

APPLICATION GUIDE

Applications for OEM/Machine Builders



The background image shows an industrial environment with two large ABB FlexLoader machines. The machines are white with red accents and have 'FlexLoader' printed on them. A worker is visible on the left, kneeling and working on a machine. Another worker is visible on the right, standing near a conveyor belt. The entire image has a red overlay.

ABB's products and solutions for OEM/Machine builders customers are designed for easy installation, set-up, commissioning and maintenance.

We make it easy to select, specify, convert and install with comprehensive selection tools and in-depth technical documentation saving you time and money.

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- 02.** Motor Starting & Protection
- 03.** Load Management
- 04.** Monitoring & Control
- 05.** Command & Signaling
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- 07.** Continuous Power
- 08.** Digital Offering
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ABB solutions overview

For OEM/Machine
Builders

Why to choose ABB solutions



Enhanced reliability

Ensure reliability in your installation thanks to our preconfigured bundles of coordinated products, selected in accordance with installation standards and requirements.



Continuous operation

Avoid downtime and costly service interruptions by protecting the whole electrical circuit thanks to our solutions with advanced specifications.



Speed up your project

Save time and costs during the design and installation phase by placing together our preconfigured and ready-to-install bundles of products.



Safety and protection

ABB product specifications often exceed standard requirements, helping you to enhance safety, reduce hazards and prevent downtime using surge protection devices or Jokab safety components.

ABB Solutions for OEM/Machine builders

Solution overview

1. **Motor Starting & Control**
 - Full speed Motor Starting & Protection
 - Variable speed Motor control
2. **Load Management**
3. **Monitoring & Control**
4. **Command & Signaling**
5. **Switching & Protection**
6. **Continuous Power**
7. **Digital Offering**
8. **Automation**
9. **Robotics**



ABB Solutions for OEM/Machine builders

Scalable solutions for different types of needs

Essential

Just what you need for stand-alone machinery

General machinery (e.g. Press machine, packaging, conveyers, filling)

Pumps (stand-alone pumps)

HVAC (Commercial)

GenSets (ATS)

Elevators & Escalators

Enhanced

The right solution - even in demanding conditions

Control panels for Renewables

Battery management systems

EVCI (Electrical Vehical Charging Infrastructure)

Cranes, hoisting

Processing and Packaging

Advanced

Seamless data access and extended support over the complete product lifecycle

Pumps (e.g. water & waste water projects)

HVAC (Critical infrastructure)

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Motor Starting & Protection

Motor Starting & Protection

Solution overview

ABB's comprehensive range of motor starting solutions, products and services delivers the certainty of consistent quality and performance.

Manual Motor Starters

Manual Motor Starters, electromechanical devices mainly used to switch motors and provide fuseless protection against short-circuit, overload and phase failures.

Contactors

Contactors, Electronically or electromechanical controlled coils for direct or star-delta motor starting.

Softstarters

Softstarter, increase a motor's lifetime by protecting it from electrical stress

Variable Speed Drivers

Variable Frequency Drives, designed to provide reliable control over the speed and torque of motors

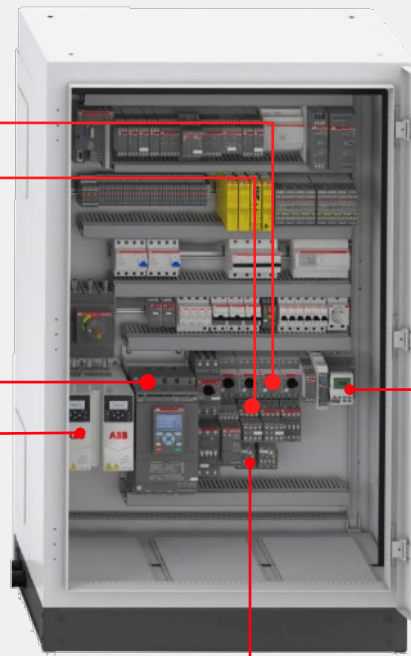
Overload Relays

Overload Relays, in combination with contactors, they provide reliable protection against overloads and phase failures for motors



Digital connectivity

for remote monitoring, diagnostic and predictive maintenance



Universal Motor Controller

Universal Motor Controller, combine motor protection and control functions, fieldbus and Ethernet communication, and fault diagnosis in a single device

Motor Starting & Protection

Product Assortment

Full speed Motor Starting & Protection

MOTOR STARTING AND PROTECTION



ELECTRONIC COMPACT STARTERS



UNIVERSAL MOTOR CONTROLLERS



NOVOLINK™



Variable Speed Motor Control

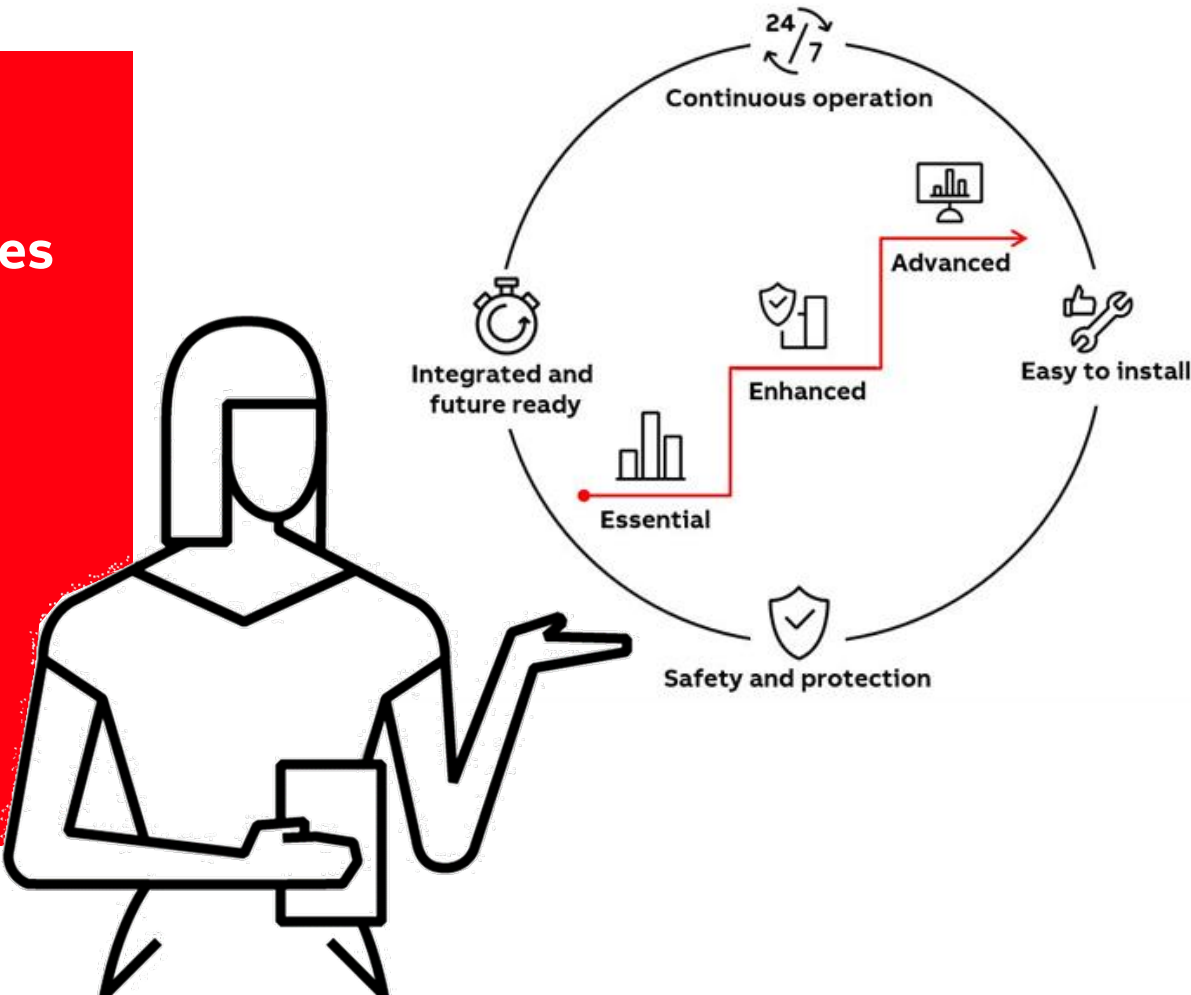
VARIABLE SPEED MOTOR CONTROL

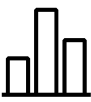


Motor Starting & Protection

Full speed Motor Starting & Protection

A scalable solution for different types of needs



 **ESSENTIAL SOLUTIONS**
For Stand-alone machinery
 Get the essentials with fast, reliable installations

 **ENHANCED SOLUTIONS**
For Complex machines
 Get robust protection with enhanced safety, control, and monitoring

 **ADVANCED SOLUTIONS**
For Smart industry
 Get ahead with smart data and predictive applications to keep your plant running

Full speed Motor Starting & Protection

Essential Solutions



ESSENTIAL SOLUTIONS for stand-alone machinery

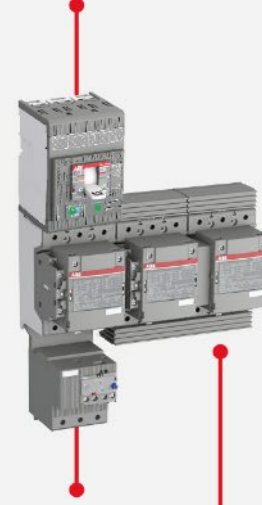
Get the Essentials right with fast and reliable installations The Essential Solution ensures that combinations of core power devices work in coordination, provides continuous operation, and guarantees easy installation. In addition, the Essential Solution typically covers requirements for stand-alone machinery like pumps, compressors, ventilation, etc.



Compressor



Ventilation



Water pump



Conveyors

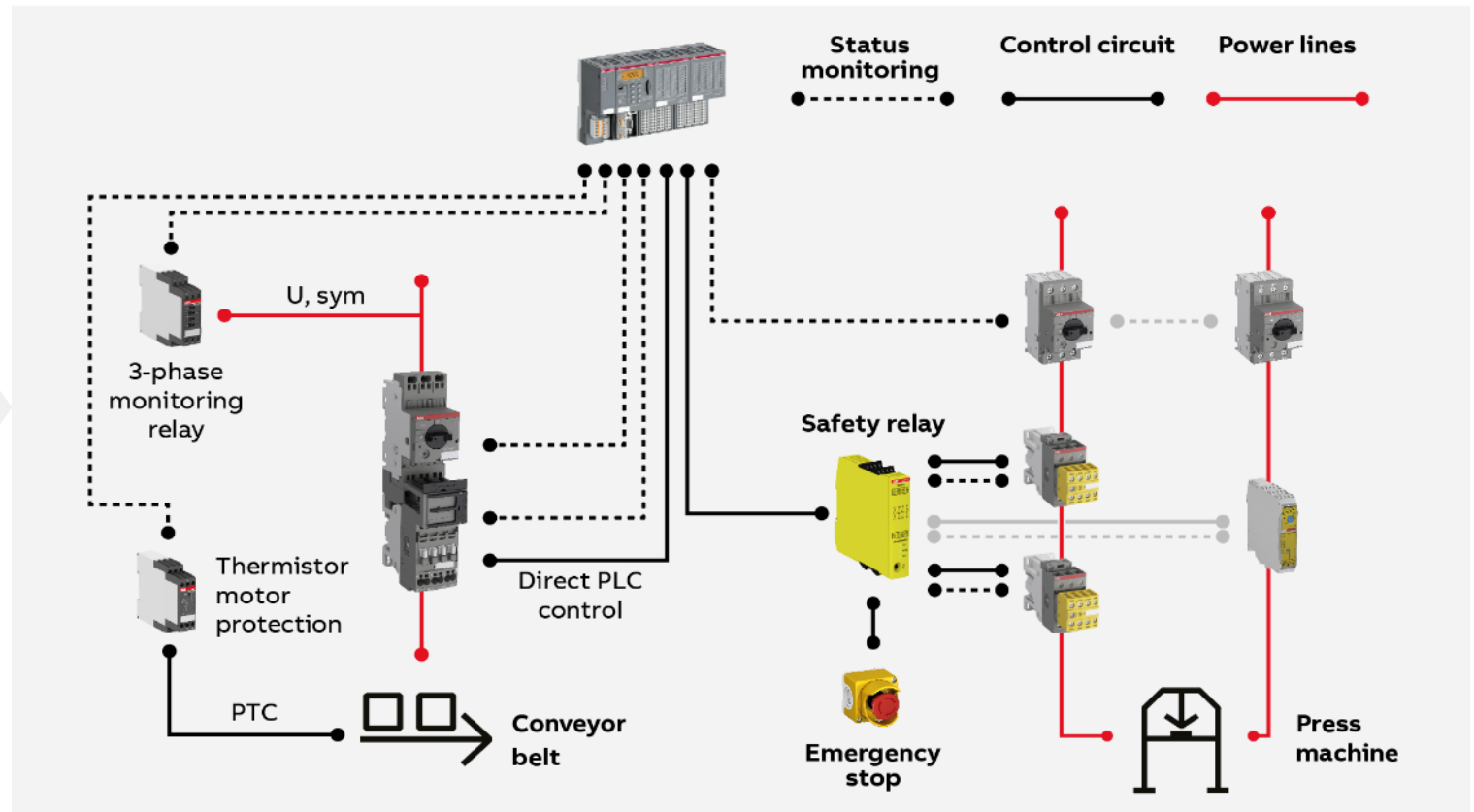
Full speed Motor Starting & Protection

Enhanced Solutions



ENHANCED SOLUTIONS for complex machinery

Get robust protection with utilizing the Enhanced Solution. We provide enhanced control, safety, and monitoring for applications in the field of discrete automation. The Enhanced Solution includes additional protection functions like Liquid level relay, twin pump alternative relay, Temperature monitoring, Thermistor motor protection relay, under or over voltage monitoring relay, safety relays, and others. Based on the request, we can address any other requirements.



