Contactors
type AF1350 / AF1650

AF1350/AF1650 3-pole Contactors

a.c./d.c. Operated - Wide voltage range
Electronic Coil Interface

Description

The AF1350/AF1650 3-pole contactors are of the block type design.

- **Main poles and auxiliary contact blocks**
  - 3 main poles,
  - 1 N.O. and 1 N.C. auxiliary contacts (1 contact block fitted on the left hand side).
  - 2 N.O. and 2 N.C. auxiliary contacts (1 contact block fitted on each side)

  A maximum of 4 auxiliary contact blocks can be fitted on each contactor.

- **Electronic control**

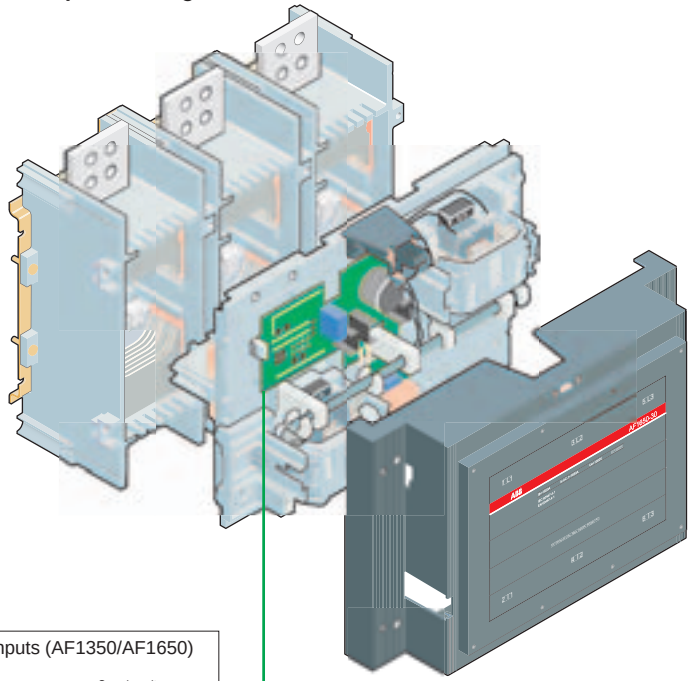
  The contactors are fitted with an electronic coil interface controlled by a specific integrated circuit developed by ABB.

  Advantages
  - Wide voltage range, 100...250 V a.c. and d.c.
  - Can manage large voltage variations
  - Reduced power consumption
  - Very distinct closing and opening
  - Noise free
  - Can withstand voltage interruptions or voltage dips in the control supply (≤ 20 ms)

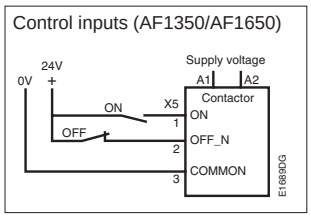
- **Control inputs**

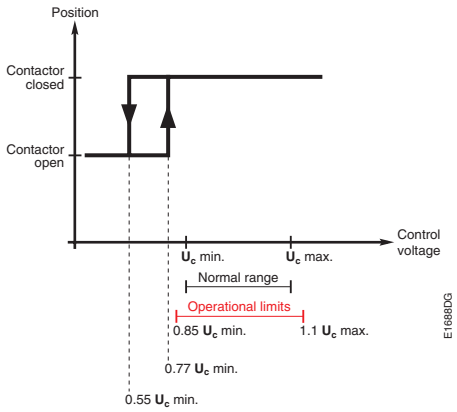
  The AF1350/AF1650 contactors are as standard equipped with low voltage inputs for control, for example by a PLC (☞ see drawing below)

AF1350/AF1650 specific design



Control circuit with electronic coil interface.





