | | | | | | | | |
| AC operated AS09..S, AS12..S, AS16..S | ■ E312527 | ■ | | | | | | | | | | | |
| DC operated ASL09..S, ASL12..S, ASL16..S | ■ E312527 | ■ | | | | | | | | | | | |
| **4 to 11 KW** | | | | | | | | | | | | | |
| AC / DC operated AF09..S AF12..S, AF16..S | ■ E312527 | ■ | ■ | | | ■ | ■ | | ■ | ■ | ■ | | ■ |
| AF26..S | | ■ | ■ | | | ■ | ■ | | ■ | ■ | ■ | | ■ |
| **Contactor relays with spring terminals** | | | | | | | | | | | | | |
| AC operated 4-pole, 8-pole - NS.. | ■ E252354 | ■ | | | | | | | | | | | |
| DC operated 4-pole, 8- pole - NSL.. | ■ E252354 | ■ | | | | | | | | | | | |

# Certifications and approvals

| | Certifications | | | Approvals: ship classification societies | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mark** | | | | | | | | | | | | |
| **Abbreviation** | cULus | CCC | EAC | BV | DNV | LR | RINa | ABS | RMRS | CCS | ClassNK | PRS |
| **Approved in** | North America | China | Russia | France | | Gr.Britain | Italy | USA | Russia | China shipping | Japan | Poland |
| **Accessories for AS09 ... AS16 contactors** | | | | | | | | | | | | |
| **Auxiliary contacts** | | | | | | | | | | | | |
| CA3 | ■ E252354 | ■ | ■ | | | | | | | | | |
| CA3..S | ■ E252354 | ■ | | | | | | | | | | |
| **Mechanical interlock unit** | | | | | | | | | | | | |
| VM3 | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | | |
| **Connecting links** | | | | | | | | | | | | |
| BEA16-3 | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | | |
| BEA16-3U | ■ E312527 | | | □ | □ | □ | □ | □ | □ | □ | | |
| BER16C-3 | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | | |
| BEY16C-3 | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | | |
| **Electronic timer** | | | | | | | | | | | | |
| TEF3 | ■ E252354 | | ■ | | | | | | | | | |
| **Surge suppressors** | | | | | | | | | | | | |
| RT5, RC5-1, RV5 | ■ E312527 | | ■ | | | | | | | | | |
| **Accessories for AF09 ... AF2650 and EK contactors and NF contactor relays** | | | | | | | | | | | | |
| **Auxiliary contacts** | | | | | | | | | | | | |
| CA4, CC4 | ■ E252354 | ■ | ■ | ■ (CA4) | ■ (CA4) | ■ | ■ | ■ | ■ | | □ | |
| CAT4 | ■ E252354 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | □ | |
| CAL4 | ■ E252354 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | □ | |
| CAL19 | ■ E76003 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| CAL18 | ■ E76003 | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| CAL20 | ■ | ■ | | | | | | | | | | |
| CAL16 | ■ E76003 | ■ | ■ | | | | | | | | | |
| CE5...D0.1 | ■ E319322 | ■ | ■ | | | | | | | | | |
| CE5...D2 | ■ E319322 | ■ | ■ | | | | | | | | | |
| CE5...W0.1 | ■ E319322 | ■ | ■ | | | | | | | | | |
| CE5...W2 | ■ E319322 | | ■ | | | | | | | | | |
| CEL18 | ■ E76003 | ■ | ■ | | | | | | | | | |
| CEL19 | ■ | ■ | ■ | | | | | | | | | |
| CA4..S, CAL4..S, CAT4..S | ■ E252354 | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | | | |
| **Electronic timer** | | | | | | | | | | | | |
| TEF4, TEF45 | ■ E252354 | | ■ | | | | | | | | | |
| **Mechanical / electrical interlock unit** | | | | | | | | | | | | |
| VEM4 | ■ E312527 | ■ | ■ | | | | | | | | | |
| **Mechanical interlock units** | | | | | | | | | | | | |
| VM4, VM96-4 | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ | |
| VM19 | ■ E36588 | | | □ | □ | □ | □ | □ | □ | □ | | |
| VM140/190 | ■ E36588 | | | □ | □ | □ | □ | □ | □ | □ | | |
| VM205/265 | ■ E36588 | | | □ | □ | □ | □ | □ | □ | □ | | |
| VM 750 | ■ E36588 | | | □ | □ | □ | □ | □ | □ | □ | | |
| VM1650H | ■ E36588 | | | □ | □ | □ | □ | □ | □ | □ | | |
| **Interface relay** | | | | | | | | | | | | |
| RA4 | ■ E252354 | | ■ | | | | | | | | | |

□ Marine not needed for this accessory.

# Certifications and approvals

| | Certifications | | | Approvals: ship classification societies | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mark** | | | | | | | | | | | |
| **Abbreviation** | cULus | CCC | EAC | BV | DNV | LR | RINa | ABS | RMRS | CCS | ClassNK | PRS |
| **Approved in** | North America | China | Russia | France | | Gr.Britain | Italy | USA | Russia | China shipping | Japan | Poland |
| **Latching unit** | | | | | | | | | | | | |
| WB75-A | ■ E252354 UL certified only | | ■ | | | | | | | | | |
| WA4 | ■ E312527 | | | | | | | | | | | |
| **Connecting links with manual motor starters** | | | | | | | | | | | | |
| BEA16-4, BEA26-4, BEA38-4, BEA65-4 | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ | |
| **Connection sets for reversing contactors** | | | | | | | | | | | | |
| BER16-4, BER38-4 | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ | |
| BER65-4, BER96-4 | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ | |
| BER140-4, BER205-4, BER370-4 | ■ E36588 | | | □ | □ | □ | □ | □ | □ | □ | □ | |
| BEM460-30, BEM750-30 | ■ E36588 | | | □ | □ | □ | □ | □ | □ | □ | □ | |
| **Connection sets for star-delta starters** | | | | | | | | | | | | |
| BEY16-4, BEY38-4 | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ | |
| BEY65-4, BEY96-4 | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ | |
| BEY190-4, BEY205-4, BEY265-4, BEY370-4 | ■ E36588 | | | □ | □ | □ | □ | □ | □ | □ | □ | |
| BED460, BED580, BED750 | ■ E36588 | | | □ | □ | □ | □ | □ | □ | □ | □ | |
| **Phase to phase connections** | | | | | | | | | | | | |
| BEP140-30, BEP205-30, BEP370-30 | ■ E36588 | | | □ | □ | □ | □ | □ | □ | □ | □ | |
| BEP140-40, BEP205-40, BEP370-40 | | | | □ | □ | □ | □ | □ | □ | □ | □ | |
| BES460, BES750 | ■ E36588 | | | □ | □ | □ | □ | □ | □ | □ | □ | |
| **Connection bars between contactors and MCCB** | | | | | | | | | | | | |
| BEA140/XT2, BEA140/XT3 | ■ E36588 | | | □ | □ | □ | □ | □ | □ | □ | □ | |
| BEA205/XT4 | ■ E36588 | | | □ | □ | □ | □ | □ | □ | □ | □ | |
| BEA370/T5 | ■ E36588 | | | □ | □ | □ | □ | □ | □ | □ | □ | |
| **Terminal connecting strips and shorting bars** | | | | | | | | | | | | |
| LY16-4, LY38-4 | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ | |
| LY110, LY185, LY300, LY460, LY750 | ■ E36588 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ | |
| LP185, LP300, LP460, LP750 | ■ E36588 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ | |
| LH38-4 | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ | |
| LF16-4, LF38-4 | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ | |
| LG16-4 | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ | |
| LK96-4F | ■ E312527 | | | □ | □ | □ | □ | □ | □ | □ | □ | |
| **Additional coil terminal blocks** | | | | | | | | | | | | |
| LD38-4 | ■ E312527 | | | □ | □ | □ | □ | □ | □ | □ | □ | |
| **Additional terminal blocks** | | | | | | | | | | | | |
| LDC4 | ■ E312527 | | | □ | □ | □ | □ | □ | □ | □ | □ | |
| **Protective covers** | | | | | | | | | | | | |
| BX4, BX4-CA | ■ E252354 | | | □ | □ | □ | □ | □ | □ | □ | □ | |
| **Terminal shrouds** | | | | | | | | | | | | |
| LT65-30 ... LT96-30 | – | | | □ | □ | □ | □ | □ | □ | □ | □ | |
| LT52-40 ... LT80-40 | – | | | □ | □ | □ | □ | □ | □ | □ | □ | |
| LT140 ... LT750 | ■ E36588 | | | □ | □ | □ | □ | □ | □ | □ | □ | |
| LT140-40 ... LT370-40 | ■ E73397 | | | □ | □ | □ | □ | □ | □ | □ | □ | |
| **Terminal enlargement** | | | | | | | | | | | | |
| LW | ■ E36588 | | | □ | □ | □ | □ | □ | □ | □ | □ | |

(1) In progress. □ Marine approvals not needed for this accessory.