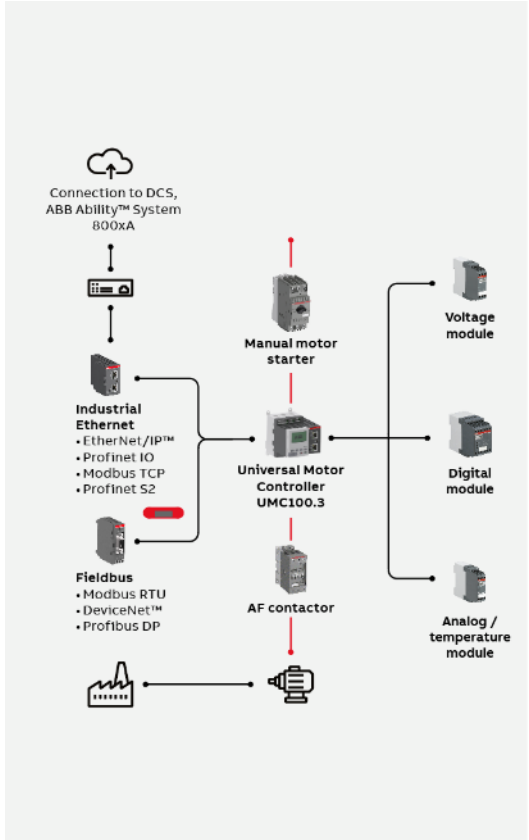
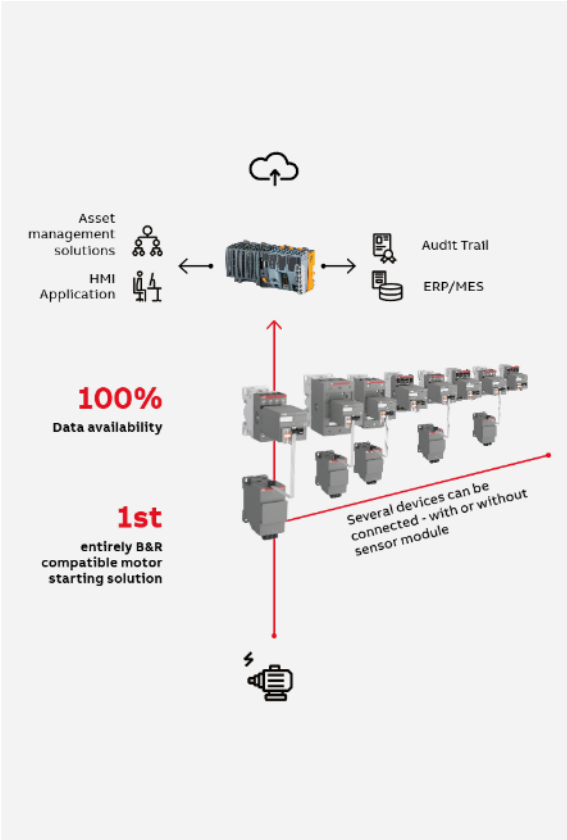
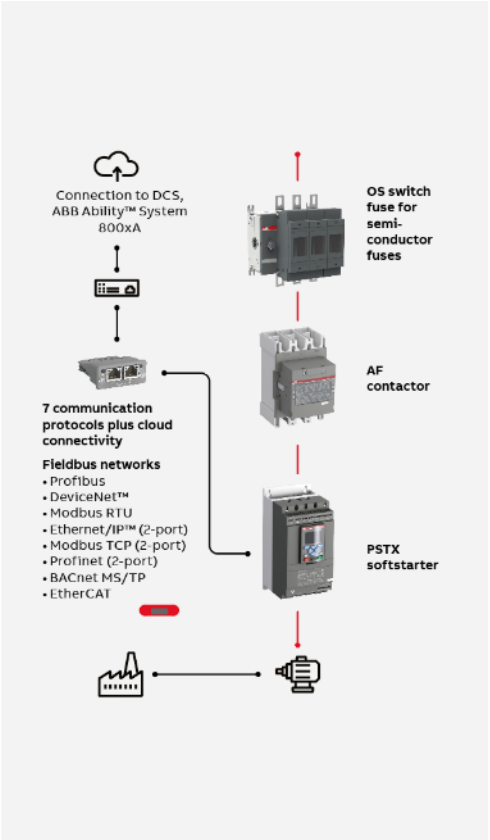
Full speed Motor Starting & Protection

Advanced Solutions



ADVANCED SOLUTIONS for smart industry

Get ahead with smart data and predictive applications, to keep your planning running. The Advanced solution includes integrated and future-ready motor protection, flexible motor control, fault diagnostics and maintenance, and supports all major communication protocols.

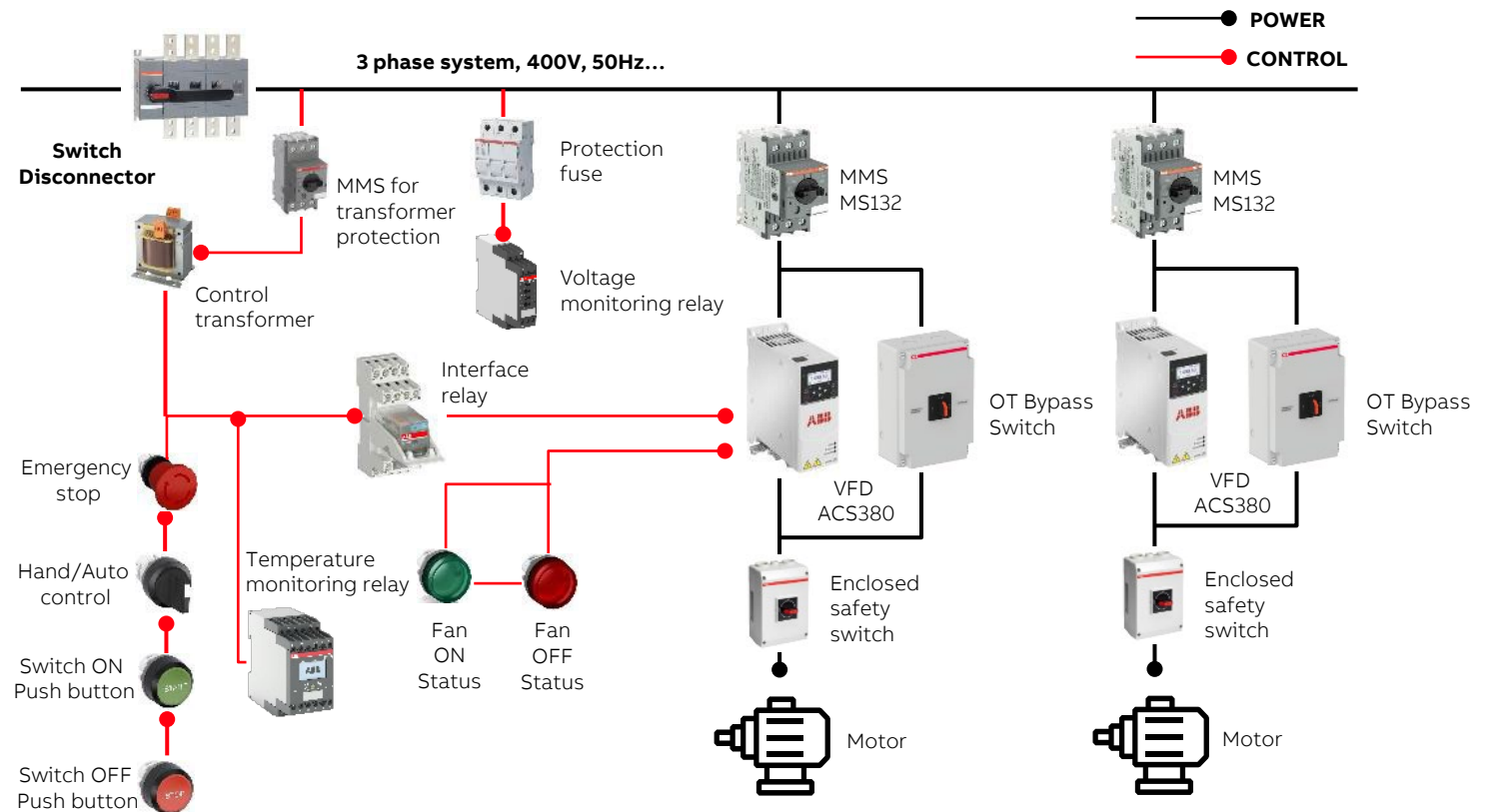


Motor Starting & protection

Variable Speed Motor Control

Premium control and design flexibility in motor control is essential. So too is dependability.

You can count on all of this in all in our machinery drives, with scalability from basic to the highly advanced machinery applications. Our direct torque control (DTC) gives you highly accurate control for virtually any motor. Our integrated safety features and ready-made application control programs are built on user-friendliness.



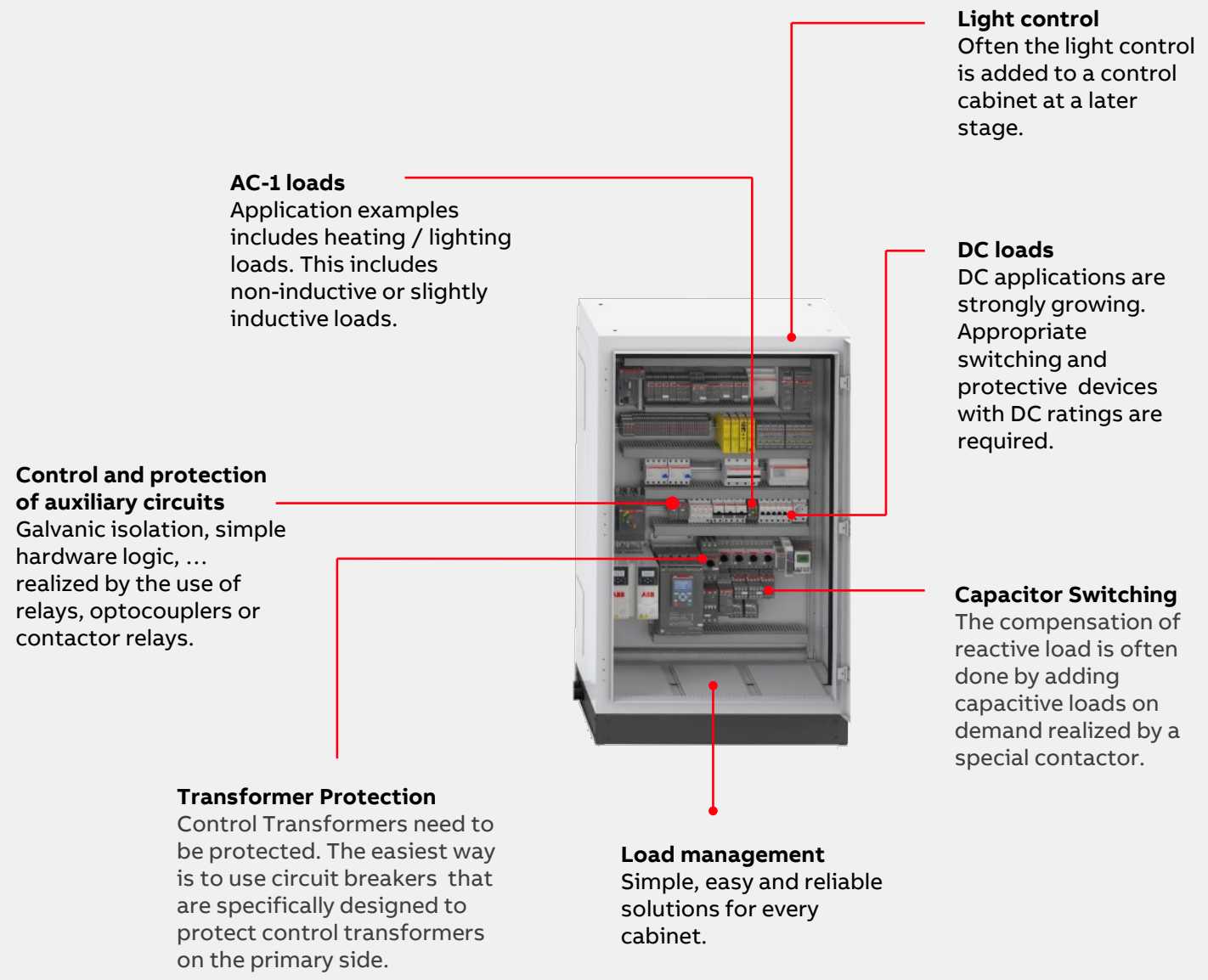
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Load Management

Load Management Solution overview

ABB bundles are the solutions to manage loads other than AC-3 under Load Management. We offer various solutions to manage demanding AC- and DC-loads, to build logics, to control and switch specific loads like lights and capacitors or provide galvanic isolation and signal separation.

Several functions are inherent of a component (and sometimes so basic that they are forgotten) but all of them are extremely important to accomplish the machine processes.



Load Management

Product Assortment

INTERFACE RELAYS AND OPTOCOUPLERS



CONTACTORS FOR DC SWITCHING



CAPACITOR SWITCHING



TRANSFORMER PROTECTION



CONTACTOR RELAYS



LAMP STARTING SOLUTIONS



Control of Auxiliary circuits

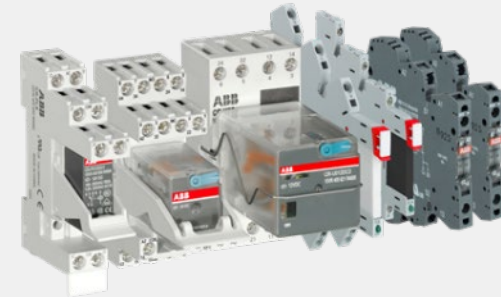
Overview

By definition interface Relays, optocouplers or contactor Relays are designed to provide information and electrical compatibility between functional components isolated from each other, not allowing for a direct connection due to high difference of potentials. A common design principle of these devices is a galvanic isolation between input and output circuits.

These devices can fulfill following tasks beside switching on and off:

- Galvanic Isolation
- Signal multiplication
- Voltage Conversion

INTERFACE RELAYS AND OPTOCOUPPLERS

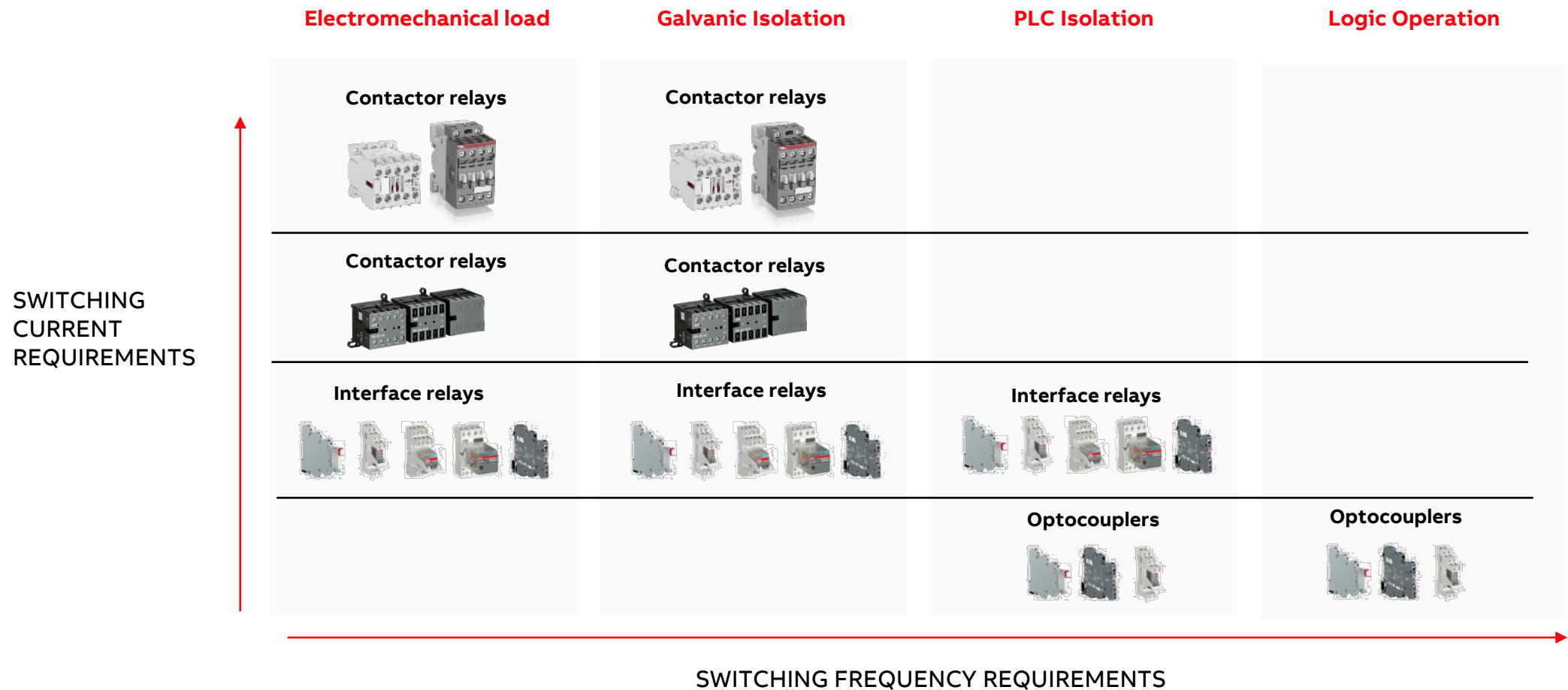


CONTACTOR RELAYS



Control of Auxiliary circuits

How to select



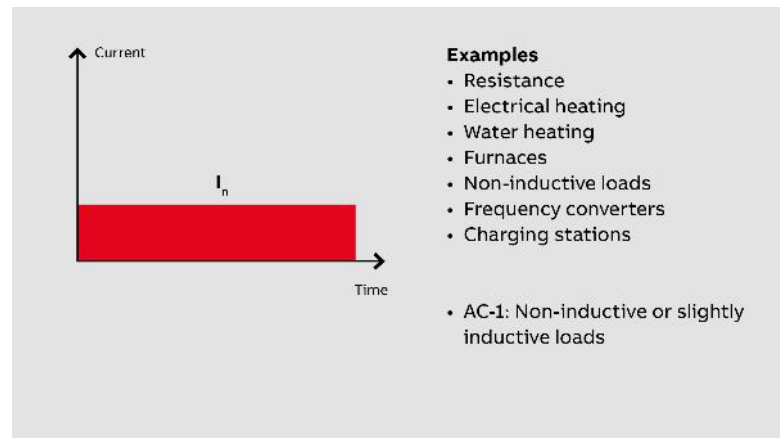
AC-1 Resistive Loads

Overview

The harmonized utilization category AC-1 covers general and resistive type loads. This includes non-inductive or slightly inductive loads, as well as resistance furnaces and heaters. Additional ratings, such as “Resistance Air Heating” and “CSA Electrical Heating Control”, which require additional electrical cycling, can be performed to further validate control devices for use in heating applications. However, the general use of the AC-1 rating is sufficient for most heating applications.