AF1350/AF1650 3-pole Contactors

a.c./d.c. Operated - Wide voltage range
Electronic Coil Interface

- **The most compact 1650A contactor**
- **Modern family design to match other ABB products**
- **Type 2 coordinated with breakers**
- **Electronic coil interface**
- **PLC operation possible**
- **cULus approved**
- **Low environmental impact thanks to Life Cycle Assessment**

Applications

AF1350 and 1650 are modern and compact 3-pole contactors designed for heavy duty industrial applications. They are designed for carrying and switching both inductive (AC-3) and resitive (AC-1) loads.
High mechanical and electrical endurance make them suitable also for motor applications.

Typical applications are as:
– Transfer switch or as main isolation contactor in generator sets
– Main contactor for static power switching
– Main or by-pass contactor in windmills
– Main or by-pass contactor for frequency drives and softstarters
– Y/D starters for example on board ships

The coil is electronically controlled with features such as wide coil voltage range, low pull-in value and low power consumption to mention some of the features. It can also be operated with a low voltage signal directly from a PLC.

These contactors are fully tested together with ABB breakers to meet type 2 co-ordination.

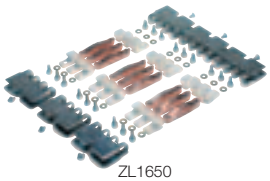
For motor applications there is a three phase electronic overload relay called E1250 DU available.

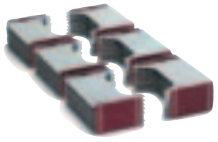
AF1350/AF1650 3-pole Contactors

Ordering details

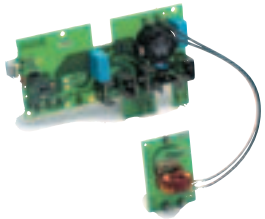

AF1350 / AF1650

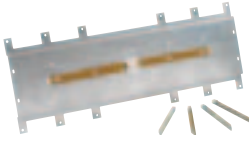

CAL 18-11

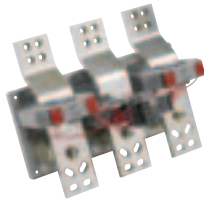

ZL1650


ZW1650


ZAF1650


ZP1650


VM1650


E1250 DU

Contactor (Terminal screws and fixing screws included)

Rated operational current AC-1 θ ≤ 40 °C A	AC-3 400 V A	Auxiliary contacts fitted		Type	Order code		Weight kg 1 piece
1350	860	1	1	**AF1350-30-11**	**1SFL 65 7001 R7011**		34.00
		2	2	**AF1350-30-22**	**1SFL 65 7001 R7022**		34.00
1650	1050	1	1	**AF1650-30-11**	**1SFL 67 7001 R7011**		35.00
		2	2	**AF1650-30-22**	**1SFL 67 7001 R7022**		35.00

Accessories

Auxiliary contact blocks (side mounting)

For contactor type	Contact blocks		Type	Order code	Packing pieces	Weight kg
AF1350, AF1650	1	1	**CAL18-11**	**1SFN 01 0720 R1011**	2	0.050
	1	1	**CAL18-11B** [1]	**1SFN 01 0720 R3311**	2	0.050

[1] CAL18-11B is a block for mounting outside a CAL18-11 block.

Main contact sets

For contactor type	Type	Order code	Packing set	Weight kg
AF1350	**ZL1350**	**1SFN 16 6503 R1000**	1	2.500
AF1650	**ZL1650**	**1SFN 16 6703 R1000**	1	3.500

Arc chutes/De-ionizing plates

For contactor type	Type	Order code	Packing set	Weight kg
AF1350, AF1650	**ZW1650**	**1SFN 16 6510 R1000**	1	4.000

Coils

For contactor type	Type	Order code	Packing set	Weight kg
AF1350, AF1650	**ZAF1650**	**1SFN 15 6570 R7026**	1	0.900

Printed circuit-board

For contactor type	Type	Order code	Packing set	Weight kg
AF1350, AF1650	**ZP1650**	**1SFN 16 6521 R1070**	1	0.300

Mechanical interlocking of two horizontal mounted contactors

For contactor type	Type	Order code	Packing set	Weight kg
AF1350, AF1650	**VM1650H**	**1SFN 03 6503 R1000**	1	6