# Certifications and approvals

| | Certifications | | | | | | | | Approvals: ship classification societies | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mark** | | | | | | | | | | | | | | | |
| **Abbreviation** | CSA | UL | cULus | CCC | EAC | ATEX | IEC Ex | KC | BV | DNV | LR | RINa | ABS | RMRS | ClassNK |
| **Approved in** | Canada | USA | North America | China | Russia | | | Korea | France | | Gr.Britain | Italy | USA | Russia | Japan |
| **Teminal extension** | | | | | | | | | | | | | | | |
| LX | | | ■ E36588 | | ■ | □ | | | □ | □ | □ | □ | □ | □ | □ |
| **Connection socket** | | | | | | | | | | | | | | | |
| LL | | | ■ E36588 | | ■ | □ | | | □ | □ | □ | □ | □ | □ | □ |
| **Connection modules** | | | | | | | | | | | | | | | |
| LD146-30, LD146-40 | | | ■ E36588 | | ■ | □ | | | □ | □ | □ | □ | □ | □ | □ |
| **Function marker** | | | | | | | | | | | | | | | |
| BA4 | | | ■ E252354 | | | □ | | | □ | □ | □ | □ | □ | □ | □ |
| **Fixing clip** | | | | | | | | | | | | | | | |
| BB4 | | | ■ E312527 | | | □ | | | □ | □ | □ | □ | □ | □ | □ |
| **Manual motor starters** | | | | | | | | | | | | | | | |
| MS116 | | | ■ E137861 | ■ | ■ | | | ■ | ■ | ■ | ■ | | ■ | ■ | |
| MS132 | | | ■ E137861 E345003 | ■ | ■ | ■ | ■ (1) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| MS165 | | | ■ E137861 E345003 | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| MS132-K | | | ■ | ■ | ■ | ■ | ■ | ■ | | | ■ | | | ■ | |
| **Manual motor starters magnetic only** | | | | | | | | | | | | | | | |
| MO132 | | | ■ E137861 E345003 | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| MO165 | | | ■ E137861 E345003 | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| **Circuit breaker for transformer protection** | | | | | | | | | | | | | | | |
| MS132-T | | | ■ E137861 | ■ | ■ | | | ■ | | | | | | | |
| MS132-KT | | | ■ E137864 | ■ | | | | | | | | | | | |
| **B mini contactors** | | | | | | | | | | | | | | | |
| **3-pole contactors** | | | | | | | | | | | | | | | |
| AC operated B6, B7 | | | ■ E191658(5) | ■ | ■ | | | ■ | ■ | ■ | ■ | | | ■ | |
| DC operated BC6, BC7, B7D | | | ■ E191658(5) | ■ | ■ | | | ■ | ■ | ■ | ■ | | | ■ | |
| **3-pole reversing contactors** | | | | | | | | | | | | | | | |
| AC operated VB6, VB7 | | | ■ E191658(5) | ■ | ■ | | | ■ | | ■ | | | | ■ | |
| DC operated VBC6, VBC7 | | | ■ E191658(5) | ■ | ■ | | | ■ | | ■ | | | | ■ | |
| AC operated VB6A, VB7A | | | ■ E191658(5) | ■ | ■ | | | ■ | | ■ | | | | ■ | |
| DC operated VBC6A, VBC7A | | | ■ E191658(5) | ■ | ■ | | | ■ | | ■ | | | | ■ | |
| **3-pole low consumption contactors** | | | | | | | | | | | | | | | |
| DC operated BC6, BC7 | | | ■ E191658(5) | ■ | ■ | | | ■ | ■ | ■ | ■ | | | ■ | |
| DC operated B6S, B7S | | | ■ E191658(5) | ■ | ■ | | | ■ | ■ | ■ | ■ | | | ■ | |
| **4-pole contactors** | | | | | | | | | | | | | | | |
| AC operated BC6, BC7 | | | ■ E191658(5) | ■ | ■ | | | ■ | ■ | ■ | ■ | | | ■ | |
| DC operated B6S, B7S | | | ■ E191658(5) | ■ | ■ | | | ■ | ■ | ■ | ■ | | | ■ | |

# Certifications and approvals

| | Certifications | | | | | | | | Approvals: ship classification societies | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mark** | | | | | | | | | | | | | | | |
| **Abbreviation** | CSA | UL | cULus | CCC | EAC | ATEX | IEC Ex | KC | BV | DNV | LR | RINa | ABS | RMRS | ClassNK |
| **Approved in** | Canada | USA | North America | China | Russia | | | Korea | France | | Gr.Britain | Italy | USA | Russia | Japan |
| **Contactor relays** | | | | | | | | | | | | | | | |
| AC operated K6 | | | ■ E48139(5) | ■ | ■ | | | | | | | | | ■ | |
| DC operated KC6 | | | ■ E48139(5) | ■ | ■ | | | | | | | | | ■ | |
| **Low consumption contactor relays** | | | | | | | | | | | | | | | |
| DC operated KC6 | | | ■ E48139(5) | ■ | ■ | | | | | | | | | ■ | |
| DC operated K6S | | | | ■ | ■ | | | | | | | | | ■ | |
| **Accessories for B mini contactors** | | | | | | | | | | | | | | | |
| **Auxiliary contacts** | | | | | | | | | | | | | | | |
| CA6 | | | ■ E48139(5) | ■ | ■ | | | | | | | | | ■ | |
| CAF6 | | | ■ E48139 | ■ | ■ | | | | | | | | | ■ | |
| **Connecting links** | | | | | | | | | | | | | | | |
| BEA7/132 | | | ■ E312527(5) | | | | | | □ | □ | □ | □ | □ | □ | □ |
| **Connection sets for reversing contactors** | | | | | | | | | | | | | | | |
| BSM6-30 | | | ■ E191658 | | | | | | □ | □ | □ | □ | □ | □ | □ |
| **Surge suppressors** | | | | | | | | | | | | | | | |
| RV-BC6 | | | ■ E191658 | | | | | | | | | | | | |

(5) cURus for devices equipped with flat and soldering pin terminals, and BEA7/132

# Certifications and approvals

| | Certifications | | | | | | | | Approvals: ship classification societies | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mark** | | | | | | | | | | | | | | | |
| **Abbreviation** | CSA | UL | cULus | CCC | EAC | ATEX | IEC Ex | KC | BV | DNV | LR | RINa | ABS | RMRS | ClassNK |
| **Approved in** | Canada | USA | North America | China | Russia | | | Korea | France | | Gr.Britain | Italy | USA | Russia | Japan |
| **M mini contactors** | | | | | | | | | | | | | | | |
| **3-pole contactors** | | | | | | | | | | | | | | | |
| AC operated MC1A, MC2A | | | ■ E191658 | ■ | | | | | ■ | | | ■ | | | |
| DC operated MC1C, MC2C | | | ■ E191658 | ■ | | | | | ■ | | | ■ | | | |
| **3-pole low consumption contactors** | | | | | | | | | | | | | | | |
| DC operated MC1I, MC1K, MC2I, MC2K | | | ■ E191658 | ■ | | | | | | | | ■ | | | |
| **4-pole contactors** | | | | | | | | | | | | | | | |
| AC operated MC1A, MC2A | | | ■ E191658 | ■ | | | | | ■ | | | ■ | | | |
| DC operated MC1C, MC2C | | | ■ E191658 | ■ | | | | | ■ | | | ■ | | | |
| **4-pole low consumption contactors** | | | | | | | | | | | | | | | |
| DC operated MC1I, MC1K | | | ■ E191658 | ■ | | | | | | | | ■ | | | |
| **Contactor relays** | | | | | | | | | | | | | | | |
| AC operated MCRA | | | ■ E48139 | ■ | | | | | ■ | | | | | | |
| DC operated MCRC | | | ■ E48139 | ■ | | | | | ■ | | | | | | |
| **Low consumption contactor relays** | | | | | | | | | | | | | | | |
| DC operated MCRI, MCRK | | | ■ E48139 | ■ | | | | | | | | | | | |
| **Accessories for M mini contactors** | | | | | | | | | | | | | | | |
| **Auxiliary contacts** | | | | | | | | | | | | | | | |
| MACL, MARL | | | ■ E48139 | ■ | | | | | ■ | | | ■ | | | |
| MACN, MARN | | | ■ E48139 | ■ | | | | | ■ | | | ■ | | | |
| **Mechanical interlock unit** | | | | | | | | | | | | | | | |
| MMH0 | | | ■ E191658 | | | | | | □ | □ | □ | □ | □ | □ | □ |
| **Connecting links** | | | | | | | | | | | | | | | |
| BEMC/132 | | | ■ E137861 | | | | | | □ | □ | □ | □ | □ | □ | □ |
| **Connection sets for reversing contactors** | | | | | | | | | | | | | | | |
| WKMIU | | | ■ E191658 | | | | | | □ | □ | □ | □ | □ | □ | □ |
| **Electronic timer** | | | | | | | | | | | | | | | |
| MREBC | | | ■ E48139 | | | | | | | | | | | | |
| **Surge suppressors** | | | | | | | | | | | | | | | |
| MP0 | | | ■ E48139 | | | | | | ■ | | | ■ | | | |
| **Thermal overload relays** | | | | | | | | | | | | | | | |
| T16 | | | ■ E48139 | ■ | ■ | | | | ■ | ■ | ■ | ■ | ■ | ■ | |
| TF42 | | | ■ E48139 | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | |
| TF65 | | | ■ E48139 | ■ | ■ | ■ (3) | | | ■ | ■ | ■ | ■ | ■ | ■ | |
| TF96 | | | ■ E48139 | ■ | ■ | ■ (3) | | | ■ | ■ | ■ | ■ | ■ | ■ | |
| TF140DU | | | ■ E48139 | ■ | ■ | | | | ■ | ■ | ■ | ■ | ■ | ■ | |
| TF140DU-V1000 | | | ■ E48139 | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | |
| TA200DU | | | ■ E48139 | ■ | ■ | | | | ■ | ■ (4) | ■ | | ■ | ■ | |
| TA200DU-V1000 | | | ■ E48139 | ■ | ■ | ■ | | | ■ | ■ (4) | ■ | | ■ | ■ | |