FEATURES:

- No peak current when powered
- $\cos \phi \sim 1$
- Voltage and current oscillate phase compliant
- The circuit only transmits active power
- key value I_{th}
(thermal continuous current)



4-POLE CONTACTORS

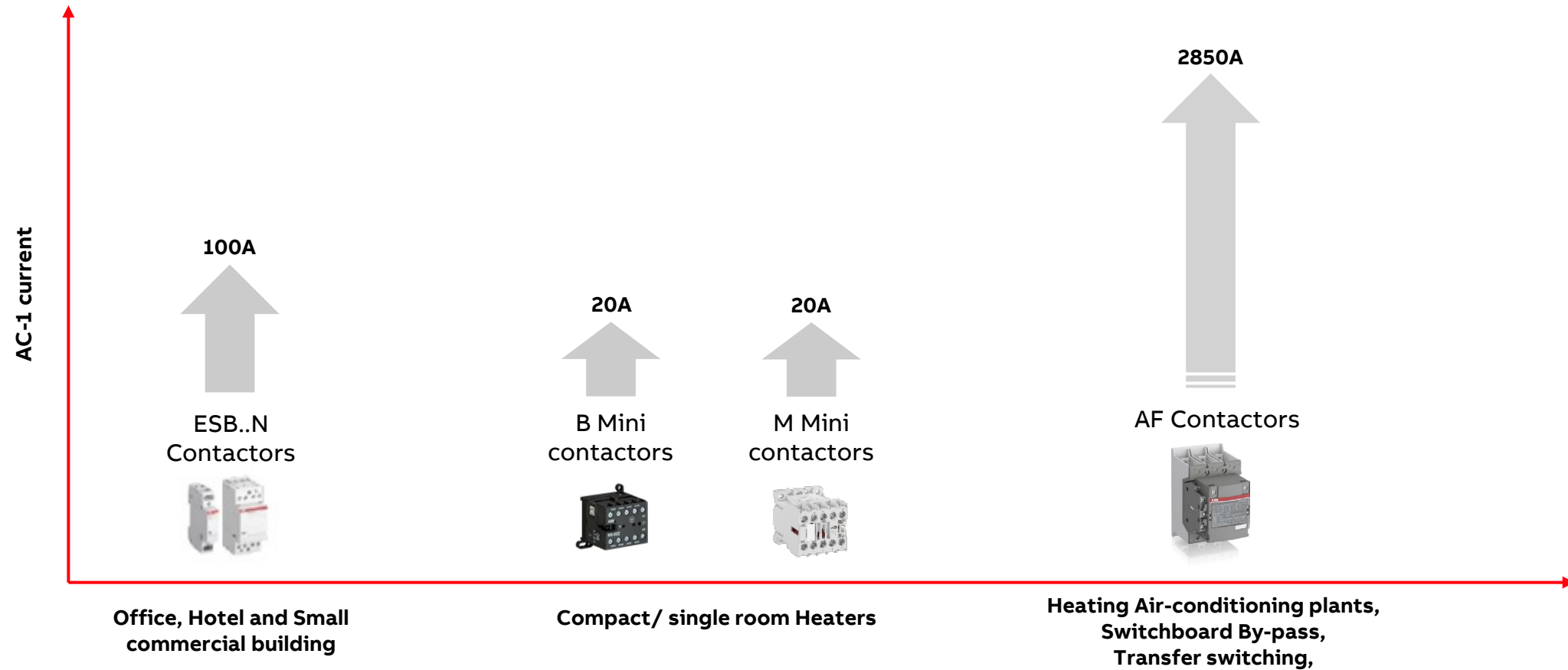


INSTALLATION CONTACTORS



AC-1 Resistive Loads

How to select



DC Loads Overview

DC switching is a rapidly growing technology driven by the energy transition.

Many new segments are arising with specific requirements as battery charging stations, e-mobility, battery storages, DC buildings, fuel cells, railway, PV systems.

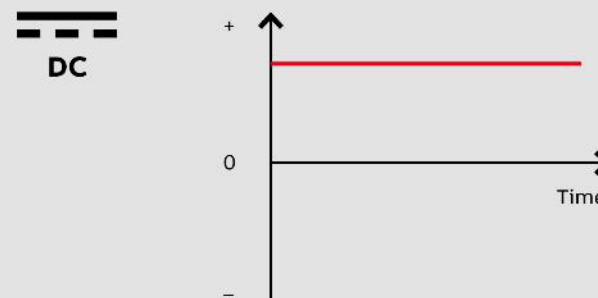
DC loads need to be handled differently compared to AC loads when it comes to switching and protecting. The mechanical opening of a DC circuit under load always leads to arcing, which must subsequently be handled and quenched. Generally, much higher forces for switching at much faster speed are required.

The following criteria will help to select the right contactor:

1. The definition of the actual application requirements
2. The inductance in the circuit
3. Bidirectional applications
4. Consideration of the short circuit
5. Mechanical and electrical service life

Special contactors are designed to manage high DC loads (>1000VDC, >200ADC)

CONTACTORS FOR DC SWITCHING



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.

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.

DC Loads

How to select

Resistive Loads

BESS

Shunt Motors (DC-3)

Series Motors (DC-5)

Photovoltaic Panel (DC-PV3)

 **Advanced**



 **Enhanced**



 **Essential**



Utilization Categories

Lighting

Overview

In industrial applications lamp loads are connected in a 3 line supply system while in private houses lamps are single line connected.

We may differentiate 3 different type of applications:

- Streetlight switching
- Lights in commercial or industrial buildings
- Greenhouses

Also the type of lamp loads can be different, some examples:

- Formerly streetlights were (big) incandescent lamps
- In offices or supermarkets luminescent lamps were often used, partly centrally or decentrally compensated
- Greenhouses bear additional requirements due to the big number of lamps switched at the sametime and the harsh environmental conditions

Several utilization categorize according to IEC are available to describe the concrete requirements. Today there is a strong Movement to electronically controlled LED lamps and new norms and measures will come up.

Utilization Category	Typical Applications	Applicable IEC norm
AC-5a	Switching of discharge lamps 60947-4-1 AC-5b Switching of incandescent lamps	60947-4-1
AC-5a	Switching of discharge lamps 60947-4-1 AC-5b Switching of incandescent lamps	60947-4-1

LAMP STARTING SOLUTIONS



Lighting

How to select



OFFICE AND SMALL
COMMERCIAL
BUILDING LIGHTS



LIGHT FOR
PRODUCTION CELLS



HOTEL ROOM



STREET LIGHT



EMERGENCY LIGHT



CONVENTIONAL
GREENHOUSE
LIGHTING



LED GREENHOUSE
LIGHTING



Advanced



Enhanced



Essential



MS132-L +
AF..L +
adapter



MS132-L /
MS132-LC
+ AF...L +
adapter



MS132-L +
AF..L



MS132-L +
AF..L



Capacitor switching

Overview

In Low Voltage industrial installations, capacitors are mainly used for reactive energy correction (improving the power factor). When these capacitors are energized, over-currents 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.

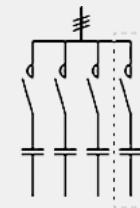


Single-step capacitor bank scheme

Use the A/AF ... 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.

CAPACITOR SWITCHING



Transformer Protection

Overview

Low voltage transformers are used to supply control 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 is required.

Inrush current of transformers

During the power up of transformers, a very high inrush current (ca. $20 \times I_n$) is generated.

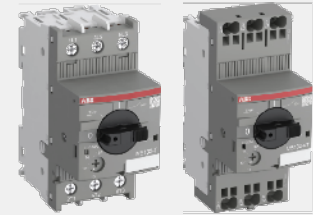
Hence, specially calibrated devices are needed for protection of transformers in order to prevent their tripping during the transformer start-up phase and precisely control primary transformer current.

Circuit breakers for transformer protection are the ideal solution to protect transformers and the installation against short circuit and overload. They are protection devices with thermal tripping elements for overload protection and electromagnetic tripping elements for short-circuit protection. Furthermore, they provide a disconnect function for safety isolation of the installation and the supply. They can be used for manual switching of loads.

Key values:

- Embedded short circuit and overload functions
- Adjusted tripping characteristics
- Selection table MS132-T with ABB control transformers available

TRANSFORMER PROTECTION



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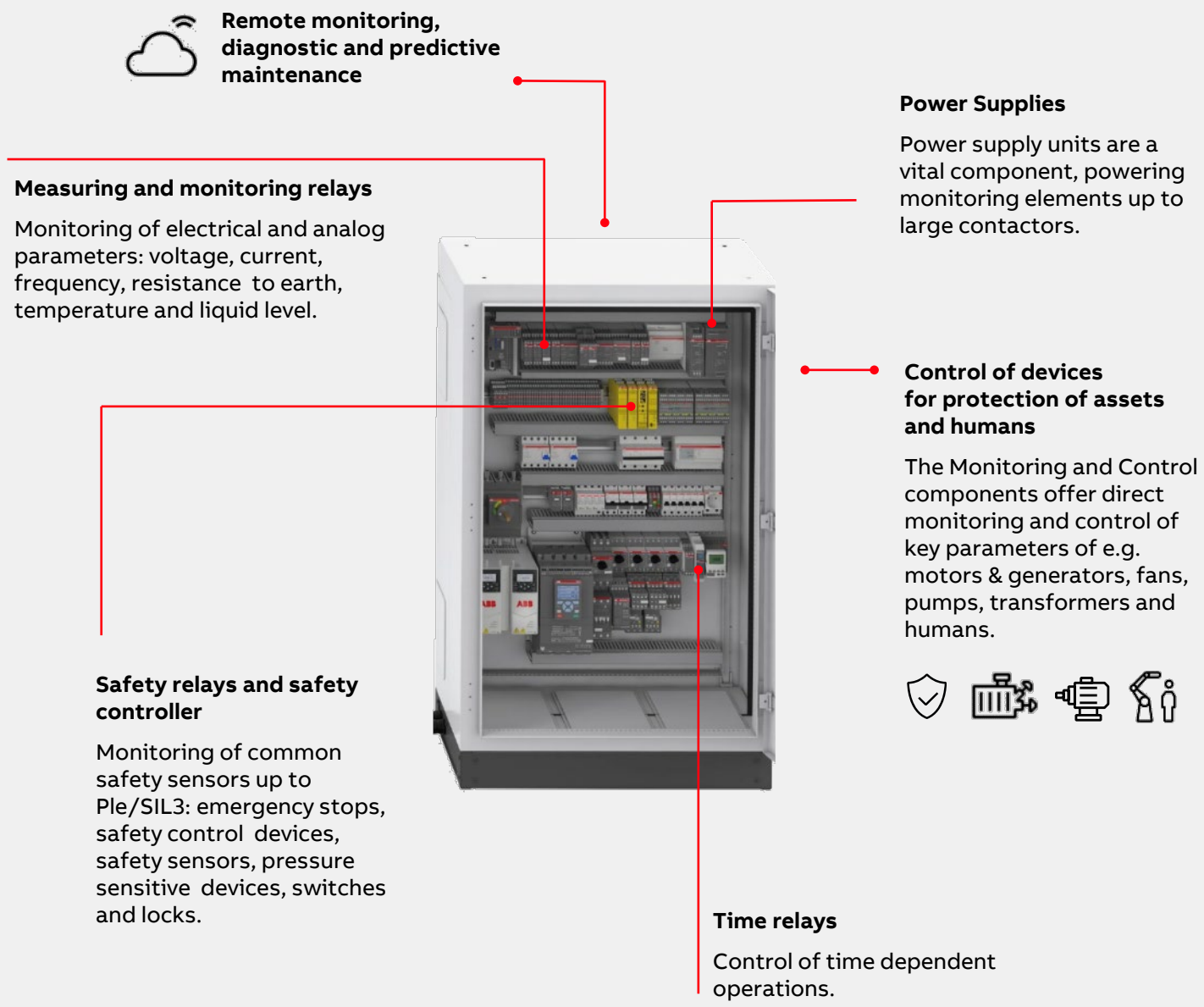
Monitoring & Control

Monitoring & Control

Solution overview

No matter which measurement or monitoring task you have to perform, we can protect your machine and ensure smooth operation.

We offer the right solution, especially where overload, temperature, liquid or other potentially harmful fluctuations occur in your automation task



Monitoring & Control

End uses

	 Safety logical units	 Time	 Three-phase voltage	 Single-phase voltage/ current	 Grid feeding	 Thermistor	 Temperature	 Insulation	 Liquid level
Motor control & protection*	●	●	●			●	●		●
Power distribution**		●	●	●	●		●	●	
Renewables		●		●	●		●	●	
Machinery	●	●	●	●		●	●		

* HVAC, water & waste water, compressors, conveyers, elevators etc.
** Commercial, industrial, infrastructure

Monitoring & Control

Product Assortment

TIME RELAYS



MEASURING AND MONITORING RELAYS



PLUTO SAFETY PLC



SAFETY RELAYS & SAFETY CONTROLLER



Monitoring & Control

How to select



Safety logical units



Time



Three-phase voltage



Single-phase voltage/ current



Grid feeding



Thermistor



Temperature



Insulation



Liquid level



Advanced

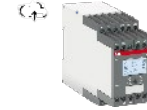
Pluto Safety Programmable Controller



CM-UFD



CM-TCN.012 with Modbus RTU



Enhanced

Sentry Safety Relays, Vital Safety Controller



CT-S



CM-PxS/CM-MPx



CM-SxS/CM-ExS



CM-MSS



CM-TCN.011/CM-TCS



CM-IWx



CM-MSS



Essential

CT-C / CT-D



CM-PxE



CM-MSE



CM-MSE



Power supply

Overview

The CP range offers the latest technology in a more compact package. Modern power supply units are a vital component in machinery.



Power supply Requirements



Type of Loads

Particularly in case of difficult loads, e.g. motors or large contactors, the power supply must provide sufficient reserves in order to be able to drive high inrush currents.

All power supplies providing power reserves (e.g. CP-C.1 and CP-S.1 series) are able to start such kinds of loads reliably without any need for oversizing.

I need to monitor the Power Supply

The 24 V power supplies > 18 W of the CP-E series, CP-C.1 and CP-S.1 are equipped with a “OUTPUT OK” signaling output as a standard feature. CP-C.1 also has an additional transistor alarm output signal “I > I_R”.

Is Power Factor Correction required?

Since 1 January 2001, all power supplies above 75 W that can be directly connected to the mains must meet the limit values for harmonic currents according to IEC/EN 61000- 3-2.

However, PFC can also make sense when the power supply is not directly connected to the public electricity supply, e.g. if the electric system contains consumers that are sensitive to mains pollutions caused by the power supply.

All power supplies of the CP-C.1 series are equipped with active PFC.