Electronic overload relay - class 10, 20, 30 selectable

For contactor type	Type	Order code	Packing set	Weight kg
AF1350, AF1650	**E1250 DU**[2]	**1SFA 73 9001 R1000**	1	10

[2] mounting kit with busbars for contactor mounting included

AF1350/AF1650 3-pole Contactors

Technical Data

General Technical Data

Contactor type:		AF1350/AF1650
Rated insulation voltage U_i		
according to IEC 60947-4-1	V	1000
according to UL/CSA	V	600
Rated impulse withstand voltage U_{imp}.	kV	8
Standards		
Devices complying with		
- International standards		IEC 60947-1 / 60947-4-1
- European standards		EN 60947-1 / 60947-4-1
- UL		508
Certifications - Approvals		
Air temperature close to contactor		
– fitted with electronic O/L relay	°C	-25 to +70
– without electronic O/L relay	°C	-40 to +70
– for storage	°C	-40 to +70
Operating altitude	m	≤ 3000

Magnet System Characteristics

Contactor type:			AF1350/AF1650
Rated control circuit voltage ($U_C$min...U_C max)			
– at 50 Hz		V	100 ... 250
– at 60 Hz		V	100 ... 250
– d.c.		V	100 ... 250
Coil operating limits			θ ≤ 70 °C
according to IEC 60947-4-1			0.85 x U_C min...1.1 x U_C max
Drop-out voltage in % of **U_C** min. level			55 %
Coil consumption			
Average pull-in value	50 Hz	VA	1900
	60 Hz	VA	1900
	d.c.z.	W	1700
Average holding value	50 Hz	VA/W	48/17
	60 Hz	VA/W	48/17
	d.c.	W	16
Operating time			
A1-A2			
between coil energization and:			
N.O. contact closing		ms	50 ... 80
N.C. contact opening		ms	50 ... 80
between coil de-energization and:			
N.O. contact opening		ms	35 ... 55
N.C. contact closing		ms	35 ... 55
with PLC			
between coil energization and:			
N.O. contact closing		ms	40 ... 65
N.C. contact opening		ms	40 ... 65
between coil de-energization and:			
N.O. contact opening		ms	10 ... 30
N.C. contact closing		ms	10 ... 30

Main Pole - Utilization Characteristics

Contactor type:			AF1350	AF1650
Rated operational voltage U_e max.		V	1000	
Rated frequency limits		Hz	25 ... 400	
Conventional free-air thermal current I_{th}				
acc. to IEC 60947-4-1,				
open contactors θ ≤ 40 °C		A	1350	1650
with conductor cross-sectional area		mm²	2//100x5 [1]	3//100x5 [1]
Rated operational current I_e/AC-1				
for air temperature close to contactor				
	θ ≤ **40 °C**	A	**1350**	**1650**
U_e max. 1000 V	θ ≤ 55 °C	A	1150	1450
	θ ≤ 70 °C	A	1000	1270
with conductor cross-sectional area		mm²	2//100x5 [1]	3//100x5 [1]
Utilization category AC-3				
for air temperature close to contactor ≤ 55 °C				
Rated operational current I_e AC-3				
	220-230-240 V	A	860	1050
3-phase motors	380-400 V	A	860	1050
	415 V	A	860	1050
	440 V	A	860	1050
Rated operational power AC-3				
	220-230-240 V	kW	257	315
1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors	380-400 V	kW	475	560
	415 V	kW	500	600
	440 V	kW	560	670
Rated making capacity AC-3				
according to IEC 60947-4-1			10 x I_e AC - 3	
Rated breaking capacity AC-3				
according to IEC 60947-4-1			8 x I_e AC - 3	
Short-circuit protection			Product coordination with ABB circuit breaker. Please consult your nearest sales office for more information.	
Rated short-time withstand current I_{cw}				
at 40 °C ambient temp., in free air,				
from a cold state	1 s	A	10 000	12 000
	10 s	A	8 000	10 000
	30 s	A	6 000	7 500
	1 min	A	4 500	5 500
	15 min	A	1 600	2 200
Maximum breaking capacity				
cos φ = 0.35				
	at 440 V	A	10000	12000
Heat dissipation per pole I_e /AC-1		W	80	80
I_e /AC-3		W	50	50
Max. electrical switching frequency				
– for AC-1		cycles/h	60	
– for AC-3		cycles/h	60	
– for AC-2, AC-4		cycles/h	60	
Electrical durability			50 000	
Mechanical durability				
– millions of operating cycles			500 000	
– max. mechanical switching frequency		cycles/h	60	