# Certifications and approvals

| | Certifications | | | | | | | | Approvals: ship classification societies | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mark** | | | | | | | | | | | | | | | |
| **Abbreviation** | CSA | UL | cULus | CCC | EAC | ATEX | IEC Ex | KC | BV | DNV | LR | RINa | ABS | RMRS | ClassNK |
| **Approved in** | Canada | USA | North America | China | Russia | | | Korea | France | | Gr.Britain | Italy | USA | Russia | Japan |
| **Electronic overload relays** | | | | | | | | | | | | | | | |
| **0.10...45 A** | | | | | | | | | | | | | | | |
| E16DU | | | ■ E48139 | ■ | ■ | | | | | | | | | ■ | |
| EF19 | | | ■ E48139 | ■ | ■ | ■ | ■ (1) | | ■ | ■ | ■ | ■ | ■ | ■ | |
| EF45 | | | ■ E48139 | ■ | ■ | ■ | ■ (1) | | ■ | ■ | ■ | ■ | ■ | ■ | |
| **20...150 A** | | | | | | | | | | | | | | | |
| EF65 | | | ■ E48139 | ■ | ■ | ■ (2) | ■ (1) | | ■ | ■ | ■ | ■ (2) | ■ | ■ | |
| EF96 | | | ■ E48139 | ■ | ■ | ■ | ■ (1) | | ■ | ■ | ■ | ■ | ■ | ■ | |
| EF146 | | | ■ E48139 | ■ | ■ | ■ | ■ (1) | | ■ | ■ | ■ | ■ | ■ | ■ | |
| **63...380 A** | | | | | | | | | | | | | | | |
| EF205 | | | ■ E48139 | ■ | ■ | ■ | ■ (1) | | ■ | ■ | ■ | ■ | ■ | ■ | |
| EF370 | | | ■ E48139 | ■ | ■ | ■ | ■ (1) | | ■ | ■ | ■ | ■ | ■ | ■ | |
| **150...1250 A** | | | | | | | | | | | | | | | |
| EF460 | | | ■ E48139 | ■ | ■ | ■ | ■ (1) | | ■ | ■ | ■ | ■ | ■ | ■ | |
| EF750 | | | ■ E48139 | ■ | ■ | ■ | ■ (1) | | ■ | ■ | ■ | ■ | ■ | ■ | |
| EF1250 | | | ■ E76003 | | ■ | | | | | | | | | | |
| **Electronic compact starter** | | | | | | | | | | | | | | | |
| HF range | | | ■ E191658 | ■ | | ■ | | | | | | | | | |

(1) IECEx is valid for product produced from week15, 2017. (2) EF65-56 has no RINa approval and ATEX certification is valid for EF65-56 produced from week 47, 2015. (3) ATEX is valid for products produced from week 26, 2015. All electronic overload relays are (RCM) marked : EF produced from week 47, 2015; E produced from week 14, 2016. (4) 2 separate certificate available: 1 for DNV and 1 for GL.

# Coordination with short-circuit protection devices

## Motor protection

**Applicable standards**
IEC 60947-4-1 (EN 60947-4-1) and UL 60947-4-1 precisely defines the different points to be considered between the branch circuit protective device and the motor starter in order to carry out correct coordination. Complete coordination for a combination includes the below points.

- Selectivity test between the overload relay and the Short-Circuit Protection Device (SCPD).
- Short-circuit condition tests at prospective “r” currents
  These currents depend on the rated operational current of the starter (Ie AC-3 / AC-3e) and are given by the standard (Table 13).
  For example:
  - r = 1 kA for Ie AC-3/AC-3e ≤ 16 A
  - r = 3 kA for 16 A < Ie AC-3/AC-3e ≤ 63 A
  - r = 5 kA for 63 A < Ie AC-3/AC-3e ≤ 125 A etc.
- Short-circuit condition tests at the rated conditional short-circuit current “Iq”
  This is the maximum prospective current that the combination can withstand, for example 50 kA.

**Definition**
To be compliant with IEC/EN 60947-4-1 and UL 60947-4-1, the branch circuit protective device and the motor starter need to be selected according to contactor’s / starter’s rating type and the characteristics of the short-circuit protection devices to enable selective protection against overloads and ensure protection against short-circuits.

**Basic functions**
Any starter is designed to:
- start motors
- ensure continuous functioning of motors
- disconnect motors from the supply line
- guarantee protection of motors against overloads.

The starter is typically made up of a switching device (contactor) and an overload protection device (thermal overload relay or electronic overload relay). These two devices MUST be coordinated with each other and with equipment capable of providing protection against short-circuit: typically a circuit breaker with magnetic release only or a switch fuse. These are not necessarily part of the starter.

**Types of coordination**
IEC/EN 60947-4-1 and UL 60947-4-1 define two types of coordination between the branch circuit protective device and the motor starter according to the expected level of service continuity. Acceptable extreme damage for the switchgear is divided into two types.

- Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.
- Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable. In this case, the manufacturer must stipulate the measures to be taken with respect to maintenance of the equipment.

**Motor efficiency class and design type**
- IEC coordination tables are displayed for IE1, IE2, IE3 and IE4 motor efficiency classes in regards with N/H or NE/HE motor design use:
  - asynchronous IE1/IE2/IE3/IE4 motors may be of the design N or H
  - asynchronous IE3/IE4 motors may be of the design NE or HE, having extended / locked rotor apparent power and current than design N and H motors.
- International Efficiency (IE) classes for single speed electric motors IEC 60034-30-1:2014 standard defines four International Efficiency (IE) classes for single speed three-phase cage rotor induction motors designed for operation on sinusoidal voltage:
  - IE4 = Super premium efficiency
  - IE3 = Premium efficiency
  - IE2 = High efficiency
  - IE1 = Standard efficiency.
- Motor design N/H and NE/HE
  IEC 60034-12:2016 standard defines motor design categories as below:
  - **Design N**
    Normal starting torque with normal locked rotor current
  - **Design H**
    High starting torque with normal locked rotor current
  - **Design NE**
    Normal starting torque with higher locked rotor current
  - **Design HE**
    High starting torque with higher locked rotor current.

For additional information, please consult our application note Motor starting and protection - IE3/IE4 ready for premium efficiency motor starting

- US Motor Minimum Efficiency Performance Standards
  Most of 3-phase industrial motors are required to meet the efficiencies listed in ANSI/NEMA MG-1, table 12-1x (NEMA Premium® efficiency).

  Following motor efficiency classes are typically known:
  - Super Premium Efficiency (comparable to IEC IE4)
  - Premium Efficiency (comparable to IEC IE3)
  - High Efficiency (comparable to IEC IE2)
  - Standard Efficiency (comparable to IEC IE1).

For additional information, please consult our application note for NEMA Premium® Efficiency motor starting

**Combination Motor Controllers (CMC)**
Article 409 of the National Electrical Code (NFPA 70) requires industrial control panels to be marked with a SCCR (Short-Circuit Current Rating). According to the National Electrical Code (NEC), UL 508A Supplement SB - Standard for Industrial Control Panels - provides an accepted method for determining the SCCR of the control panel. Industrial control panel manufacturers can use Selected Optimized Coordination tool (SOC) for guidance. SOC tool is intended for those manufacturers that purchase the discrete components and assemble combination motor controllers within their panels to achieve a combination SCCR that is higher than the lowest-rated individual component.

Failure of components under fault conditions can lead to safety concerns for personnel working in close proximity to electrical equipment. The harmonized UL 60947-4-1 and CSA C22.2 No.60947-4-1 standards define acceptance criteria for these components.

Several criteria exist for all devices:
- The short-circuit protective device successfully interrupts the fault
- The enclosure door has not blown open, and it remains possible to open it manually
- No damage to, or separation between, the conductors and the terminals
- No damage to the insulating bases of live parts, and no access to current carrying parts.

For Combination Motor Controllers, the included circuit-breaker / manual motor starter or switch should be capable of being manually operated, and should not be damaged, exposing conductive parts.

Identification number A, C, D, E or F is assigned as a reference by the submitter for each combination motor controller (CMC) construction or rating:
- Type A fusible combination:
  disconnector, fuse, contactor and overload relay
- Type C MCCB combination:
  inverse-time circuit breaker, contactor and overload relay
- Type D MCP (magnetic only) combination:
  instantaneous-only circuit breaker, contactor and overload relay
- Type E Manual self protected combination motor controller
- Type F Combination motor controller:
  manual motor starter and contactor.

## UL Component ratings

Components used within combination motor controllers are required to have individual component ratings tested and certified according to the appropriate UL Standard for that component.

The results of this testing show the UL Listed/Recognized product provides a safe and code-compliant installation when installed according to the manufacturer's instructions. In this case, a safe installation means that the installation has been found to be reasonably free of the risk of fire, electric shock and other hazards to public health.

Each component must be appropriately labeled:
- Company name and model number
- Identification of the specific component in the combination motor controller.

Individual component ratings:
- **HP:** Horsepower rating for component, if provided
- **kA:** Marked short-circuit current rating (SCCR) on individual component
- **Max Amps:** Maximum ampere rating of individual component
- **V:** Voltage rating of individual component.