The new CP-S.1 range offers active PFC with 120W up to 960W variant.

Power Supplies

How to select

	Power Distribution (Buildings & Commercial)	Elevators and Escalators	Power Distribution (Industrial & Infrastructure)	General Machinery	Renewables Control Panels	HVAC	Pumps	HVAC 
<div><div>Advanced</div></div>			<div>CP-S.1</div> 	<div>CP-C.1</div> 	<div>EPD24</div> 			
<div><div>Enhanced</div></div>	<div>CP-D + CP-D RU</div> 	<div>CP-S.1</div>  <div>CP-C.1</div>  <div>CP-C.1-A-RU</div> 	<div>CP-S.1</div> 	<div>CP-C.1</div> 	<div>CP-B</div> 	<div>CP-C.1-A-RU</div> 	<div>CP-C.1-C</div>  <div>CP-C.1-A-RU-C</div> 	<div>CP-C.1-C</div>  <div>CP-C.1-A-RU-C</div> 
<div><div>Essential</div></div>	<div>CP-D</div> 	<div>CP-D</div>  <div>CP-E</div>  <div>CP-T</div> 	<div>CP-D</div>  <div>CP-E</div>  <div>CP-T</div> 			<div>CP-S.1</div>  <div>CP-C.1-C</div> 	<div>CP-C.1-C</div> 	

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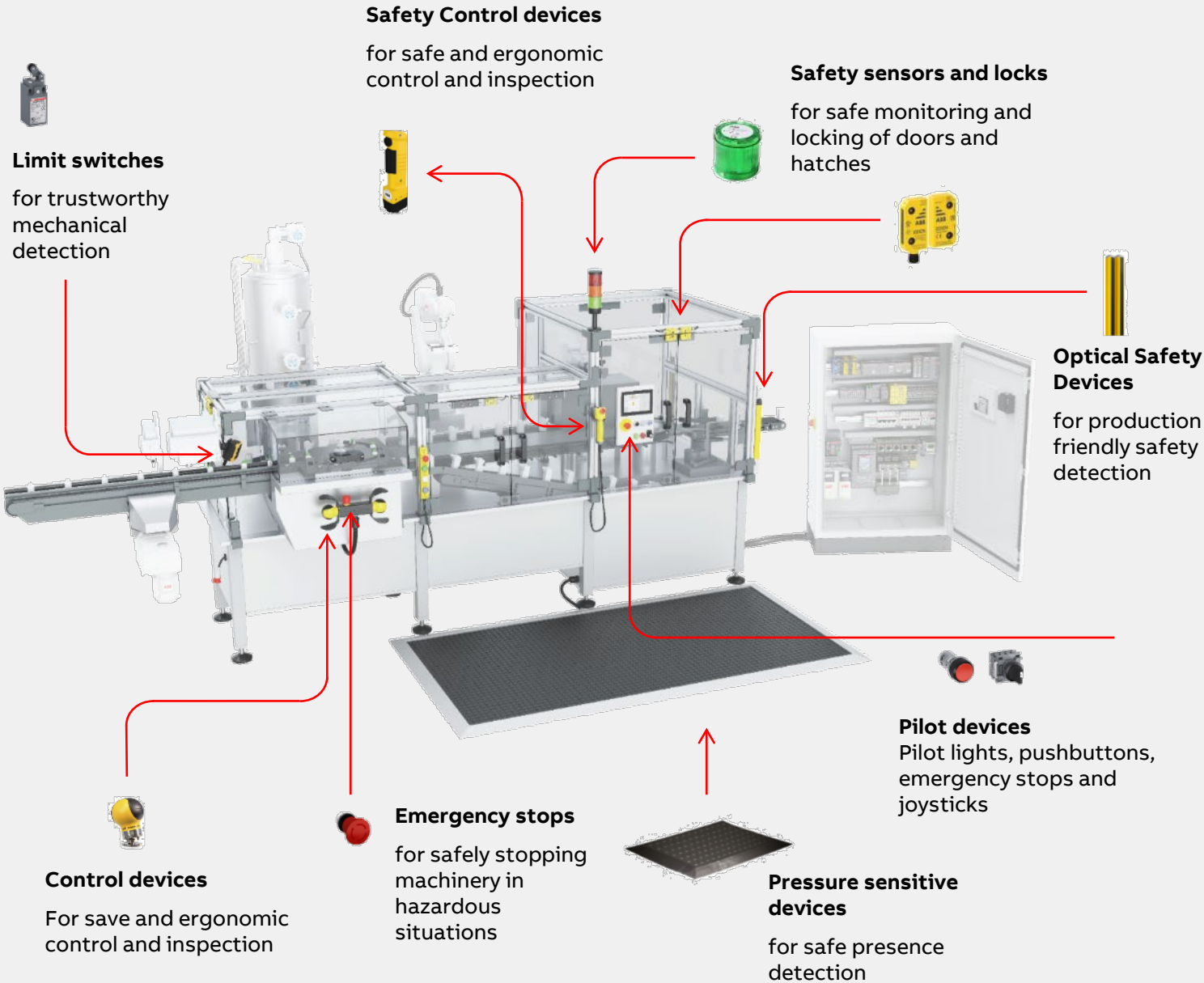
Command & Signaling

Command & Signaling

Solution overview

Trust is everything and in industrial environments. It is essential to have human-machine interfaces you can count on. Whenever you start or stop a process, the response must be assured.

Sensors, switches and locks are used to control the gates and hatches around hazardous machinery, and to monitor the position of a machine.



Command & Signaling

Product Assortment

PILOT DEVICES



CONTROL DEVICES



OPTICAL SAFETY DEVICES



LIMIT SWITCHES



SENSOR SWITCHES AND LOCKS



LIGHT TOWERS AND BEACONS



EMERGENCY STOPS



Command & Signaling

How to select

Command									Signaling		
Process		Human							Light		Sound
		Direct interface						Indirect interface			
Limit switches	Safe encoders	Pushbutton/ switches	Emergency stops	Cable operated switch	Safety control devices	Pressure sensitive devices	Switches and locks	Safety sensors	Stack lights	Pilot light	Buzzers
											

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Switching & Protection

Switching & Protection

Solution overview

ABB offers you a comprehensive portfolio of solutions for use in the control cabinet, from feeding into the control cabinet via circuit breakers and switch-disconnectors to the supply of power packs for various devices at the field level.

Overvoltage Protection

Overvoltage Protection, Large single surge events, such as lightning, can reach hundreds of thousands of volts and can cause immediate or intermittent equipment failure.

Residual Current Protection

Residual Current Protection, accurate protection of people and electrical equipment against leakage currents can be achieved by installing Residual Current Devices.

Circuit Breakers

Circuit Breakers, rather than just offering standalone protection, are key elements of the system that gives complete flexibility, extreme breaking capabilities and reliable performance.



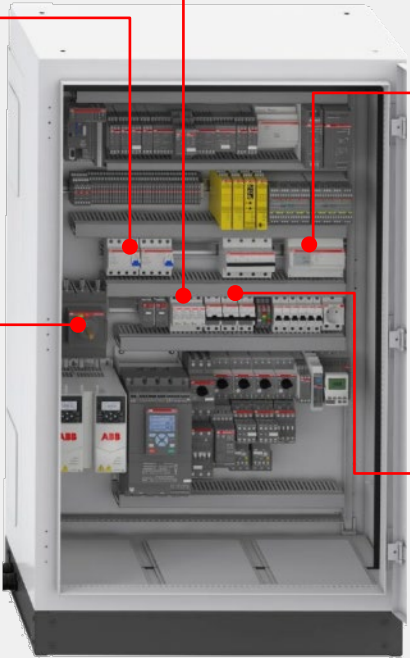
Remote monitoring, diagnostic and predictive maintenance

Measuring Devices

Measuring devices, energy use has a huge impact on the cost of operations and facility managers are aware that energy measurement and power monitoring systems are important to reduce energy costs.

Automatic Circuit Breakers

Automatic Circuit Breakers, ensure electrical safety by protecting electrical installations against overloads and short circuits.



Switching & Protection

Product Assortment

CIRCUIT BREAKERS



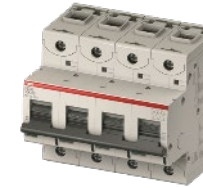
SWITCHES



FUSEGEAR



HIGH PERFORMANCE CIRCUIT BREAKERS



ENERGY EFFICIENCY DEVICES



SURGE PROTECTIVE DEVICES



RESIDUAL CURRENT DEVICES



MINIATURE CIRCUIT BREAKERS



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Continuous Power

Continuous Power

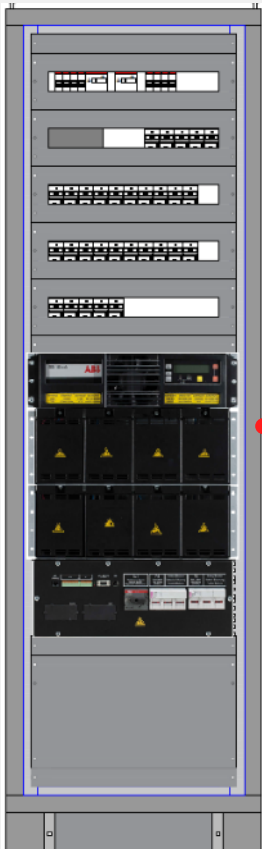
Solution overview

Continuous Power is everything in terms of products and functionalities in installations tasked with supplying energy, protecting people and loads.

ABB cutting edge solutions achieve fast coordination between devices, thus avoiding stress and damage to the electrical distribution system by excluding only the minimum zone affected by the fault

DPA UPScale UPS

Modular concept benefits for maintenance and allowing efficient service



Single Phase UPS

Guarantee reliable power for critical single-phase applications, ideal for process control automation

Continuous Power

Product assortment

Need to Stop process under control?

DPA UPSCALE

High efficiency modular UPS unit

The DPA UPScale UPS system, independent of the rack, is one of the most popular UPS systems customizable on the market and provides the best technical solutions e commercial to meet individual power protection needs.

ABB's DPA UPScale is available for high density applications requiring an all-in-one power protection solution that includes UPS modules, maintenance bypass, batteries, I/O terminals and communications. A single system delivers power protection from 10 kW to 200 kW in 10 kW or 20 kW modular steps.

For a continuously growing mid- sized infrastructure, DPA UPScale can be paralleled horizontally to increase the capacity up to 400 kW. The ability to increment the power as the critical load grows optimizes the operating efficiency and reduce the initial cost for installations.



Need to keep communications?

Uninterruptible power supply (UPS)

The UPS system guarantees constant and high-quality energy, without power interruption. ABB offers a complete range of UPS for the protection of applications from low to extremely high voltages.

The range includes single-phase UPS, modular three-phase UPS, three-phase monolithic UPS, industrial UPS and voltage stabilizers and UPS for MV/LV transformer substations compliant with CEI-016 standards.

Thanks to the remote monitoring systems, updated and detailed information on UPS operation can be accessed directly via the web, including setup, internal alarms, and operating conditions. The system notifies alarms and critical events via e-mail or SMS.



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Digital Offering

Digital Offering

ABB Ability™

Improve performance, productivity, efficiency and safety of your equipment throughout its life cycle thanks to ABB Ability™. Our innovations allow you to know your facilities better, to act faster and better, all in a collaborative way.

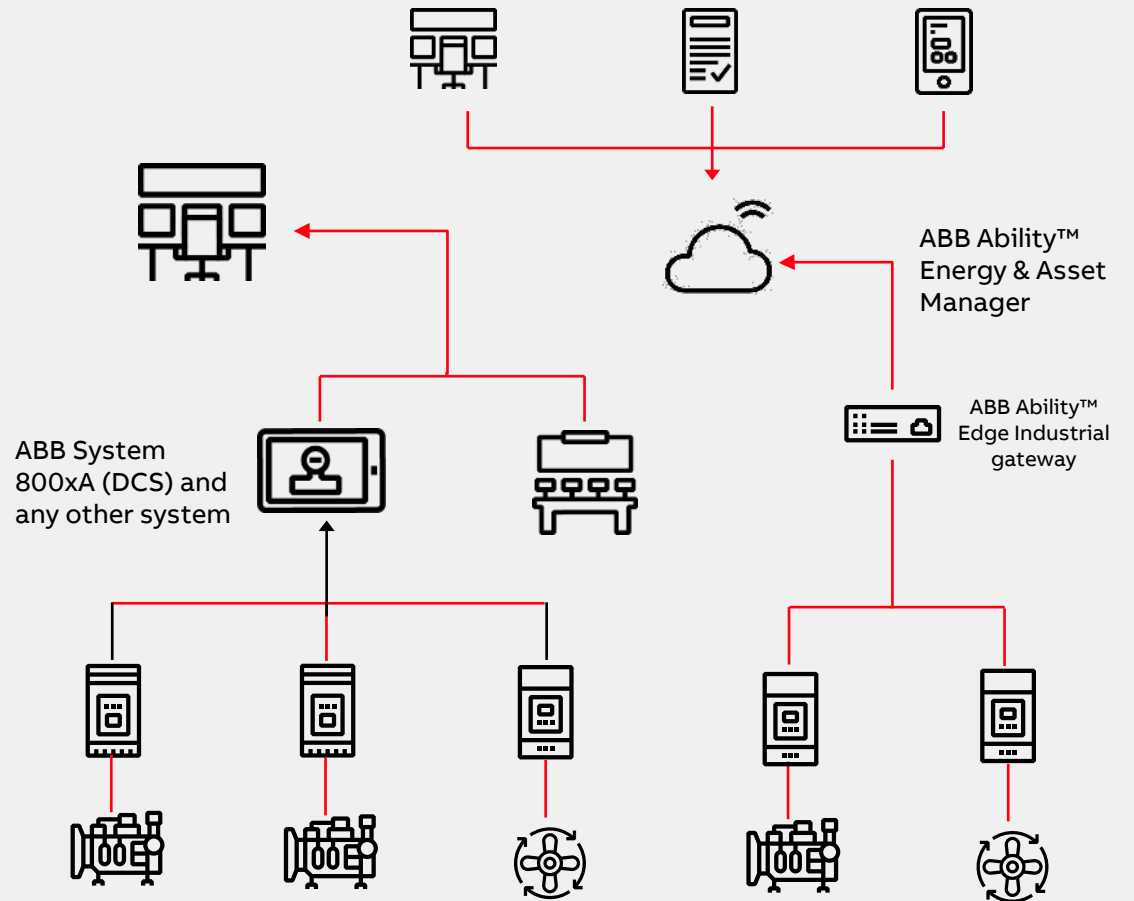
Advanced solutions use live data from relevant compressor motor parameters for measurements like current, voltage, power and diagnosis information, and maintenance counters etc..