[1] Dimensions of the bars

Amp-rating for AF1350/AF1650

The ”amp-rating” value corresponds to the ”General Use Rating” defined in specification UL508: the operational current, bot during pull-in and steady-state conditions, must not exceed the ”amp-rating” value of the device. In alternating current, the inductive cos φ of the load between 0.75 and 0.8.

Contactors	Main contacts (General Use Rating)		Auxiliary contacts		
	Nominal current	Nominal voltage	”pilot duty”	Nominal current	Nominal voltage
Type	A	V a.c.		A	V a.c.
AF1350	1350	600	A600, Q300	10	600
AF1650	1650	600	A600, Q300	10	600

3-phase motor-rating

UL Approvals stipulate the following for contactors:

- the ”3-phase motor-rating”: motor power (hp) and corresponding current (A).

- the ”amp-rating”: usual operational current (A) and nominal voltage (V).

The technical characteristics figuring on devices must be respected and have been reproduced in the table below.

Contactors	Size	Motor power P (hp) and nominal current I_e (A)					
	NEMA	U_e		U_e		U_e	
		220V/240V		440V/480V		550V/600V	
Type		hp	A	hp	A	hp	A
AF1350	–	400	954	800	954	1000	954
AF1650	8	450	1030	900	1030	1150	1050

Electronic overload relays E1250 DU for contactors AF1350/AF1650

Technical data

General technical data

Type		E1250 DU
Standards: (major European and international standards)		IEC 60947-4-1 / IEC 60947-5-1 EN 60947-4-1 / EN 60947-5-1
Approvals and certificates		CE
Rated insulation voltage U_i	V	690
Rated operating voltage U_e	V	690
Impulse withstand voltage U_{imp}	kV	6
Permissible ambient temperature		
- Storage	°C	- 25 to +70
- Operation	°C	- 25 to +70
Mounting position		Same as Contactor AF1350/AF1650
Mounting		by screws: 4 x M6
Connection terminals and attachment type		
Auxiliary contacts		
• Screw terminal (screw size)		
- with self-disengaging clamping piece		M3.5
• Tightening torque	Nm	1
• Connection cross-sections		
- single-core or stranded	mm²	2 x 0.75...4
- flexible with wire end ferrule	mm²	2 x 0.75...4
Connection terminals		
Main conductors		
• Screw terminal (screw size)		M12
Protection degree acc to IEC 60947-1/EN 60947-1		IP00

Technical data of the conducting paths

Number of conducting paths		3
Setting range	A	375 ... 1250
Tripping classes to IEC 60947-4-1/EN 60947-4-1		10, 20, 30 (adjustable)
Frequency range	Hz	50 and 60 (only for a.c. operating 3 phase)