# Coordination with short-circuit protection devices

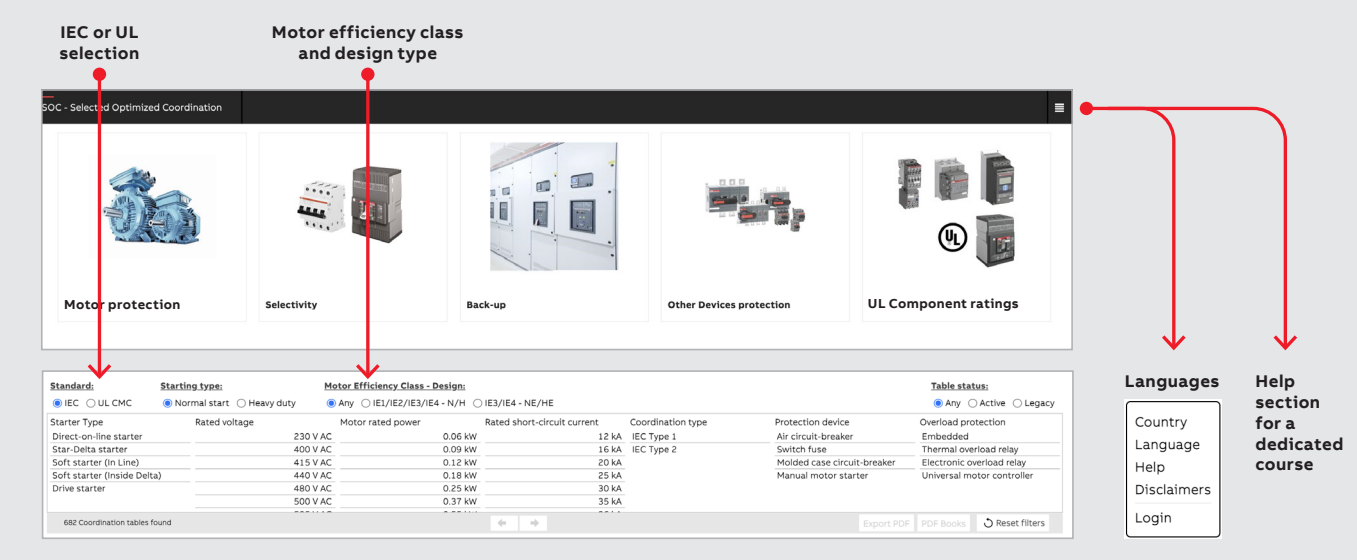
A complete data base of coordination tables, is available on below ABB Website:

- Motor protection
  - coordination according to IEC 60947-4-1 standards,
  - Combination Motor Controllers (CMC) according to UL508, UL 60947-4-1
- UL component ratings for the selection of UL Listed/Recognized products

**Access**

To find the coordination tables for motor protection, please see:

https://www.lowvoltage-tools.abb.com/soc/



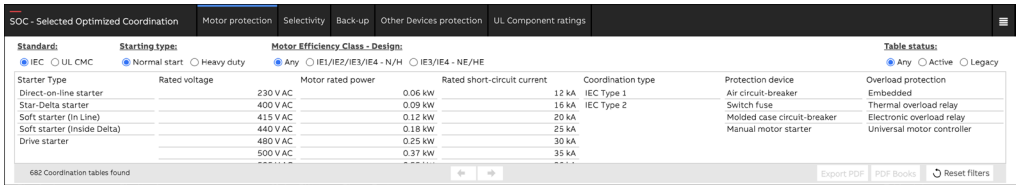

## Features

- User-friendly selection and new smart search for fast coordination table configuration
- Optimized motor protection coordination tables for IE3/IE4 high-efficiency class with respect to N/H or NE/HE motor design
- Follow-up of the sales status of the products included inside the motor protection coordination tables
- Includes dedicated product ranges available in your country
- New export PDF and e-mail sharing options
- Main languages localization for interface display and PDF documentation exportation
- New help section to train all users in an easy and quick way.

## Results

- Search results displayed at the bottom of the selection page
- Only the most appropriate solutions to your application, will be displayed at the bottom of the page. “Enable Smart Current Search” function featured for the short-circuit current where “near to” selected values also are included in the result.
- Indication of the status (Active, Legacy) of the selected tables
- Possible to print the selected pages to a PDF book or from your printer
- “Result filters” function to deselect all selected.

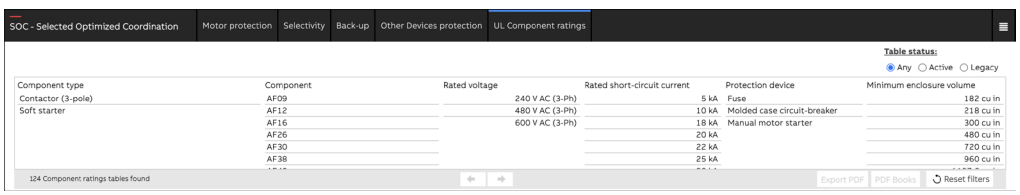
Motor protection IEC and UL CMC




To consult the last information about SOC tool, please see:

https://new.abb.com/low-voltage/support/software/selected-optimized-coordination-soc

UL Component ratings



# Standards, specifications and certifying organizations

### Definitions

ABB low voltage devices are developed and manufactured in accordance with the applicable regulations as stated in the international IEC standards, the European EN standards and the national ones such as NF, DIN, GB and BS. For devices installed in ships, an approval issued by independent classification societies is demanded by the maritime insurance companies.

### CB scheme

Certification Body certificates (CB certificates) are available to prove the complete conformity to standards

The IEC CB (Certification Body) scheme is multilateral agreement between the National Certification Bodies to allow international certification of electrical and electronic products so that a single certification allows worldwide market access.

The CB Scheme was established by the International Electrotechnical Committee for conformity testing to standards for electrical equipment (IECEE).

### Certified products

In some cases, products are validated and tested according to a standard by a certification body and the manufacturer is regularly visited by this body in order to check the respect of the design and the materials used. This process creates a certified product. This is the case of UL (Underwriters Laboratories) and CSA (Canadian Standard Association) for instance (see below).

### Specifications

#### International Specifications

The International Electrotechnical Commission, IEC, which is part of the International Standards Organization, ISO, publishes IEC publications which act as a basis for the world market.

#### European Specifications and National Specifications

The European committee for electrotechnical standardization (CENELEC), which groups together European countries, publishes EN standards.

These European standards may differ very little from IEC international standards and have similar numbering.

The same applies for national standards which use, without exception, the same numbering and reproduce the texts of these unified standards in their entirety. Contradicting national standards are withdrawn.

### European Directives

The guarantee of the free movement of goods within the European Community means that any regulatory differences between member states have been eliminated. The European directives set up common rules that are included in the legislation of each state while contradictory regulations are cancelled.

Three directives are essential:

- **Low Voltage Directive** 2006/95/EC (until April 2016, 19th) and 2014/35/EC (from April 2016, 20th) concerns electrical equipment from 0 to 1000 V AC and from 0 to 1500 V DC.

This specifies that compliance with the requirements that it sets out is acquired if the equipment conforms to the standards harmonized on an European level. EN 60947-1 and EN 60947-4-1 for contactors.

- **Machinery Directive** 2006/42/EC for safety specifications of machines and equipment on complete machines.
- **Electromagnetic Compatibility Directive** 2004/108/EC (until April 2016, 19th) and 2014/30/EC (from April 2016, 20th) which concerns all devices able to create electromagnetic disturbance.

### CE Marking:

CE marking indicates that the marked equipment conforms to the relevant EU directive.

CE marking is part of an administrative procedure and guarantees free movement of the product within the European Community.

### UKCA marking

The UKCA marking (UK Conformity Assessed) is a UK product marking that is used for products being placed on the market in Great Britain (England, Wales, and Scotland).

### Standards in Canada and the USA

Canadian and American specifications are more or less equivalent but differ greatly from IEC standards.

**UL** Underwriters Laboratories USA

**CSA** Canadian Standard Association Canada

**UL (USA)** specifications make the following distinction between devices:

**Listed Product**

A product that has been produced under UL's listing and follow-up service program in accordance with the terms of UL's service agreement and that bears the UL listing mark as the manufacturer's declaration that the product complies with UL's requirements.

**Recognized Component**

A part or subassembly covered under UL's recognition service and intended for factory installation in listed (or other) products. Recognized components are incomplete in certain construction features or restricted in performance capabilities and not intended for separate installation in the field, rather they are intended for use as components of incomplete equipment submitted for investigation by UL. Final acceptance of the component in the complete equipment is dependent upon its installation and use in accordance with all applicable use conditions and ratings noted in the component report issued by UL, in the guide information and in the individual client's Recognized Component information page.

The combined UL signs for the USA and Canada are recognized by the authorities of both countries.

**China Compulsory Certification (CCC):** The CCC mark is a compulsory certification mark in the field of safety for products sold on the Chinese market.

**EAC:** Russia (please consult your local ABB sales office)

**C-Tick:** The C-Tick mark certifies compliance with the Australian EMC requirements. The mark is also recognized in New Zealand

**ANCE:** Mexico

# Standards, specifications and certifying organizations

**Marine Approvals**

The following specifications must be respected when these devices are used on ships:

| | |
|---|---|
| **BV** | Bureau Veritas France |
| **DNV** | Det Norske Veritas Norway |
| **GL** | Germanischer Lloyd Germany |
| **LRS** | Lloyd's Register of Shipping Great Britain |
| **ABS** | America Bureau of Shipping |
| **RMRS** | Russian Maritime Register of Shipping RMRS |
| **RRR** | Russian River Register |
| **MRS** | Maritime Register of Shipping Russia |
| **PRS** | Polski Rejestr Statkow Poland |
| **RINA** | Registro Italiano Navale Italy |

**Specifications (cont.)**

**International Standards**

IEC 60947-1 Low-voltage switchgear and controlgear – Part 1: General rules

IEC 60947-4-1 Low-voltage switchgear and controlgear – Part 4: Contactors and motor starters – Section 1: Electromechanical contactors and motor starters

IEC 60947- 5-1 Low-voltage switchgear and controlgear – Part 5: Control circuit devices and switching elements – Section 1: Electromechanical control circuit devices

IEC 60947-5-4 Low-voltage switchgear and controlgear – Part 5-4: Control circuit devices and switching elements. Method of assessing the performance of low-energy contacts. Special tests

IEC 60947- 6-1 Low-voltage switchgear and controlgear – Part 6: Multiple function equipment – Section 1: Automatic transfer switching equipment

IEC 60204-1 Electrical equipment of industrial machines – Part 1: General requirements

IEC 60715 Dimensions of low-voltage switchgear and controlgear. Standardized mounting on rails for mechanical support of electrical devices in switchgear and controlgear installations

**European Standards**

EN 50 005 Low-voltage switchgear and controlgear for industrial use – Terminal marking and distinctive number: General rules

(Annex L of IEC 60947-1).

EN 50 011 Low-voltage switchgear and controlgear for industrial use – Terminal marking, distinctive number and distinctive letter for particular contactor relays (Annex M of IEC 60947-5-1)

EN 60947-1 Low-voltage switchgear and controlgear – Part 1: General rules.