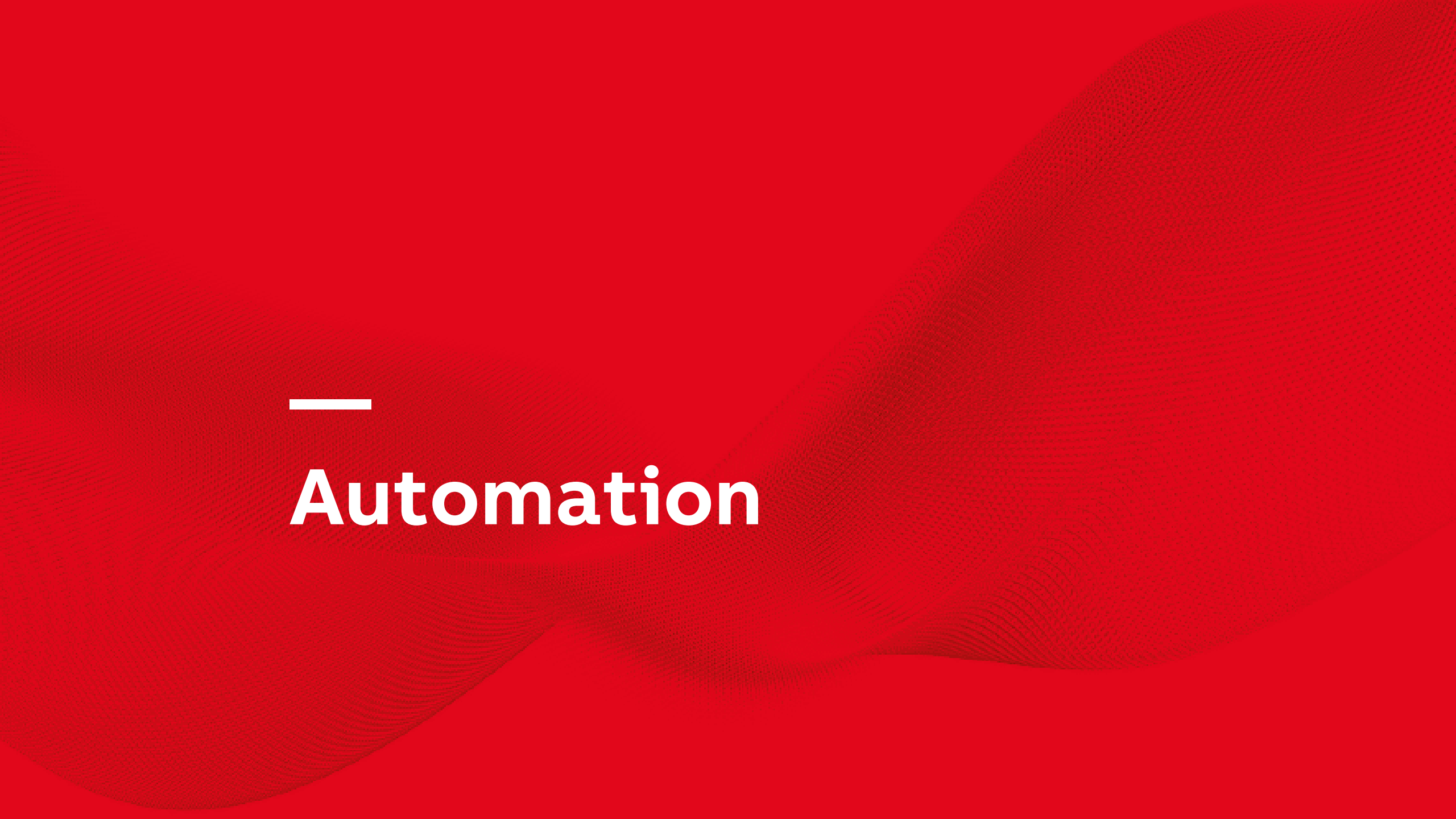
Detect problems early to help in predictive maintenance.

Advanced solution provides information about the compressor motor and operating status. This information is transferred to the superior control system (DCS). This allows you to detect upcoming problems and prevent plant standstills, as well as to increase plant availability.

Digitalization allows flexible remote control.

ABB Ability™ Energy and Asset Manager, data is always quickly available on the web applications





— **Automation**

Solutions for Machine Automation

B&R



1) Track technology

2) Magnetic levitation

3) Integrated robotics

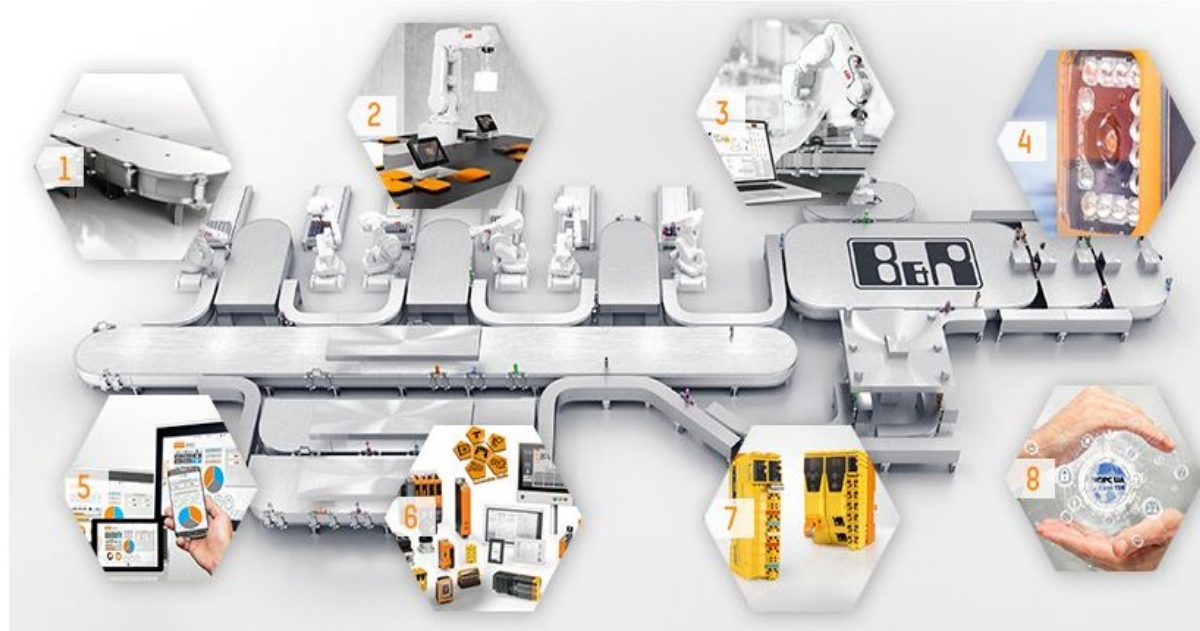
4) Integrated machine vision

5) Intuitive, intelligent HMI

6) Uniform, scalable portfolio

7) Integrated safety

8) Industrial IoT solutions

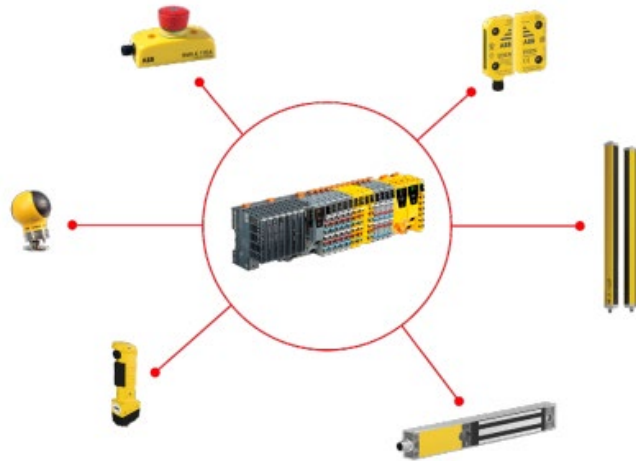


- Industrial PCs
- HMI
- PLC systems
- I/O systems
- Vision systems
- Safety technology
- Motion control
- Mechatronic systems
- Robotics
- Mobile automation
- Networks and fieldbus modules
- Software
- Process control
- Accessories
- Learning and teaching materials

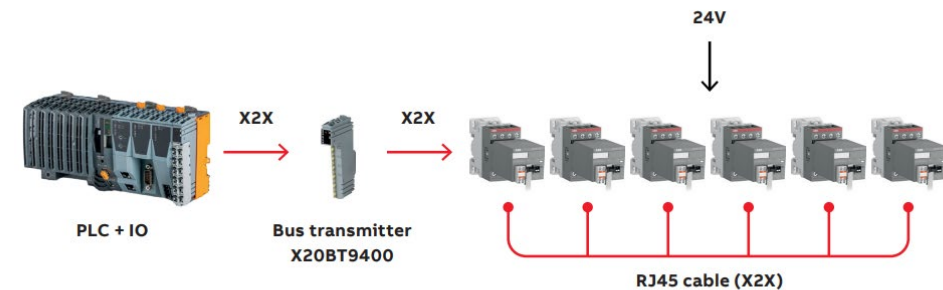
Solutions for Machine Automation

Example

The safety products from ABB 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.



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



—

Robotics

Robotics

The product range extends from human-machine-cooperative and industrial robots to conveyor systems and highly flexible modular cleaning, assembly and handling solutions. These can be easily and efficiently integrated into complex processes and special solutions in the mechanical engineering sector.

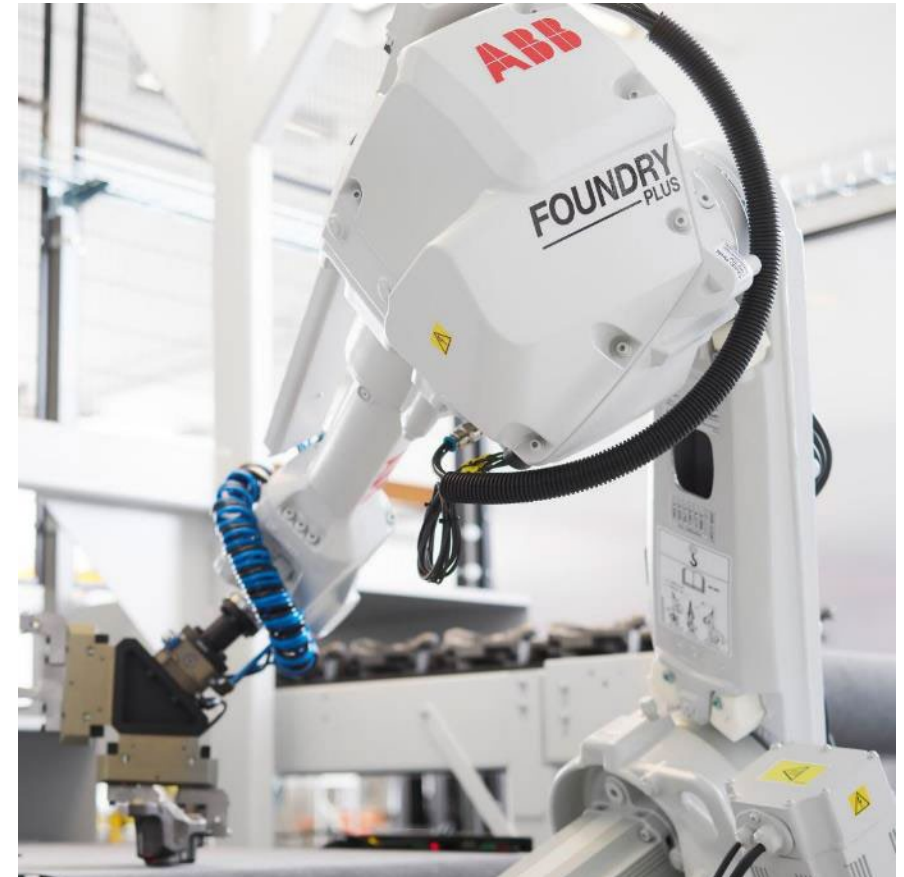
Industrial robots

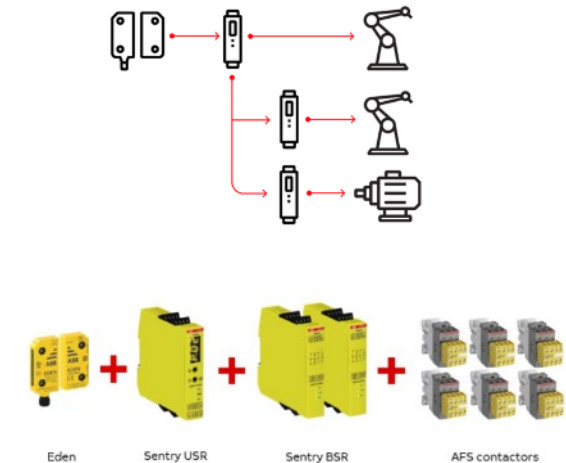


Collaborative robots



Robot controllers





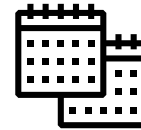
—

ABB Applications

What ABB Applications are?

The changing power needs demand smarter solutions to improve connectivity and optimize reliability.

Our Applications offer packages of combined and proven components-products, designed to overcome your industry-specific needs. It's a smarter, simpler way to solve challenges.



IDENTIFYING NEEDS

We speak to the market every day to focus on your industry-specific challenges and help where you need us the most.

ENABLING SOLUTIONS

We use our deep domain expertise to build tried-and-tested solutions for faster and easier configuration.

DELIVERING APPLICATIONS

We provide pre-configured application packages with Bill of Materials (BOM) and technical schematics to help you in speeding up your projects.

How ABB Applications can help you?

Our tried-and-tested Applications simplify the process:
faster selection, easy installation, and quicker results.



BUILT AROUND YOU

ABB's deep domain expertise offers proven solutions and expert support, all tailored to your sector's challenges.



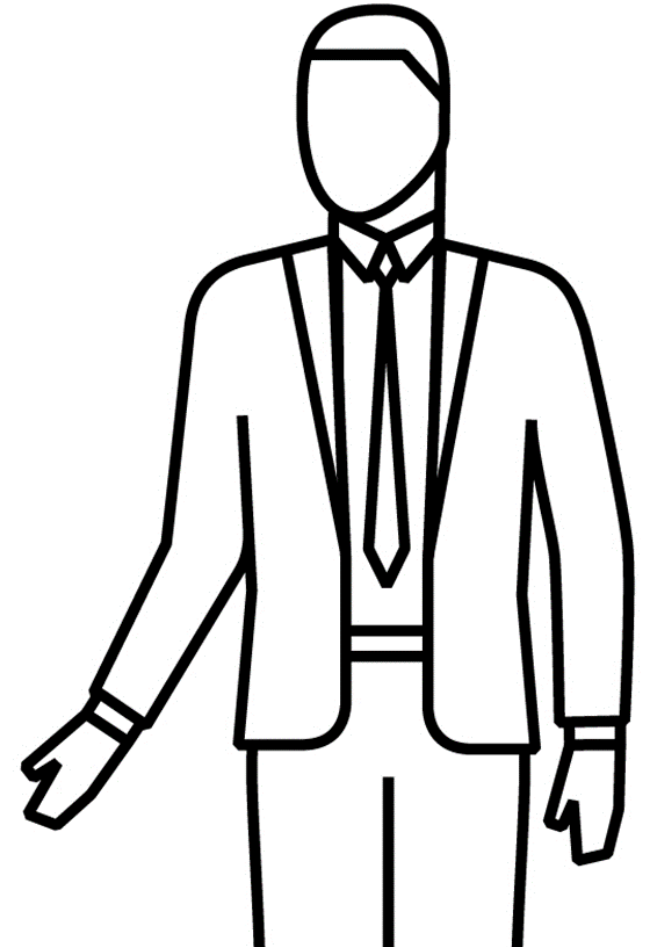
MAXIMIZED RELIABILITY

Minimize unplanned downtime and enhance reliability with tried-and-tested solutions designed by our experts to achieve selectivity and integration.



TIME-SAVING

Save time during the design phase, avoid errors and speed up your projects with ready-made solutions built on your needs.



Application for Full Speed Motor Starting & Protection

Increasing industrialization across the globe creates a huge demand for low-voltage electric motors.

47%

GLOBAL ELECTRICITY CONSUMPTION

Electric motor-driven systems account for around 47 % of global electricity consumption.

68%

ELECTRICITY CONSUMED BY MED-SIZED MOTORS

About 68 % of the electricity consumed by electric motors is used by medium-size motors, those in the 0.75 kW to 375 kW input power range.

650 M units

MARKET VAUE

Low Voltage motors market value is projected to reach a volume of 653 Million units by 2023, expanding at a CAGR of more than 9.3 % during 2018-2023.

80%

MOTORS FOR FULL SPEED APPLICATIONS

80% of all motors in the Low Voltage motors market are used in full speed applications.

Application for Full Speed Motor Starting & Protection

IE3 premium and IE4 super premium efficiency motors

IE3 premium and IE4 super premium efficiency motors

IE3/IE4 motors can achieve higher efficiency thanks to innovative design and the use of better conducting material. The higher efficiency design ultimately shows a lower rated motor current for any given kW rating.