Load rating of auxiliary contacts

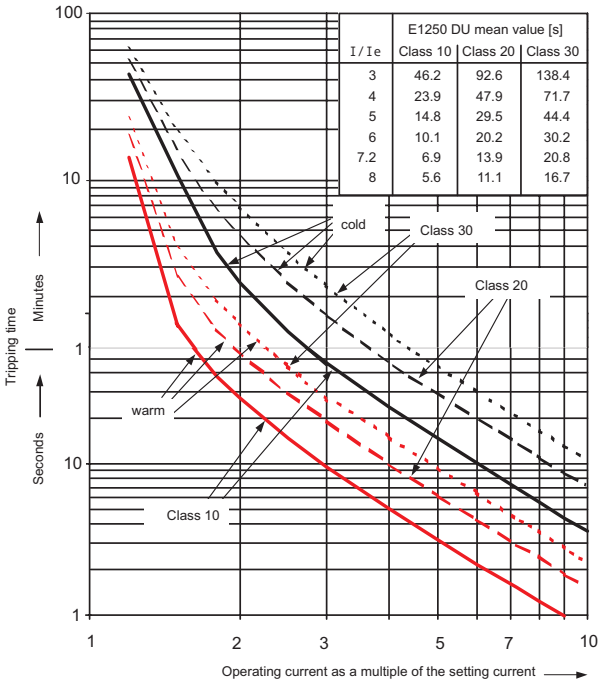
Contact		NC (95-96)	NO (97-98)
Rated operating voltage U_e	V	600	600
Rated thermal continuous current	A	6	6
Rated operating current I_e			
at AC-15 230 V	A	3	3
at AC-15 400 V	A	1.1	1.1
at AC-15 500 V	A	0.9	0.9
at AC-15 690 V	A	0.7	0.7
at DC-13 24 V	A	1.5	1.5
at DC-13 60 V	A	0.5	0.5
at DC-13 110 V	A	0.4	0.4
at DC-13 220 V	A	0.2	0.2
Short-circuit protection fuse gG	A	6	6

Description

The electronic overload realy (type E1250 DU) is available in the current range 375...1250 A. The E1250 DU is a 3-phase relay intended for a.c. circuits and is not suitable for single-phase or direct current (d.c.) circuits. The reset of the relay can be done manually or automatically. Tripping class can be set manually (class 10, 20 or 30). A busbar kit for mounting the E1250 DU to the AF1350/AF1650 contactor is included.

Tripping curves for E1250 DU electronic overload relays

Tripping characteristics 3-phase
for electronic overload relay E1250 DU



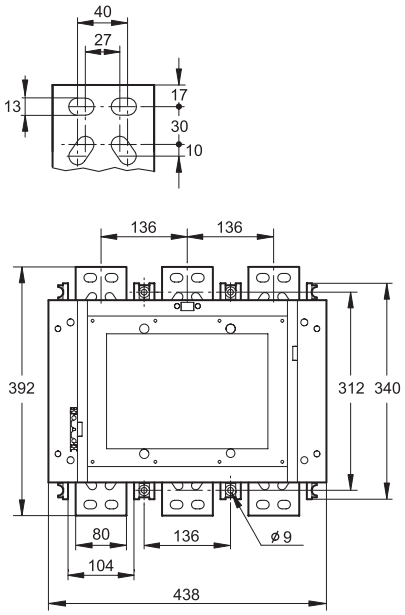
I/Ie	E1250 DU mean value [s] Class 10	Class 20	Class 30
3	46.2	92.6	138.4
4	23.9	47.9	71.7
5	14.8	29.5	44.4
6	10.1	20.2	30.2
7.2	6.9	13.9	20.8
8	5.6	11.1	16.7

Not suitable for single-phase and direct current (d.c.) motors!