EN 60947-4-1 Low-voltage switchgear and controlgear – Part 4: Contactors and motor starters – Section 1: Electromechanical contactors and motor starters.

EN 60947-5-1 Low-voltage switchgear and controlgear – Part 5: Control circuit devices and switching elements – Section 1: Electromechanical control circuit devices.

EN 60947-5-4 Low-voltage switchgear and controlgear – Part 5-4: Control circuit devices and switching elements. Method of assessing the performance of low-energy contacts. Special tests.

EN 60947- 6-1 Low-voltage switchgear and controlgear – Part 6: Multiple function equipment – Section 1: Automatic transfer switching equipment.

EN 60204-1 Electrical equipment of industrial machines – Part 1: General requirements.

EN 60 715 Dimensions of low-voltage switchgear and controlgear. Standardized mounting on rails for mechanical support of electrical devices in switchgear and controlgear installations.

**National Standards**

European countries national standards reproduce the corresponding EN... standards. Codification is built by addition of a prefix to EN numbering.

For instance:

- France **NF** EN...
- Germany **DIN** EN...
- Great Britain **BS** EN...
- Italy **CEI** EN...
- Sweden **SS** EN...

# Terms and technical definitions

### Ambient temperature

Air temperature close to the contactor.

### Assessed failure rate

Defined according to IEC 60947-5-4. This rate is given in standard industrial environments for the contactor relays and for the built-in auxiliary contact of contactors.

### Circuits

- auxiliary circuit: All the conductive parts of a contactor designed to be inserted in a different circuit from the main circuit and the contactor control circuits.
- control circuit: All the conductive parts of a contactor (other than the main circuit and the auxiliary circuit) used to control the contactor's closing operation or opening operation or both.
- main circuit: All the conductive parts of a contactor designed to be inserted in the circuit that it controls.

### Coil operating limits

Expressed in multiples of the nominal control circuit voltage Uc for the upper and lower limits.

### Conventional free air thermal current Ith

Current that the contactor can withstand in free air for a duty time of 8 hours without the temperature rise of its various parts exceeding the maximum values given by the standard.

### Coordination of protections against short circuit

The goal here is to protect electromechanical starters and soft-starters.

Any starter is designed to:

- start motors,
- ensure continuous functioning of motors,
- disconnect motors from the supply line,
- guarantee protection of motors against overloads.

The starter is typically made up of a switching device (contactor) and an overload protection device (thermal overload relay or electronic overload relay). These two devices MUST be coordinated with equipment capable of providing protection against short circuit (SCPD: short circuit protective device): typically a circuit breaker with magnetic release only or a switch fuse. These are not necessarily part of the starter.

The characteristics of the starter must comply with the international standard IEC 60947-4-1 which defines the above items as follows:

**contactor:** a mechanical switching device having only one position of rest, operated otherwise than by hand, capable of making, carrying and breaking currents under normal circuit conditions including overload conditions.

**overload release:** overload relay or release which operates in the case of overload and also in case of loss of phase.

**circuit-breaker:** defined by IEC 60947-2 as a mechanical switching device, capable of making, carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time and breaking currents under specified abnormal circuit conditions.

IEC publication 60947-4-1 defines coordination types "1" and "2":

- Type "1" coordination requires that, in the event of a short-circuit, the contactor or starter does not endanger persons or installations and will not then be able to operate without being repaired or parts being replaced.
- Type "2" coordination requires that, in short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts being light welded is acceptable. In this case, the manufacturer must stipulate the measures to be taken with respect to maintenance of the equipment.

IEC coordination tables are displayed for IE1, IE2, IE3 and IE4 motor efficiency classes in regards with N/H or NE/HE motor design use.

### Cycle time

This is the sum of the current flow time and the no-current time for given cycle.

### Definitions according to SEMI F47-0706

SEMI F47-0706 defines the voltage sag immunity required for semiconductor processing, metrology and automated test equipment, and on subsystems and components which are used in the construction of semiconductor processing equipment including but not limited to:

- Power supplies
- Generators
- Robots and factory interface
- Chillers, pumps, blowers
- AC operated contactors and contactor relays...

**voltage sag:** an rms reduction in the AC voltage, at the power frequency, for durations from a half cycle to a few seconds.

The IEC terminology for this phenomenon is voltage dip.

**voltage sag immunity:** the ability of equipment to withstand momentary electrical power interruptions or sags.

### Electrical durability

Number of on-load operating cycles that the contactor is able to carry out. It depends on the operational current, the operational voltage and the utilization category.

### Electromagnetic compatibility

AF... contactors comply with IEC/EN 60947-1 and IEC/EN 60947-4-1 standards.

Definitions:

Environment A: "Mainly relates to low-voltage non public or industrial networks/locations/installations (EN 50082-2 article 4) including highly disturbing sources".

Environment B: "Mainly relates to low-voltage public networks (EN 50082-1 article 5) such as residential, commercial and light industrial locations/installations. Highly disturbing sources such as arc welders are not covered by this environment".

Notice for AF09…AF2650 contactors:

- AF09 … AF38 contactors and NF contactor relays (produced since week 08-2013), AF40 ... AF96 contactors have been designed for environment B.
- AF09 … AF38-..-..-12 contactors and NF..E-12 contactor relays (48...130 V 50/60 Hz-DC), AF116 ... AF2650 contactors: these products have been designed for environment A.
  Use of this product in environment B may cause unwanted electromagnetic disturbances in which case the user may be required to take adequate mitigation measures.

Note: for 48...130 V 50/60 Hz-DC in environment B, AF09Z … AF38Z-..-..-22 contactor or NFZ..E-22 contactor relays can be selected.

# Terms and technical definitions

### Inching

Energization of a motor's circuit repeatedly or for short periods with the aim of obtaining small movements of the driven mechanism.

### Intermittent duty

Duty during which the contactor is successively closed or open for periods which are too short to enable the contactor to achieve thermal balance.

### International Efficiency (IE) classes for single speed electric motors

IEC 60034-30-1:2014 standard defines four International Efficiency (IE) classes for single speed three-phase cage rotor induction motors designed for operation on sinusoidal voltage:

- IE4 = Super premium efficiency
- IE3 = Premium efficiency
- IE2 = High efficiency
- IE1 = Standard efficiency

### Load factor

Ratio of the on-load operating time to the total cycle time x 100.

### Mirror contacts



Definitions of mirror contact acc. to IEC 60947-4-1, Annex F 2.1. Normally closed auxiliary contact (N.C.) which cannot be in the closed position simultaneously with the normally open (N.O.) main contact.

### Mechanical durability

Number of no-current operating cycles that a contactor is able to carry out.

### Mechanically linked contacts



Definitions of mechanically linked elements acc. to IEC 60947-5-1, Annex L. Combination of "n" Make auxiliary contact element(s) and "m" Break auxiliary contact element(s) are designed in such a way that they cannot be in the closed position simultaneously.

One control circuit device may have more than one group of mechanically linked contact elements.

### Motor design N/H and NE/HE

IEC 60034-12:2016 standard defines motor design categories as below:

- **Design N**
  Normal starting torque with normal locked rotor current
- **Design H**
  High starting torque with normal locked rotor current
- **Design NE**
  Normal starting torque with higher locked rotor current
- **Design HE**
  High starting torque with higher locked rotor current.

Asynchronous IE1/IE2/IE3/IE4 motors may be of the design N or H. Asynchronous IE3/IE4 motors may be of the design NE or HE, having extended/locked rotor apparent power and current than design N and H motors.

IEC 60947-4-1 Ed.4 introduces now a new AC-3e utilization category for AC circuit switching and keeps the use and definition of existing AC-3 utilization category unchanged.

- AC-3: Refer to the asynchronous motor of designs N and H according to IEC 60034-12:2016
- AC-3e: Refer to the asynchronous motor of designs NE and HE, according to IEC 60034-12:2016, with extended / higher locked rotor apparent power and current than design N and H respectively, to achieve a higher efficiency class according to IEC 60034-30-1.
  AC-3e category is defined for the use and the selection of MS116, MS132, MS165 manual motor starters, 3-pole AF09… AF190 contactors and B mini-contactors: please see their respective data pages.

### Mounting position

Comply with the manufacturer's instructions. Restrictions are to be taken into account for certain mounting positions.

### Operating altitude

Altitude of the site of installation, in which a device operates. For equipment to be used at high altitudes, it is necessary to consider the reduction of the dielectric strength and the cooling effect of the air. Electrical equipment intended to operate under these conditions shall be designed and used in accordance with the recommendation given for low voltage control and protection products in below application note for altitudes up to 5000 m.

### Operating cycle or cycle

Includes one making operation and one breaking operation.

### Plugging

Stopping or fast reversal in rotation direction of a motor by two supply leads being interchanged while the motor is running.

# Terms and technical definitions

### Rated breaking or making capacity

Root mean square (r.m.s.) value of the current that the contactor is able to break or make at a given voltage according to the conditions specified by standards and for a given utilization category.

### Rated control voltage Uc

Control voltage value for which the control circuit is sized.

### Rated impulse withstand voltage Uimp

Peak value of an impulse voltage, having a specified form and polarity, which does not cause breakdown in specific test conditions.

### Rated insulation voltage Ui

Reference voltage for dielectric tests and creepage distances.

### Rated operational current Ie

Current rated by the manufacturer. It is mainly based on the rated operational voltage Ue, the rated frequency, the utilization category, the rated duty and the type of protective enclosure, if necessary.

### Rated operational voltage Ue

Voltage to which the contactor's utilization characteristics refer. In three-phase it is the phase-to-phase voltage.

### Resistance to vibrations

Requirements for vehicles, boats and other means of transport. For the specified vibration amplitude and frequency values the device must remain able to operate.

### Shock withstand

Requirement for vehicles, crane drives, installations on board ships and plug-in equipment. For the acceptable "g" values, the contacts must not change position and the thermal overload relays must not trip.