During the starting phase of an IE3 motor, the starting current can be roughly 25 % higher than in IE1/IE2 motors, which may lead to unwanted tripping of the protection device. In addition, a correct evaluation of the electrical endurance of the contactor should be carried out.

ABB's control and protection low voltage products are IE3/IE4 compatible, offering users premium motor starting solutions, with small footprints.



Application for Full Speed Motor Starting & Protection

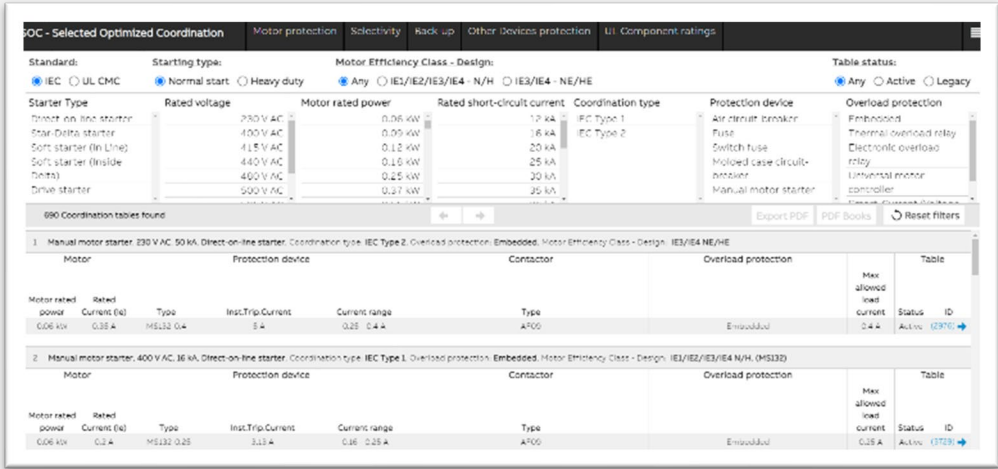
Selected optimized coordination tables

Selected optimized coordination tables

ABB provides coordination tables for the selection of low voltage equipment, specifically tested for starting and protecting IE3/IE4 motors in the SOC tool. Essential, enhanced and advanced solutions as introduced in this presentation can be selected [here](#).

Product selection for different types of starting methods are available as well, including direct-on-line, star-delta and Softstarters.

Usage of coordination tables helps reduce the time for selection and design of solutions as well as the risk of unwanted downtime, e.g. caused by nuisance tripping. This provides protection and safety, further driving down the total cost of ownership.



SOC - Selected Optimized Coordination

Standard: ☒ IEC ☐ UL CMC Starting type: ☒ Normal start ☐ Heavy duty Motor Efficiency Class - Design: ☒ Any ☐ IE1/IE2/IE3/IE4 - N/H ☐ IE3/IE4 - NE/HE Table status: ☒ Any ☐ Active ☐ Legacy

Starter Type: Rated voltage: Motor rated power: Rated short-circuit current: Coordination type: Protection device: Overload protection:

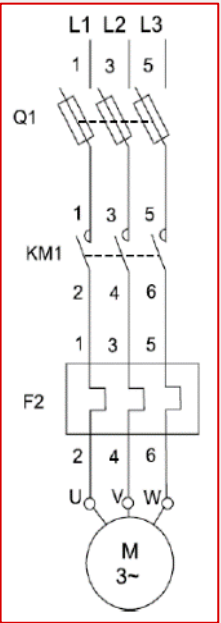
690 Coordination tables found

Motor	Protection device	Contactor	Overload protection	Max allowed load current	Status	ID
1 Manual motor starter, 230 V AC, 50 kA, Direct-on-line starter, Coordination type: IEC Type 2, Overload protection: Embedded, Motor Efficiency Class - Design: IE3/IE4 NE/HE						
Motor rated power: 0.06 kW	Rated current (In): 0.25 A	Type: MS32 0.4	Inst.Trip Current: 5 A	Current range: 0.25 - 0.4 A	Type: AP00	Embedded
2 Manual motor starter, 400 V AC, 16 kA, Direct-on-line starter, Coordination type: IEC Type 1, Overload protection: Embedded, Motor Efficiency Class - Design: IE1/IE2/IE3/IE4 N/H, (MS33D)						
Motor rated power: 0.06 kW	Rated current (In): 0.2 A	Type: MS32 0.25	Inst.Trip Current: 3.15 A	Current range: 0.16 - 0.25 A	Type: AP00	Embedded

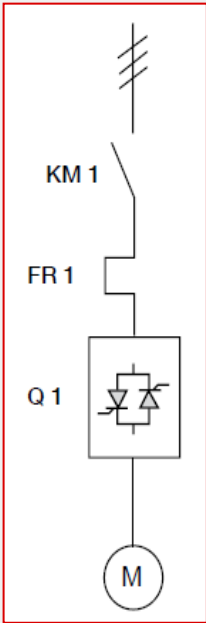
Application for Full Speed Motor Starting & Protection

Starting Selection for Fans

Since typical Fan rating is below 16A, our recommended starter type is a Direct-online starter & Softstarter



Direct-on-line starter



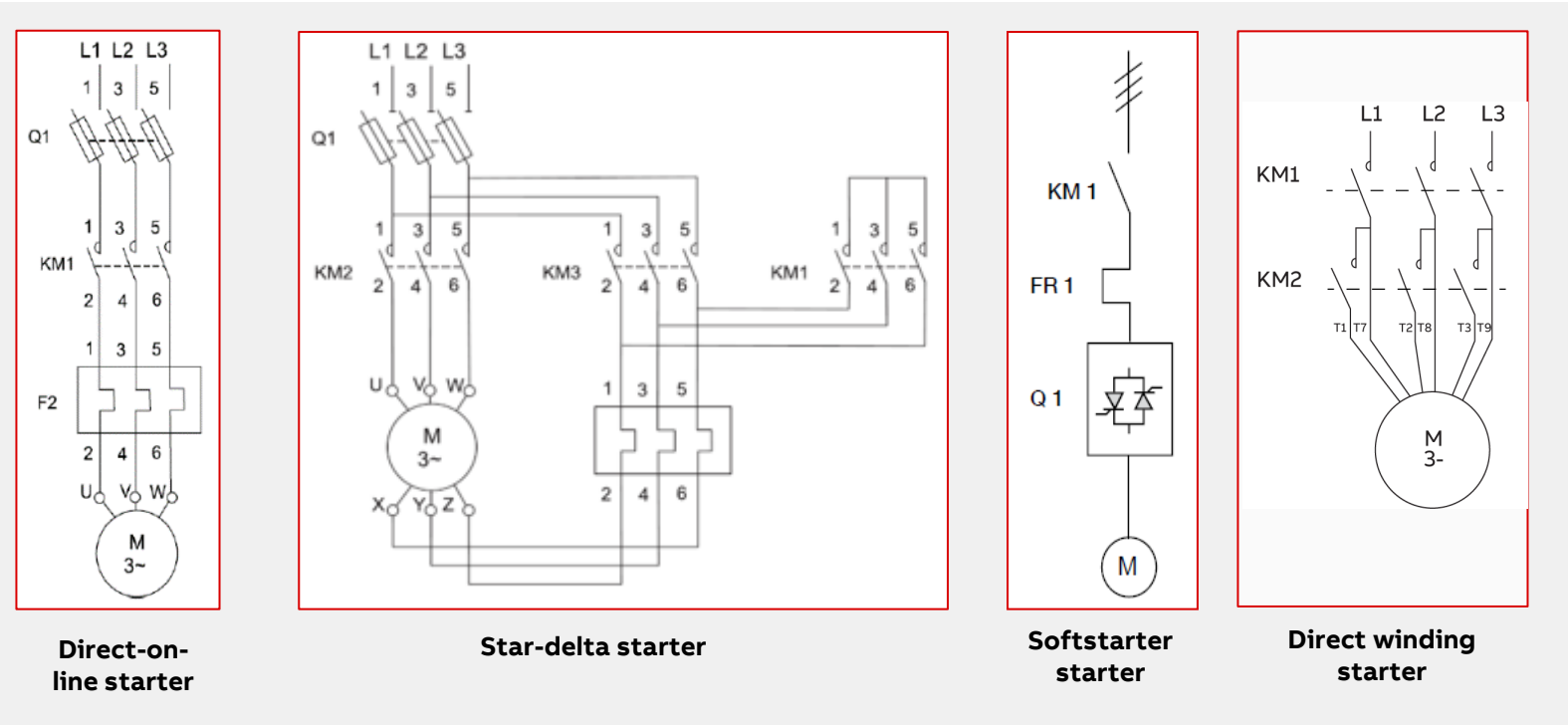
Softstarter starter

Product combination	Fan Rating	Key Differentiator
MMS + B Mini contactor	up to 5.5 kW	For efficient and spacing saving
MMS + contactor (Push-In Spring)	up to 18.5 kW	For a reliable connection, faster, and easier wiring and vibration proof.
MMS + contactor (Screw version)	up to 45 kW	For standard offerings
MMS + PSR (Softstarter)	up to 45 kW	For Smooth start and stop.

Application for Full Speed Motor Starting & Protection

Starting Selection for Compressors

Our recommended starter type for full speed compressors is a Direct-online starter up to 18,5 kW and for higher ratings Softstarter solution

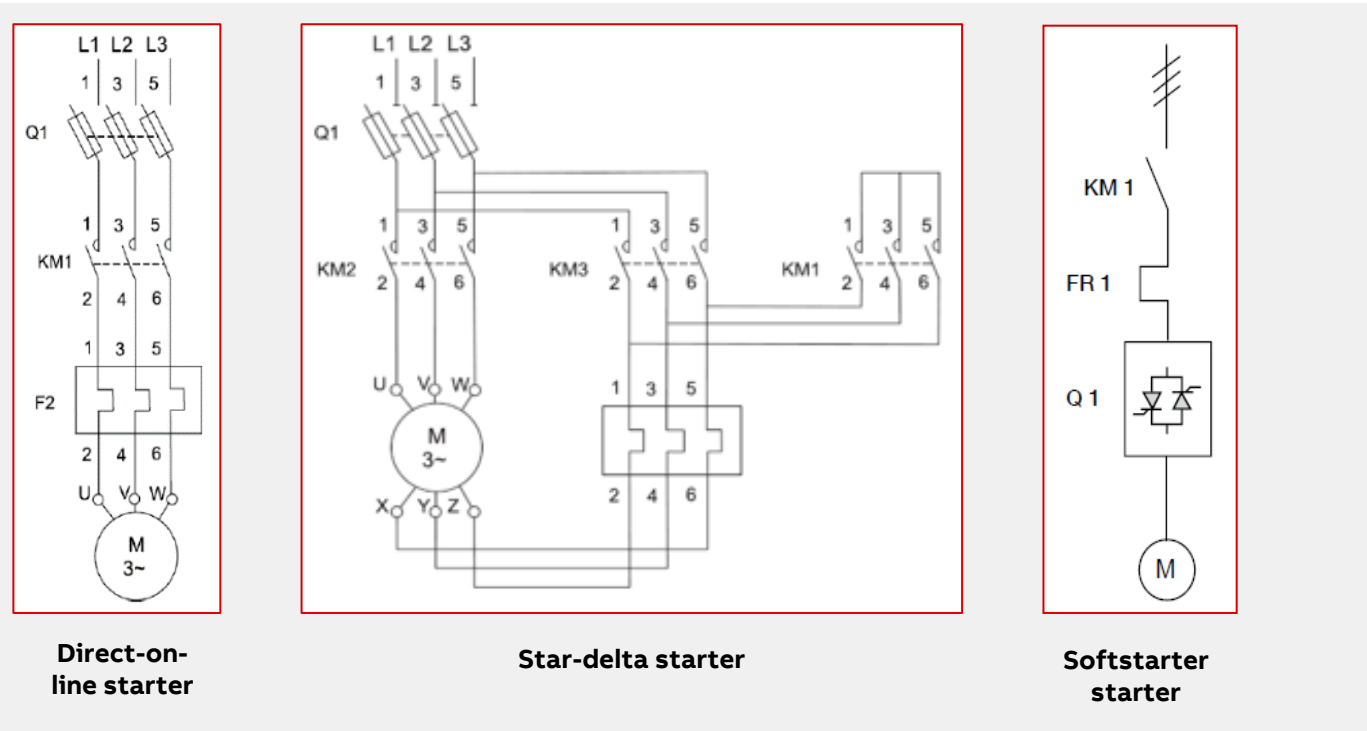


Product combination	Compressor Rating	Key Differentiator
MMS + contactor (Push-In Spring)	up to 18.5 kW	For a reliable connection, faster, and easier wiring and vibration proof.
MMS + contactor (Screw version)	up to 45 kW	For standard offerings
MMS + PSR (Softstarter)	up to 45 kW	For Smooth start and stop.
MMS + contactor (Push-In Spring)	up to 18.5 kW	For a reliable connection, faster, and easier wiring and vibration proof.

Application for Full Speed Motor Starting & Protection

Starting Selection for Pumps

Our recommended starter type for full speed pumps to avoid water hammering is Softstarter solution



Product combination	Pump Rating	Key Diffentiator
MMS + contactor (Push-In Spring)	up to 18.5 kW	For a reliable connection, faster, and easier wiring and vibration proof.
MMS + contactor (Screw version)	up to 45 kW	For standard offerings
MMS + PSR, PSE or PSTX (Softstarter)	up to 45 kW	Eliminate water hammering with torque control Avoid running dry with underload protection
MMS + contactor (Push-In Spring)	up to 18.5 kW	For a reliable connection, faster, and easier wiring and vibration proof.

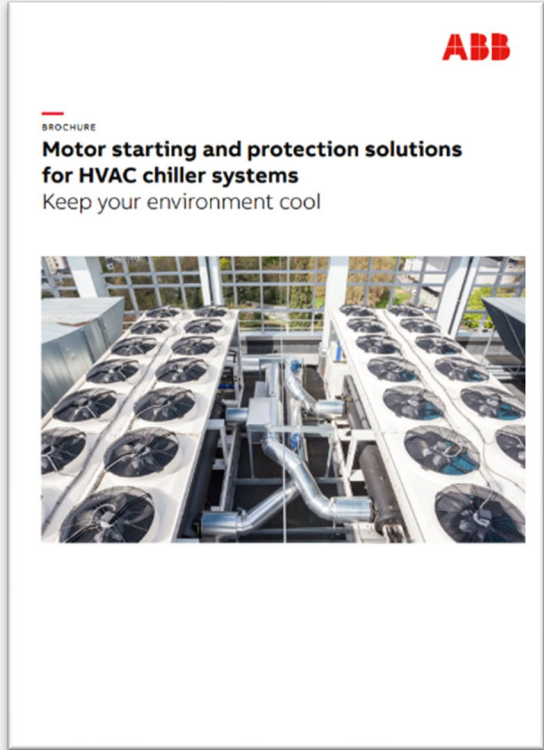
Application for HVAC

IEC

The choice of starter type in Air-cooled chiller systems, depends on the type of compressor and condenser fan.

The ABB scalable motor starting solution provides complete flexibility in choosing the right starter solution for full-speed motor control of Air-cooled chiller systems.