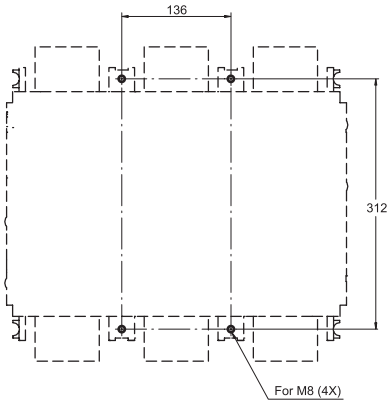
AF1350/AF1650 3-pole Contactors

Dimensions and Drilling plans

Dimensions

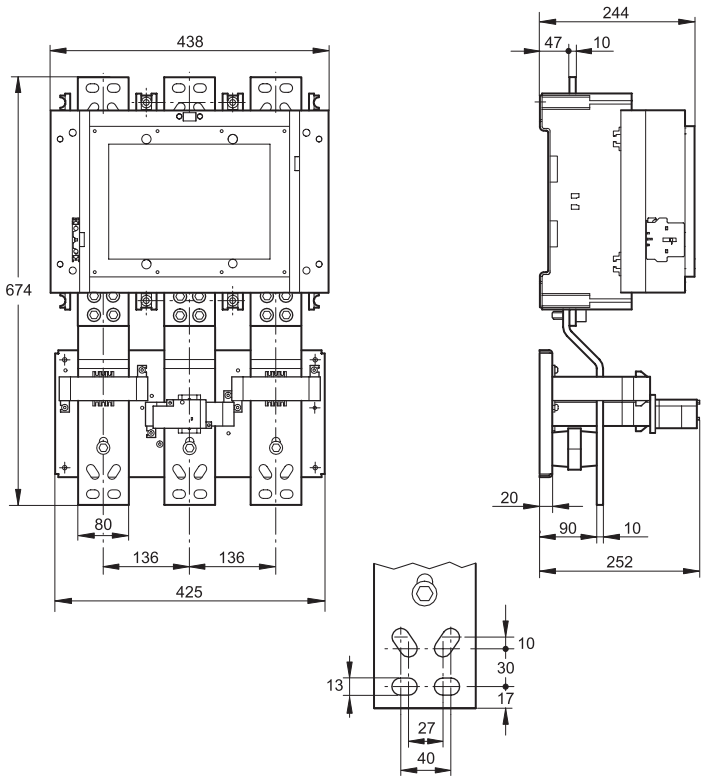


Drilling plan

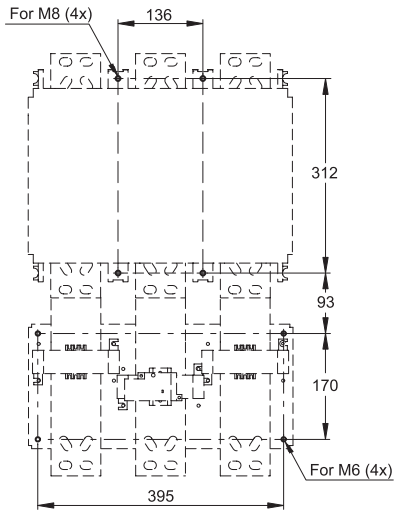


AF1350/AF1650 Contactor

Dimensions



Drilling plan

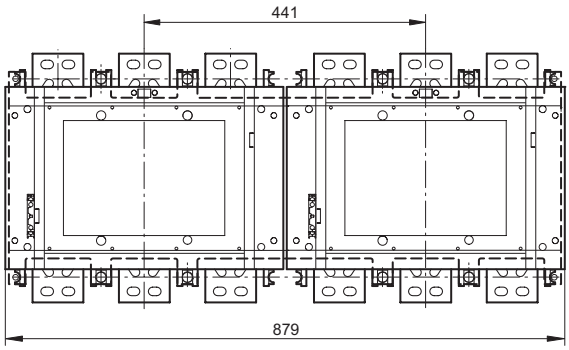


AF1350/AF1650 Contactor + E1250 DU Electronic O/L relay

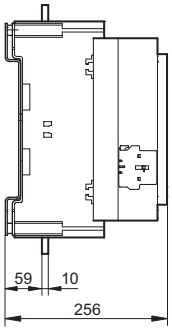
AF1350/AF1650 3-pole Contactors

Dimensions and Drilling plan
PLC wiring and mounting positions

Dimensions



AF1350/AF1650 contactor + VM1650H mechanical interlock



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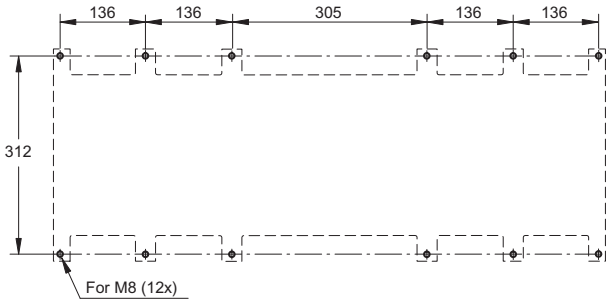
Drilling plan