### Switching frequency

Number of switching cycles per hour.

### Thermal overload relay tripping classes

IEC 60947-4-1 defines tripping classes 10 A, 10, 20 and 30. Types 10 A, 10, etc. correspond to the maximum tripping time for a making current at 7.2 times the setting current.

Furthermore, for each class the standard specifies the tripping time for 1.5 times the setting current and sets the non tripping condition at 1.05 times the setting current.

All these data are summarized in the table below.

**Extract from IEC 60947-4-1:**

| Tripping class | | 10 A | 10 | 20 | 30 |
|---|---|---|---|---|---|
| Max. tripping time for 1.5 times the setting current (warm state) | s | 120 | 240 | 480 | 720 |
| Tripping time for 7.2 times the setting current (cold state) | s | 2 - 10 | 4 - 10 | 6 - 20 | 9 - 30 |
| For 1.05 times the setting current | | No tripping | | | |

### Time

- Time constant: Ratio of the inductance to the resistance (L/R = mH/Ω = ms).
- Short-time withstand current: Current that the contactor is able to withstand in closed position for a short time interval and in specified conditions.
- Closing time: Time interval between the coil energization and the instant the contacts touch on all the poles.
- Opening time: Time interval between the coil de-energization and the instant the contacts separate on all the poles.

# Standards and utilization categories

## Utilization categories:

A contactor's duty is characterised by the utilization category together with the rated operational voltage and current indicated.

**Utilization categories for contactors according to IEC 60947-4-1:**

| | | |
|---|---|---|
| **Alternating current:** | AC-1 | Non-inductive or slightly inductive loads, resistance furnaces. |
| | AC-2 | Slip-ring motors: starting, switching off. |
| | AC-3 | Cage motors: starting, switching off running motors. |
| | AC-3e | Cage motors with higher locked rotor current: starting, switching off running motors. |
| | AC-4 | Cage motors: starting, plugging, inching. |
| | AC-5a | Discharge lamp switching. |
| | AC-5b | Incandescent lamp switching. |
| | AC-6a | Transformer switching. |
| | AC-6b | Capacitor bank switching. |
| | AC-8a | Hermetic refrigeration compressor motor control with manual resetting of overload releases. |
| | AC-8b | Hermetic refrigeration compressor motor control with automatic resetting of overload releases. |
| **Direct current:** | DC-1 | Non inductive or slightly inductive loads, resistance furnaces. |
| | DC-3 | Shunt motors: starting, plugging, inching, dynamic breaking of DC motors. |
| | DC-5 | Series motors: starting, plugging, inching, dynamic breaking of DC motors. |
| | DC-6 | Incandescent lamp switching. |

**Utilization categories for contactor relays according to IEC 60947-5-1:**

| | | |
|---|---|---|
| **Alternating current:** | AC-12 | Control of resistive loads and static loads with opto-coupler isolation. |
| | AC-13 | Control of static loads with transformer isolation. |
| | AC-14 | Control of weak electromagnetic loads (≤ 72 VA). |
| | AC-15 | Control of electromagnetic loads (> 72 VA). |
| **Direct current:** | DC-12 | Control of resistive loads and static loads with opto-coupler isolation. |
| | DC-13 | Control of DC electromagnets. |
| | DC-14 | Control of DC electromagnets having economy resistors. |

In fact some applications, and the specific criteria characterizing the various loads controlled by contactors, may modify the utilization characteristics of the contactors. The main applications concerned are:

**Capacitor bank switching**

Account must be taken of high peaks when the current is made and of harmonic currents during continuous duty. For this application, IEC publication 60947-4-1 stipulates utilization category AC-6b. The operational currents or powers acceptable for the contactors are determined by our electrical tests; IEC publication 60947-4-1 gives the calculating formula for determining the operational current (Table 9).

**Transformer switching**

Account must be taken of the peaks due to magnetization phenomena when the current is made.
For this application, IEC publication 60947-4-1 stipulates utilization category AC-6a. The operational currents or powers acceptable for the contactors are determined using the values obtained for AC-3 or AC-4 category tests and the calculating formula given in IEC 60947-4-1 (Table 9).

**Lighting circuit switching**

The current peaks occurring on energization of the circuit and the power factor depend on the type of lamps, the connection mode and whether or not there is compensation.
For this application, IEC publication 60947-4-1 stipulates two standard utilization categories:
AC-5a for discharge lamp switching.
AC-5b for incandescent lamp switching.

**Slip-ring motor switching**

The contactors used for short-circuiting rotor resistors can be used for rotor voltages up to 2 times the rated operational voltage.
The conditions of use of rotor contactors depend on the connection mode of the main poles. IEC 60947-4-1 stipulates AC-2 utilization category for startor contactor.

# Standards and utilization categories

## Utilization categories (cont.)

**DC power circuit switching**

Arc suppression is more difficult in direct current than in alternating current. Higher the time constant and voltage, heavier the breaking conditions: consequently several poles have to be connected in series.

**AC high current circuit switching**

Possibility of increasing performances by connecting poles in parallel.

**Circuit switching during temporary and intermittent duty**

In these cases higher operational currents are acceptable.

**Influence of the length of the conductors used in the contactor control circuit**

According to the operational voltages, the cross-sectional areas, the coil consumption and the control layout, difficulties due to line resistances and capacitances may appear during contactor closing and opening orders.

## Making and breaking conditions for utilization categories

| Utilization category | | Durability test conditions | | | | | | Occasional operation<br>Making and breaking capacities - 50 operating cycles | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Making conditions | | | Breaking conditions | | | Making conditions | | | Breaking conditions | | |
| | | I/Ie | U/Ue | Cos. ϕ or L/R (ms) | I/Ie | U/Ue | Cos. ϕ or L/R (ms) | Ic/Ie | Ur/Ue | Cos. ϕ or L/R (ms) | Ic/Ie | Ur/Ue | Cos. ϕ or L/R (ms) |
| **Contactors for AC circuit switching** | | | | | | | | | | | | | |
| AC-1 | | 1 | 1 | 0.95 | 1 | 1 | 0.95 | 1.5 | 1.05 | 0.8 | 1.5 | 1.05 | 0.8 |
| AC-2 | | 2.5 | 1 | 0.65 | 2.5 | 1 | 0.65 | 4 | 1.05 | 0.65 | 4 | 1.05 | 0.65 |
| AC-3 | Ie ≤ 17 A | 6 | 1 | 0.65 | 1 | 0.17 | 0.65 | 10 | 1.05 | 0.45 | 8 | 1.05 | 0.45 |
| | 17 < Ie ≤ 100 A | 6 | 1 | 0.35 | 1 | 0.17 | 0.35 | 10 | 1.05 | 0.45 | 8 | 1.05 | 0.45 |
| | Ie > 100 A | 6 | 1 | 0.35 | 1 | 0.17 | 0.35 | 10 | 1.05 | 0.35 | 8 | 1.05 | 0.35 |
| AC-4 | Ie ≤ 17 A | 6 | 1 | 0.65 | 6 | 1 | 0.65 | 12 | 1.05 | 0.45 | 10 | 1.05 | 0.45 |
| | 17 < Ie ≤ 100 A | 6 | 1 | 0.35 | 6 | 1 | 0.35 | 12 | 1.05 | 0.45 | 10 | 1.05 | 0.45 |
| | Ie > 100 A | 6 | 1 | 0.35 | 6 | 1 | 0.35 | 12 | 1.05 | 0.35 | 10 | 1.05 | 0.35 |
| **Contactors for DC circuit switching** | | | | | | | | | | | | | |
| DC-1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1.5 | 1.05 | 1 | 1.5 | 1.05 | 1 |
| DC-3 | | 2.5 | 1 | 2 | 2.5 | 1 | 2 | 4 | 1.05 | 2.5 | 4 | 1.05 | 2.5 |
| DC-5 | | 2.5 | 1 | 7.5 | 2.5 | 1 | 7.5 | 4 | 1.05 | 15 | 4 | 1.05 | 15 |
| **Contactor relays for AC circuit switching** | | | | | | | | | | | | | |
| AC-14 | (≤ 72 VA) | – | – | – | – | – | – | 6 | 1.1 | 0.7 | 6 | 1.1 | 0.7 |
| AC-15 | (> 72 VA) | 10 | 1 | 0.7 | 1 | 1 | 0.4 | 10 | 1.1 | 0.3 | 10 | 1.1 | 0.3 |

**Contactor relays for DC circuit switching**

| Utilization category | Standard operation | | | | | | Occasional operation<br>Making and breaking capacities - 50 operating cycles | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Making conditions | | | Breaking conditions | | | Making conditions | | | Breaking conditions | | |
| | I/Ie | U/Ue | T0.95 | I/Ie | U/Ue | T0.95 | Ic/Ie | Ur/Ue | T0.95 | Ic/Ie | Ur/Ue | T0.95 |
| DC-13 | 1 | 1 | 6 P(1) | 1 | 1 | 6 P(1) | 1.1 | 1.1 | 6 P(1) | 1.1 | 1.1 | 6 P(1) |
| DC-14 | – | – | – | – | – | – | 10 | 1.1 | 15 ms | 10 | 1.1 | 15 ms |

(1) The value "6 x P" is the result of an empirical relation which is estimated to represent most DC magnetic loads up to the highest limit of P = 50 W (6 x P = 300 ms). It is accepted that loads having drawn energy above 50 W are made up of weaker loads in parallel. As a consequence, the 300 ms value must form the highest limit whatever the value of the power drawn.

**Key:**

**U (I)** = applied voltage (current)
**Ur** = recovery voltage
**L/R** = test circuit time constant
**Ue (Ie)** = rated operational voltage (current)
**Ic** = making and breaking current expressed in DC or in AC like the r.m.s. value of the symmetrical components
**T0.95** = time required to reach 95 % of the current in steady-state conditions, expressed in milliseconds

# North American standards and utilization categories

Depending on the utilization category or intended rating for a contactor, North American standards require two main tests: an endurance test to simulate conventional device making and breaking capacity over its lifetime, and an overload test to simulate periodic conditions demanding higher making and breaking capacity than is conventional for the application. The test setups differ in regards to current, power factor, and number of electrical operating cycles.