Product combination	Motor rating support	Key differentiator
B Mini contactor	Up to 5.5 kw	For space saving
MMS + contactor {Push-In Spring}	Up to 1S.5 kW	For a reliable connection, faster, and easier wiring and vibration proof
MMS + contactor {Screwversion}	Up to 45 kw	For standard offerings
MMS + PSR (Softstarter)	Up to 45 kw	For smooth start and stop



GO

Application for HVAC

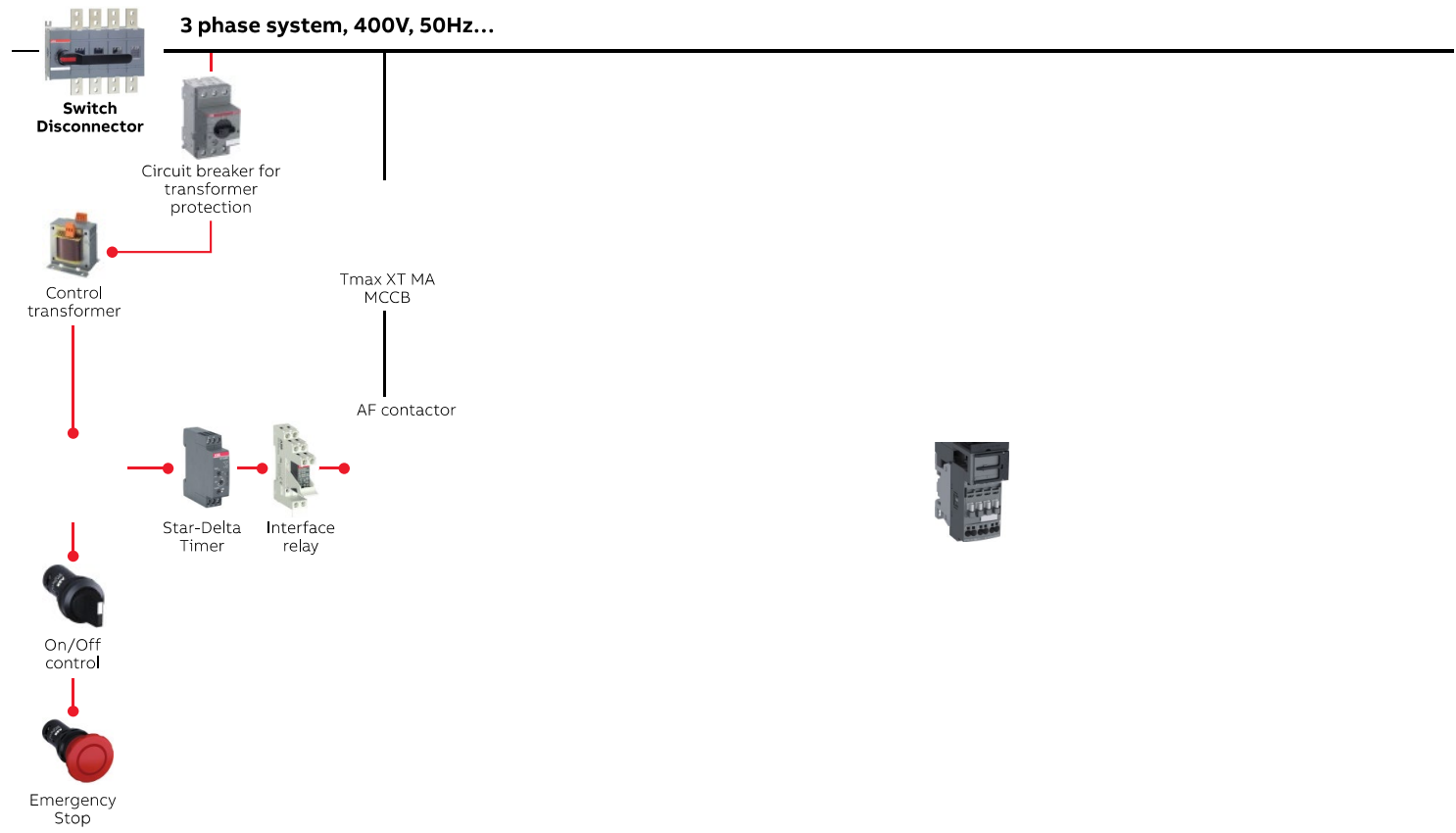
IEC



ESSENTIAL

**The ABB Essential
Solution for Air-cooled
chiller system**

Offerings for motor rating
0.06 up to 560 kw



Application for HVAC

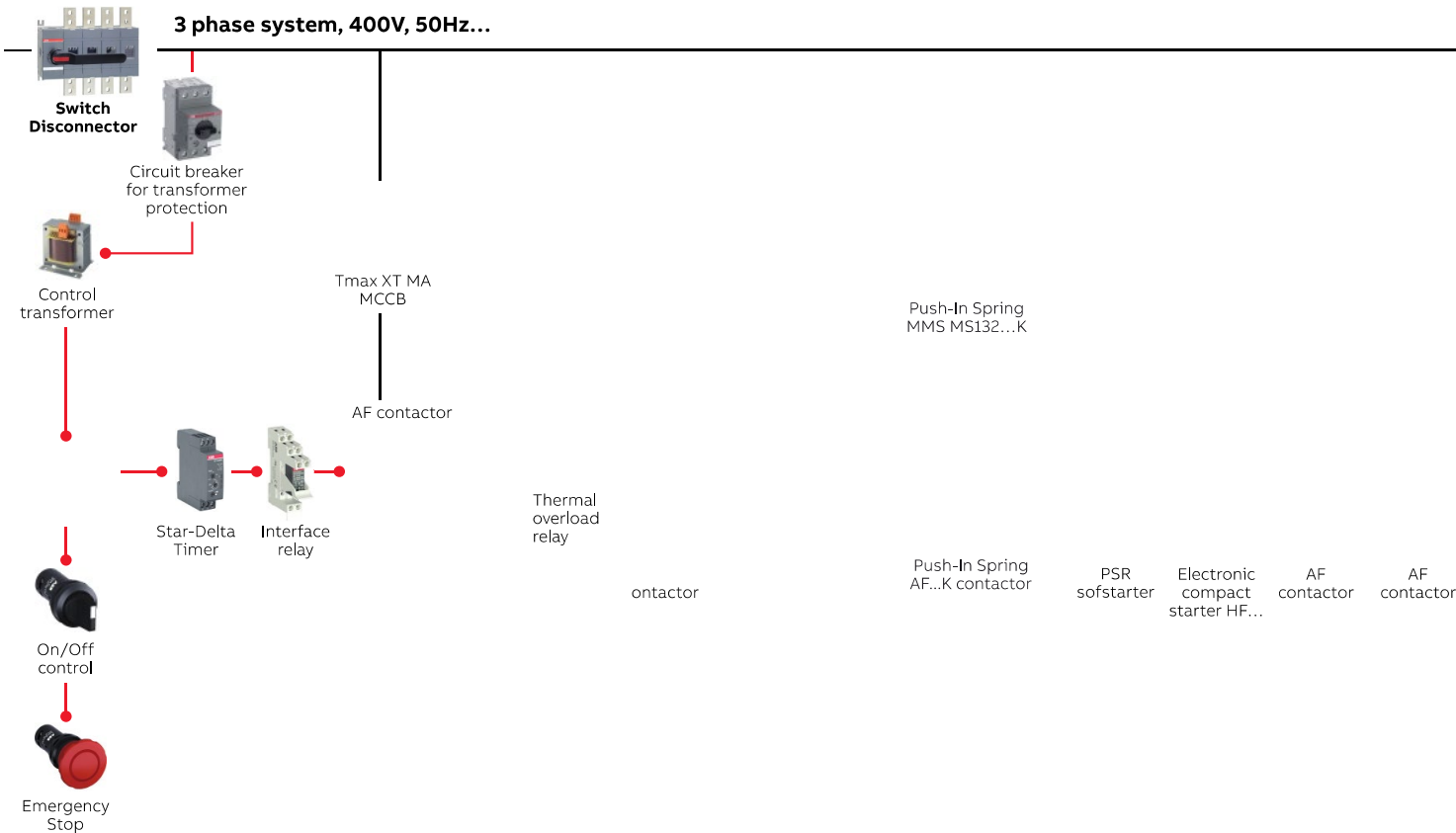
IEC



ENHANCED

The ABB Enhanced Solution for Air-cooled chiller system

Offerings for motor rating 0.06 up to 560 kw



Application for HVAC

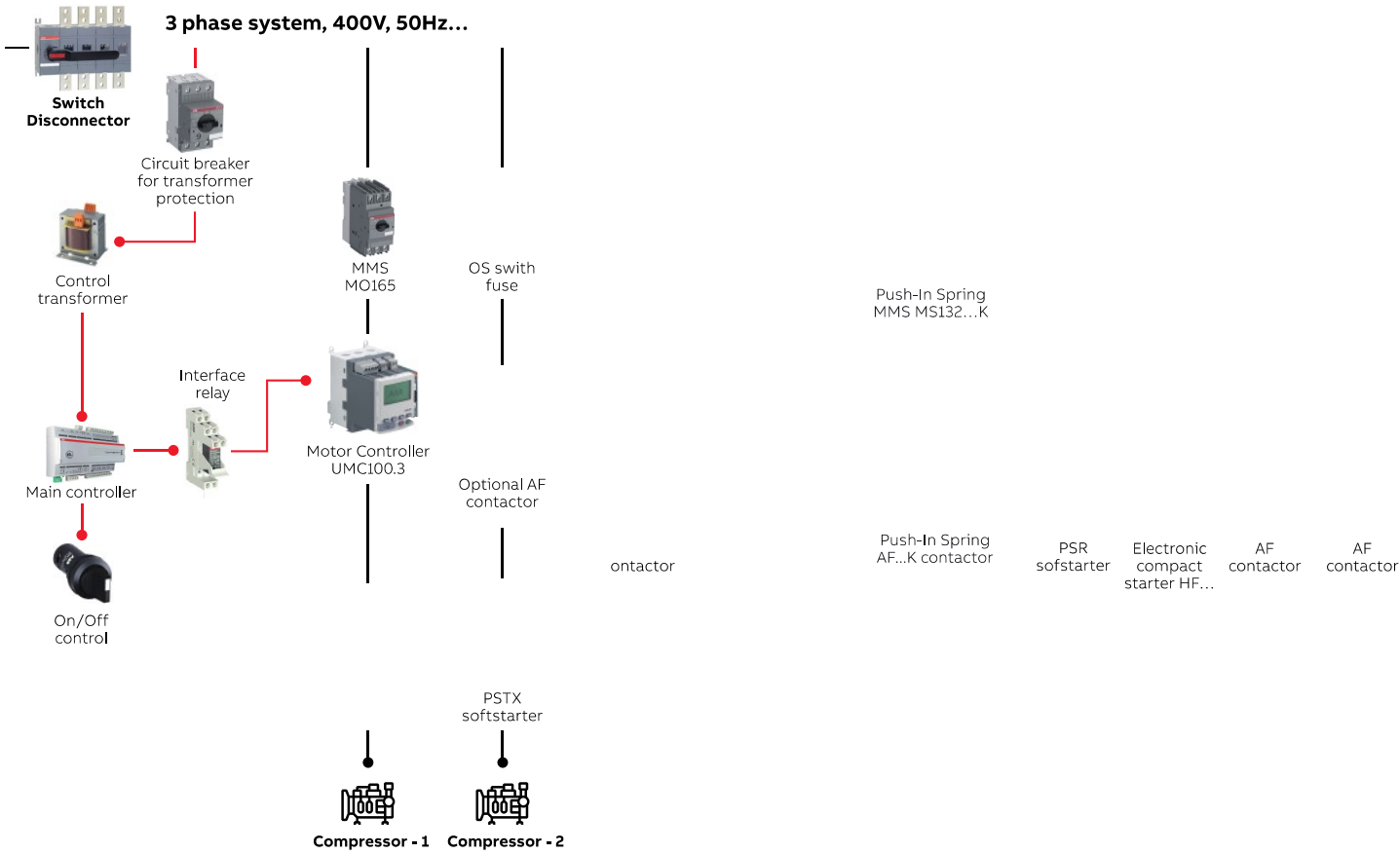
IEC



ADVANCED

The ABB Advanced Solution for Air-cooled chiller system

Offerings for motor rating 0.06 up to 560 kw





Application for Pumping IEC

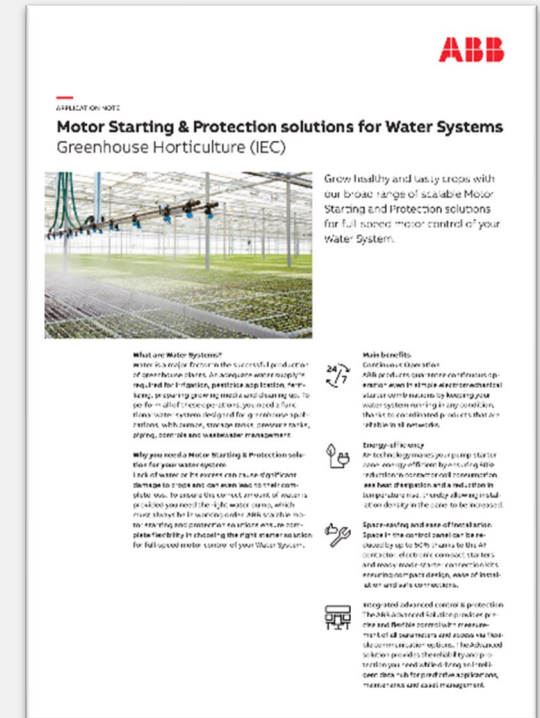
The water pump selection is based on the amount of water needed depending on the area to be watered, crops grown, weather conditions time of the year, and the environment. Also, considering the peak use time of the year. ABB's scalable motor starting solution provides complete flexibility to choose the right starting solution for full-speed motor control for your pumps

Main protection functions

- Short-circuit protection
- Overload protection (with the adjustable current setting)
- Voltage level monitoring
- Phase loss & phase sequence for correct direction of the pump running
- Earth fault protection.

Other functions

- Jammed or clogged pump by Locked rotor protection
- Dry-running detection by an undercurrent
- Thermistor motor protection for monitoring the winding temperature.
- Digital connectivity (control, energy measurements, etc...)
- Safety relays (if needed based on the design).