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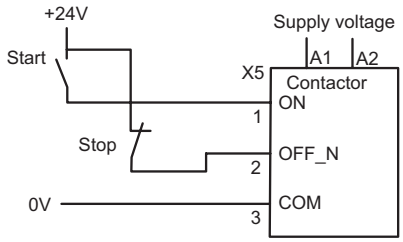
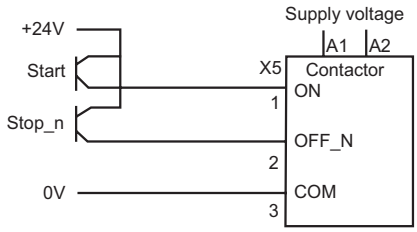
Control with logic control signals

When used with switches the wiring can be done as below.



Note: Emergency stop should disconnect A1 and A2

When used with transistor outputs the wiring can be done as below.



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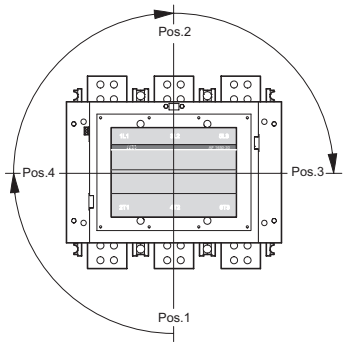
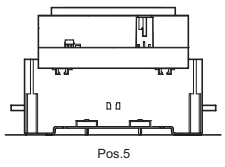
Note: Emergency stop should disconnect A1 and A2

Mounting positions





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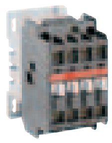
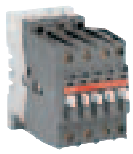
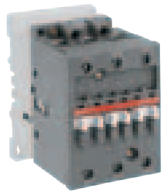
A Comprehensive product portofolio

A.., AF.., 3-pole Contactors


Types	3-Pole	A9	A12	A16	A26	A30	A40	A/AF50	A/AF63	A/AF75	A/AF95	A/AF110
Power rating AC-3, 220-240 V	IEC	2.2 kW	3 kW	4 kW	6.5 kW	9 kW	11 kW	15 kW	18.5 kW	22 kW	25 kW	30 kW
380-400 V		4 kW	5.5 kW	7.5 kW	11 kW	15 kW	18.5 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	30 kW	37 kW	40 kW	55 kW	75 kW
Rated current AC-1, 40 °C		25 A	27 A	30 A	45 A	55 A	60 A	100 A	115 A	125 A	145 A	160 A
Power 220-240 V	UL	2 hp	3 hp	5 hp	10 hp	10 hp	15 hp	20 hp	25hp	30 hp	30 hp	40 hp
440-480 V		5 hp	7.5 hp	10 hp	20 hp	25 hp	30 hp	40 hp	60 hp	60 hp	60 hp	75 hp
600 V		7.5 hp	10 hp	15 hp	25 hp	30 hp	40 hp	50 hp	75 hp	75 hp	75 hp	100 hp
General use rating		21 A	25 A	30A	40 A	50 A	60 A	80 A	90 A	105 A	125 A	140 A

Thermal/Electronic overload relay

TA 25 DU: 0.10...**0.16**, 0.16...**0.25**, 0.25...**0.4**, 0.4 ...**0.63**, 0.63 ...**1.0**, 1.0 ...**1.4**, 1.3 ...**1.8**, 1.7 ...**2.4**, 2.2...**3.1**, 2.8...**4.0**, 3.5...**5.0**, 4.5...**6.5**, 6.0...**8.5**, 7.5...**11**, 10 ...**14**, 13 ...**19**, 18 ...**25**, 24 ...**32**