The tables below provide a comparison of the types of load testing for contactors rated up to 100 A.

### AC load testing for contactors rated up to 100 A

| Harmonized test | | | Rating designation | Endurance (conventional) test | | | Overload (conditional) test | | | Required load marking |
|---|---|---|---|---|---|---|---|---|---|---|
| IEC | UL | CSA | | Multiple of current | Power factor | Number of cycles | Multiple of current | Power factor | Number of cycles | |
| **General use, non-inductive or slighting inductive loads, resistance furnaces and heaters** | | | | | | | | | | |
| ■ | ■ | ■ | AC-1: general use | 1 | 0.8 | 6000 | 1.5 | 0.8 | 50 | – |
| | ■ | ■ | AC resistance | 1 | 1 | 6000 | 1.5 | 1 | 50 | "Resistive" |
| | ■ | ■ | AC resistance air heating | 1 | 1 | 100000 | 1.5 | 1 | 50 | "Resistance" |
| | | ■ | AC electrical heating control | 1 | 1 | 250000 | 1.5 | 1 | 50 | – |
| **Motor loads** | | | | | | | | | | |
| ■ | ■ | ■ | AC-2: slip-ring motors | 2 | 0.65 | 6000 | 4 | 0.65 | 50 | – |
| ■ | | | AC-3: squirrel cage motors | 2 | 0.45 | 6000 | 10 for make<br>8 for make break | 0.45 | 50 make +<br>50 make break | – |
| | ■ | ■ | AC motor (across-the-line switching) | 2 | 0.40 – 0.50 | 1000 | LRA (~6) | 0.40 – 0.50 | 50 | – |
| | ■ | ■ | Elevator control, AC motor | 2 | 0.50 | 500000 | n/a | n/a | n/a | "Elevator duty" |
| ■ | ■ | ■ | AC-4: plugging, inching, jogging | 6 | 0.45 | 6000 | 12 for make<br>10 for make break | 0.45 | 50 make +<br>50 make break | – |
| **Lamps and lighting loads** | | | | | | | | | | |
| ■ | ■ | ■ | AC-5a: electric discharge lamps | 2 | 0.45 | 6000 | 3 | 0.45 | 50 | "Ballast" |
| ■ | ■ | ■ | AC-5b: incandescent lamps | 1 | Lamp | 6000 | 1.5 | Lamp | 50 | "Tungsten" |
| **Transformers and capacitors** | | | | | | | | | | |
| ■ | | | AC-6a: transformers | The manufacturer shall verify the AC-6a rating by testing with a transformer, or may derive the rating from the values for AC-3. | | | | | | |
| ■ | | | AC-6b: capacitors | Capacitive ratings may be derived by capacitor switching tests or assigned on the basis of established practice and experience. | | | | | | |
| | ■ | ■ | Capacitive switching (kVar) | 1 | Capacitor | 6000 | 1.5 | Capacitor | 50 | – |
| **Hermetic refrigerant compressor motors** | | | | | | | | | | |
| ■ | ■ | ■ | AC-8a: hermetic refrigerant compressor | 1 | 0.8 | 30000 | 6 | 0.45 | 50 | "Hermetic refrigeration compressor" |
| ■ | ■ | ■ | AC-8b: hermetic refrigerant compressor (recycle rating) | 6 | 0.45 | 6000 | 6 | 0.45 | 50 | – |

Note: the information above is an overview of UL 60947-4-1 tables 1, 7, 10, 5.4.1DV.1.1, 8.2.4.1DV.1.1, and 8.2.4.2DV.1.1 and is intended for comparison purposes only.

### DC load testing for contactors rated up to 100 A

| Harmonized test | | | Rating designation | Endurance test | | | Overload test | | | Required load marking |
|---|---|---|---|---|---|---|---|---|---|---|
| IEC | UL | CSA | | Multiple of current | L/R ms | Number of cycles | Multiple of current | L/R ms | Number of cycles | |
| **General use, non-inductive or slighting inductive loads, resistance furnaces and heaters** | | | | | | | | | | |
| ■ | ■ | ■ | DC-1: general use | 1 | 1 | 6000 | 1.5 | 1 | 50 | – |
| | ■ | ■ | DC resistance | 1 | 1 | 6000 | 1.5 | 1 | 50 | "Resistive" |
| | ■ | ■ | DC resistance air heating | 1 | 1 | 100000 | 1.5 | 1 | 50 | "Resistance" |
| **Motor loads** | | | | | | | | | | |
| ■ | | | DC-3: shunt motors | 2.5 | 2 | 6000 | 4 | 2.5 | 50 | – |
| | ■ | ■ | DC motor (across-the-line switching) | 2 | n/a | 1000 | 10 | n/a | 50 | – |
| | ■ | ■ | Elevator control, DC motor | 2 | n/a | 500000 | Not applicable | | | "Elevator duty" |
| ■ | | | DC-5: series motors | 2.5 | 7.5 | 6000 | 4 | 15 | 50 | – |
| **Lamps and lighting loads** | | | | | | | | | | |
| ■ | ■ | ■ | DC-6: incandescent lamps | 1 | Lamp | 6000 | 1.5 | Lamp | 50 | "Tungsten" |

Note: the information above is an overview of UL 60947-4-1 tables 1, 7, 10, 5.4.1DV.1.1, 8.2.4.1DV.1.1, and 8.2.4.2DV.1.1 and is intended for comparison purposes only.

# Degrees of protection

**General**

In an installation, the degree of protection required for electrical equipment depends on the environmental characteristics. The degree of protection, ensured by the enclosure of equipment or by the cubicle containing the equipment is expressed by the IP code which gives the level of protection against access to hazardous parts, the ingress of foreign bodies and/or the ingress of water, in compliance with IEC 60529, IEC 60947-1.

Besides the IP symbol, the complete code has two figures followed (optionally) by two additional letters. A short description of the elements used in IP coding is given below.

| IP... code | Figures or letters | Specifications for installation protection | Protection of persons |
|---|---|---|---|
| **First figure** | | **Against ingress of foreign bodies** | **Against access to hazardous parts with:** |
| | **0** | No protection | No protection |
| | **1** | Diameter > 50 mm | Back of hand |
| | **2** | Diameter > 12.5 mm | Finger |
| | **3** | Diameter > 2.5 mm | Tool |
| | **4** | Diameter > 1 mm | Wire |
| | **5** | Limited protection against dust | Wire |
| | **6** | Total protection against dust | Wire |
| **Second figure** | | **Against entrance of water having a harmful effect** | |
| | **0** | No protection | |
| | **1** | Vertical dripping | |
| | **2** | Dripping at a vertical angle of < 15° | |
| | **3** | Rain at a vertical angle of < 60° | |
| | **4** | Splashing | |
| | **5** | Low pressure water jet | |
| | **6** | Powerful water jets | |
| | **7** | Temporary immersion | |
| | **8** | Permanent immersion | |
| **Additional letter (optional) for use with:** | | **Against ingress of foreign bodies** | **Against access to hazardous parts with:** |
| First figure 0 | **A** | Stopped by a barrier with a 50 mm Ø sphere | Back of hand |
| First figure 0 or 1 | **B** | Entrance of test finger limited to 80 mm | Finger |
| First figure 1 or 2 | **C** | Wire with 2.5 mm Ø and length of 100 mm | Tool |
| First figure 2 or 3 | **D** | Wire with 1 mm Ø and length of 100 mm | Wire |
| **Additional letter (optional)** | | **Specific additional information** | |
| | **H** | High voltage apparatus | – |
| | **M** | Moving parts which are moving during water test | |
| | **S** | Moving parts which are stationary during water test | |
| | **W** | Specified atmospheric conditions | |

Note: The type of enclosure or cubicle in which the equipment must be installed prevails with respect to the degree of protection.

# Climatic withstand of devices

The life time of devices are mainly influenced by series of climatic factors which cause their corrosion.

In practice, besides climatic conditions, there are other factors which may damage equipment such as fungi, insects (termites), dust, work site dirt and aggressive environment (salty or sulphurous atmosphere, etc.) which can often only be identified at the place of installation.

Climatic stress, definitions and test conditions are dealt with in national publications such as the DIN 50 series and UTE 63-100 publication which are attached to international publications such as IEC 60068.

**The test conditions are:**

| Description | Symbolization | Time of one cycle | Cycle phase time | Temperature in test chamber | Relative humidity |
|---|---|---|---|---|---|
| Humidity and variable temperature | IEC 60068-2-30 Test Db | 24 hours | 12 hours including rise in temperature | 40 °C | 95 % |
| | | | 12 hours including cooling (open device) | 25 °C | 95 % |

ABB contactors have been used for many years in the most countries, with hot and humid climates for example: Brazil, Indonesia, India or on ships. Experience has shown that ABB devices can be used in most countries throughout the world.

The climate of the country in which the apparatus is installed is not the determining choice factor.

**Account must be taken of:**

- the immediate environment of the devices (sheltered, ventilated, temperature),
- the aggressivity of the immediate atmosphere at the place of installation,
- the length and frequency of non operating periods.