TA 42 DU: 22...**32**, 29...**42**

TA 75 DU: 29...**42**, 36...**52**, 45...**63**, 60...**80**

TA 80 DU: 60...**80**

TA 110 DU: 65...**90**, 80...**110**

Auxiliary contact block

Front Mounting 1 x NO CA 5-10 1 x NC CA 5-01 (Up to A/AF110)
Side Mounting 1 NO + 1 NC CAL 5-11 CAL18-11

Timer

Pneumatic
0.1 ... 40 s TP 40
10 ... 180 s TP 180

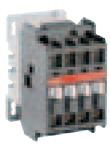
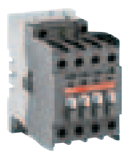
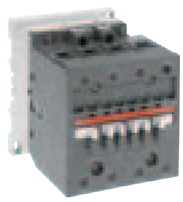
Electronic TE5S

Interlock

Mechanical and electrical VE 5-1

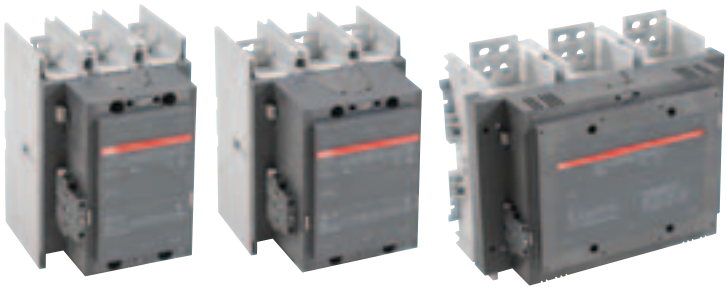
Mechanical and electrical VE 5-2

A.., EK.., 4-pole Contactors

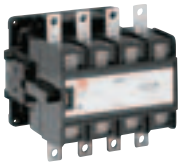




Types	4-Pole	A9	A16	A26	A45	A50	A75
Rated current AC-1, 40 °C	IEC	25 A	30 A	45 A	70 A	100 A	125 A
General use rating	UL	21 A	30 A	40 A	80 A	80 A	105 A





3-Pole	A/AF145	A/AF185	A/AF210	A/AF260	A/AF300	AF400	AF460	AF580	AF750	AF1350	AF1650
	45 kW	55 kW	59 kW	80 kW	90 kW	110 kW	132 kW	160 kW	220 kW	257 kW	315 kW
	75 kW	90 kW	110 kW	140 kW	160 kW	200 kW	250 kW	315 kW	400 kW	475 kW	560 kW
	110 kW	132 kW	160 kW	200 kW	250 kW	315 kW	355 kW	500 kW	600 kW	–	–
	250 A	275 A	350 A	400 A	500 A	600 A	700 A	800 A	1050 A	1350 A	1650 A
	50 hp	60 hp	75 hp	100 hp	100 hp	150 hp	200 hp	250 hp	300 hp	400 hp	450 hp
	100 hp	125 hp	150 hp	200 hp	250 hp	350 hp	400 hp	500 hp	600 hp	800 hp	900 hp
	125 hp	150 hp	200 hp	250 hp	300 hp	400 hp	500 hp	600 hp	700 hp	1000 hp	1150 hp
	230 A	250 A	300 A	350 A	400 A	550 A	650 A	750 A	900 A	1350 A	1650 A
	TA 200 DU	130 ... **175** 150 ... **200**	TA 450 DU	165 ... **235** 220 ... **310**							
	E 200 DU	60 ... **200**	E 320 DU	100 ... **320**		E 500 DU	150 ... **500**	E 800 DU	250 ... **800**	E 1250 DU	375 ... **1250**
	Side Mounting 1 NO + 1 NC CAL18-11										
	Electronic TE5S										
	Mechanical VM 300H					Mechanical VM 750H				Mechanical VM 1650H	


4-Pole	EK110	EK150	EK175	EK210	EK370	EK550	EK1000
	200 A	250 A	300 A	350 A	550 A	800 A	1000 A
	170 A	200 A	250 A	300 A	420 A	540 A	–

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