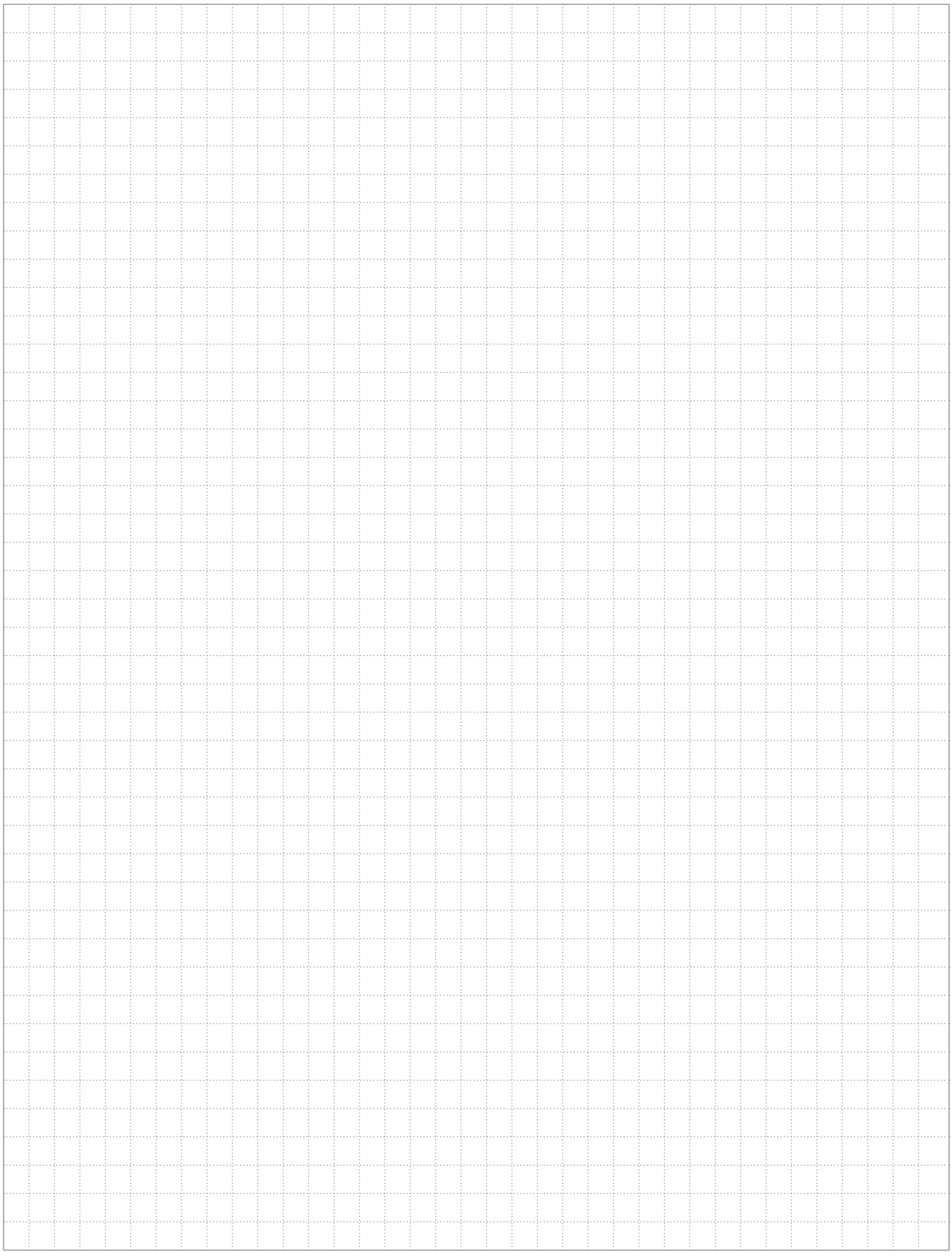
In the case of frequent condensation (i.e. the formation of condensation caused by rapid changes in temperature), heating resistors must be installed in cubicles (100 to 250 W per $m^3$ of enclosure).

**The table below gives the cases where heating is necessary.**

| Environment | | Operating conditions | Climate | Internal heating of enclosure |
|---|---|---|---|---|
| Inside premises | No running water no condensation | Continuous or not | All climates | Without |
| | With running water | Continuous | All climates | Without |
| | | Frequent or long stops | Temperate | Without |
| | | | Tropical | With |
| Outside, sheltered | No running water no condensation | Continuous or not | Temperate | Without |
| | | | Tropical | With |
| Outside or by the seaside | With running water | Continuous | All climates | Without |
| | | Frequent or long stops | Temperate | Without |
| | | | Tropical | With |

The entrance of dust, insects, dirt, etc. in devices may be prevented if the appropriate degree of protection according to IEC 60529 is chosen (See "Degree of protection" table).

# Notes



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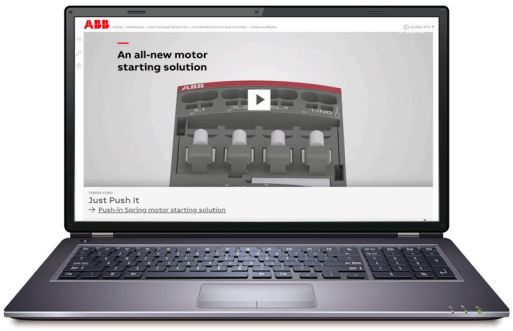
| ZP265-33 | 1SFN165423R1033 | 3/342 |
| ZP265-34 | 1SFN165423R1034 | 3/342 |
| ZP305-33 | 1SFN165823R1033 | 3/342 |
| ZP305-34 | 1SFN165823R1034 | 3/342 |
| ZP370-11 | 1SFN165423R1011 | 3/341 |
| ZP370-12 | 1SFN165423R1012 | 3/341 |
| ZP370-13 | 1SFN165423R1013 | 3/341 |
| ZP370-14 | 1SFN165423R1014 | 3/341 |
| ZP370-33 | 1SFN166023R1033 | 3/342 |
| ZP370-34 | 1SFN166023R1034 | 3/342 |
| ZP370-42 | 1SFN165423R1042 | 3/341 |
| ZP370-43 | 1SFN165423R1043 | 3/341 |
| ZPT116-11 | 1SFN164224R1011 | 3/343 |
| ZPT116-12 | 1SFN164224R1012 | 3/343 |
| ZPT116-13 | 1SFN164224R1013 | 3/343 |
| ZPT116-14 | 1SFN164224R1014 | 3/343 |
| ZPT140-11 | 1SFN164424R1011 | 3/343 |
| ZPT140-12 | 1SFN164424R1012 | 3/343 |
| ZPT140-13 | 1SFN164424R1013 | 3/343 |
| ZPT140-14 | 1SFN164424R1014 | 3/343 |
| ZPT205-11 | 1SFN165224R1011 | 3/343 |
| ZPT205-12 | 1SFN165224R1012 | 3/343 |
| ZPT205-13 | 1SFN165224R1013 | 3/343 |
| ZPT205-14 | 1SFN165224R1014 | 3/343 |
| ZPT370-11 | 1SFN166024R1011 | 3/343 |
| ZPT370-12 | 1SFN166024R1012 | 3/343 |
| ZPT370-13 | 1SFN166024R1013 | 3/343 |
| ZPT370-14 | 1SFN166024R1014 | 3/343 |
| ZW1650 | 1SFN166510R1001 | 3/343 |
| ZW2650 | 1SFN166610R1000 | 3/343 |
| ZW460 | 1SFN165710R1000 | 3/343 |
| ZW750 | 1SFN166110R1000 | 3/343 |

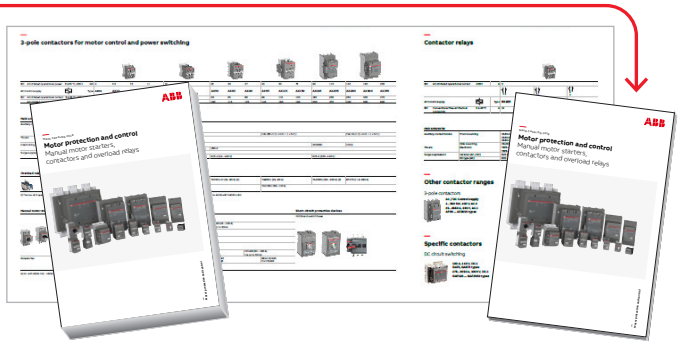
# Marketing material

http://new.abb.com/low-voltage/products/motor-protection



## Videos, prints, technical presentations and more




**Main catalog :** 1SBC100214C0201

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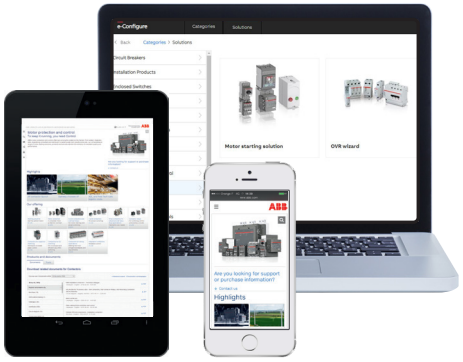
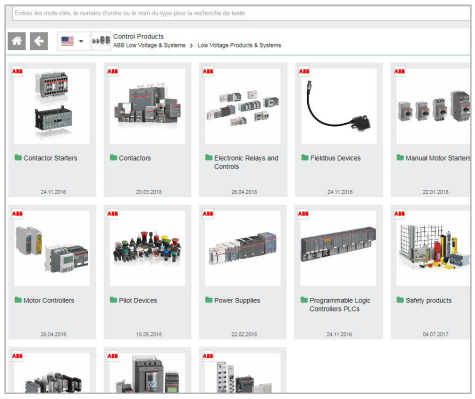
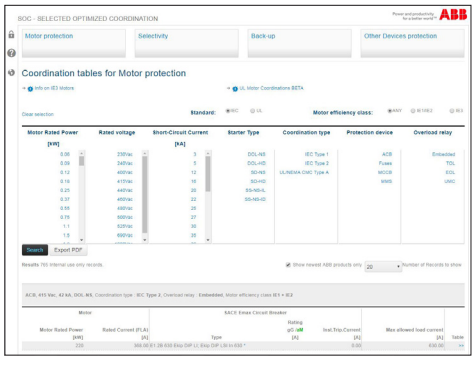
## Main online tools




**Cadenas portal:** Download 2D or 3D files according to your needs (STEP, IGES...)

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