GO

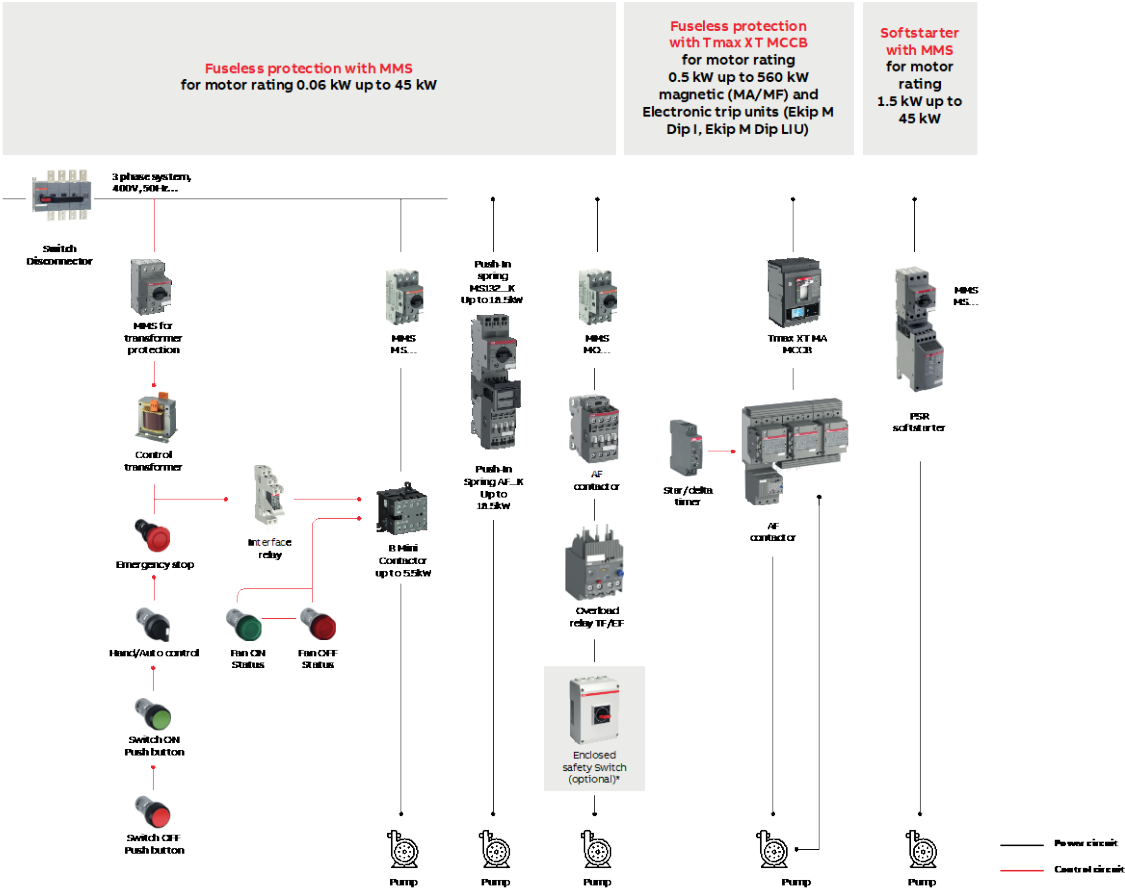
Application for Pumping

IEC



ESSENTIAL

ABB's Essential Solution
for starting water
system pumps in
Greenhouse horticulture



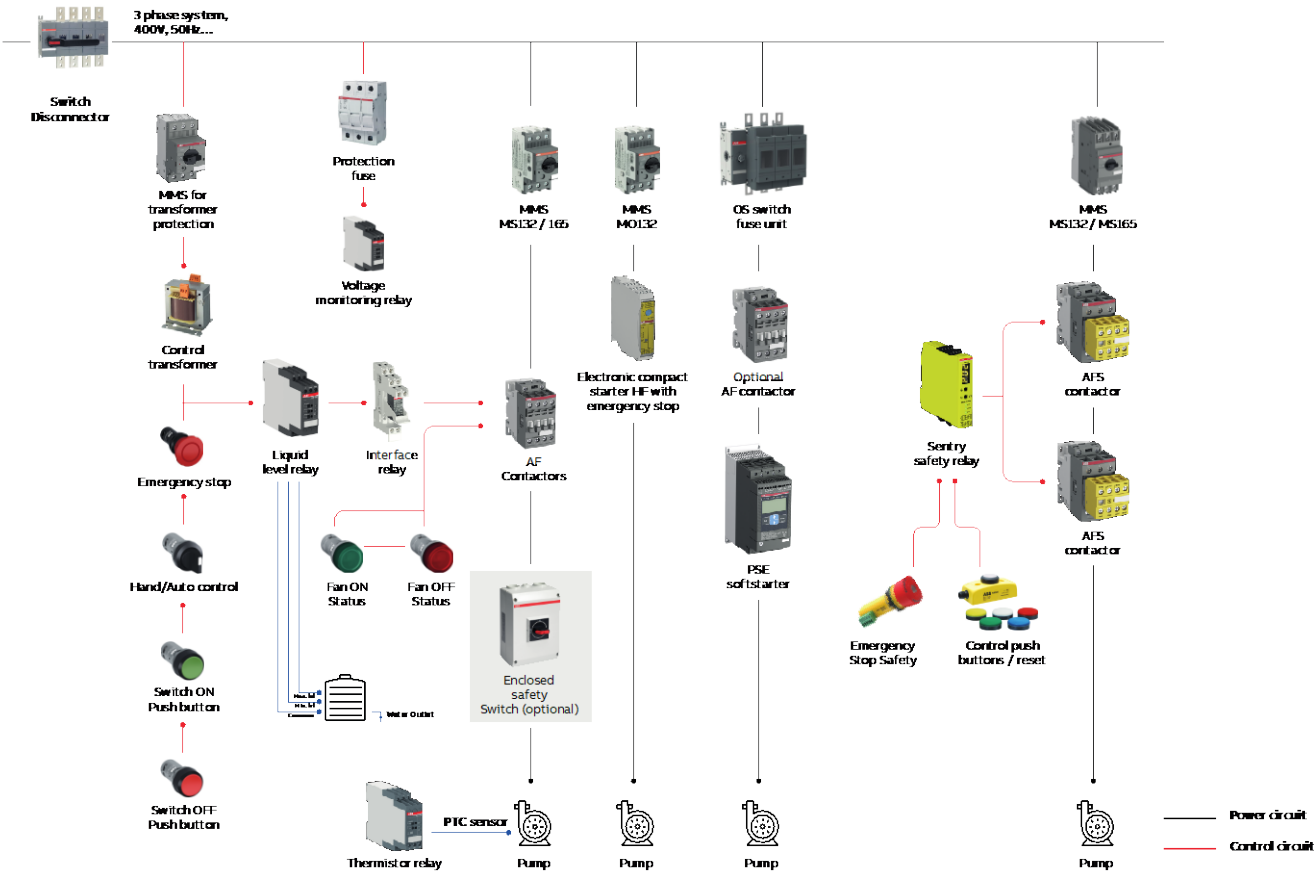
Application for Pumping

IEC



ENHANCED

ABB's Enhanced Solution
for starting water
system pumps in
Greenhouse horticulture



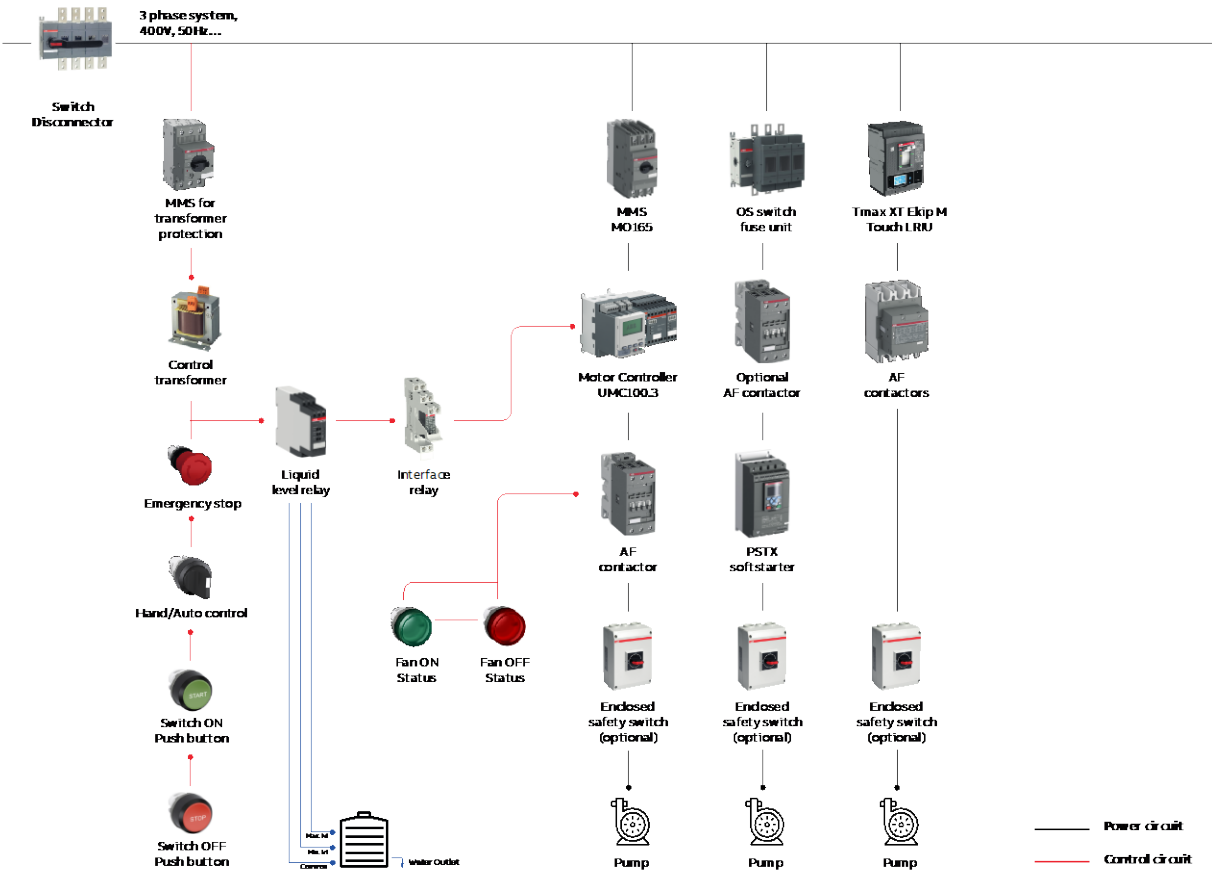
Application for Pumping

IEC



ADVANCED

ABB's Advanced Solution
for starting water
system pumps in
Greenhouse horticulture





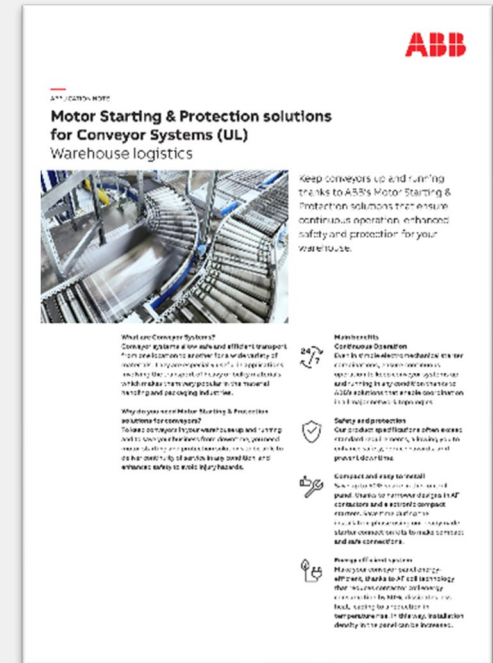
Application for Conveyor Systems

UL

Conveyors allow quick and efficient transport for a wide variety of materials, but they are especially useful in applications involving the transportation of heavy or bulky materials, which makes them very popular in the material handling and packaging industries.

The motor size and type selection to start conveyors is done based on the product weight, dimensions (length, width, height), and flow rate/speed of the conveyor system. The starter type selection is based on the speed and accuracy needed for the type of conveyor system. Variable frequency drives can be used if a system needs speed control.

ABB's scalable and comprehensive motor starting product line provides complete flexibility to choose the right starting solution for full-speed motor control for any conveyor system in a warehouse.

[GO](#)

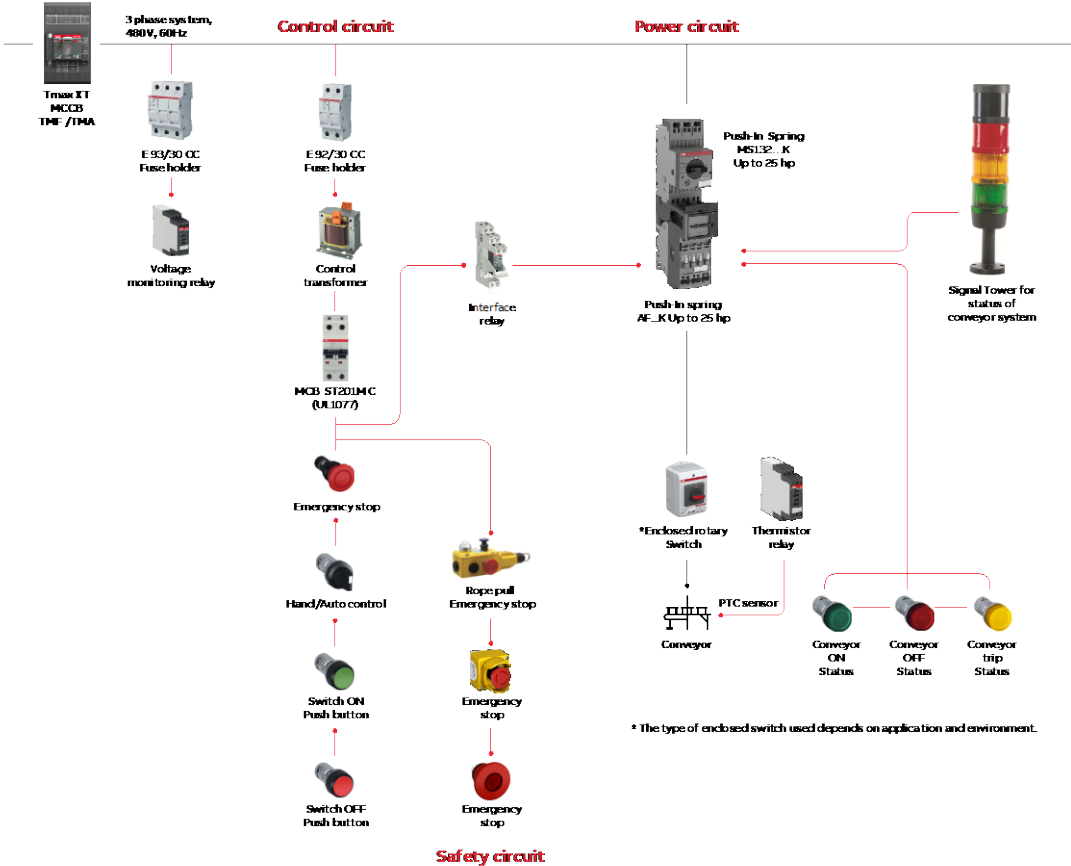
Application for Conveyor Systems

UL



ENHANCED

ABB's Enhanced Solution
for Conveyor



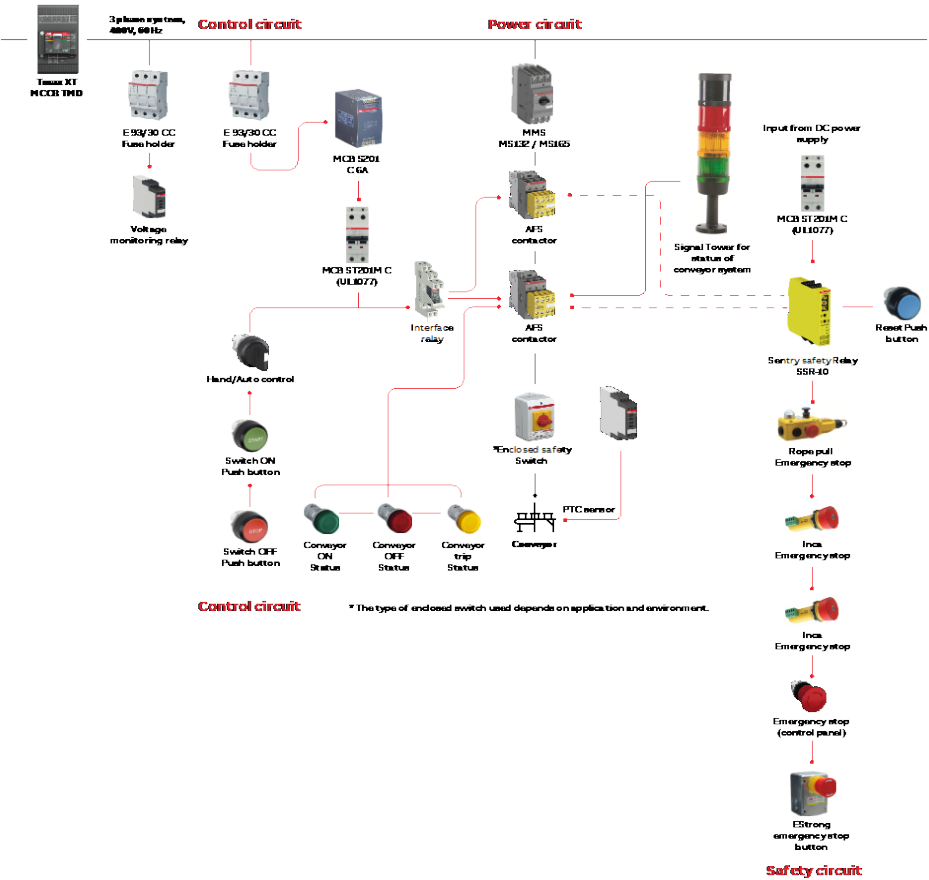
Application for Conveyor Systems

UL



ENHANCED

ABB's Enhanced Solution
for Conveyor with Sentry
safety relay



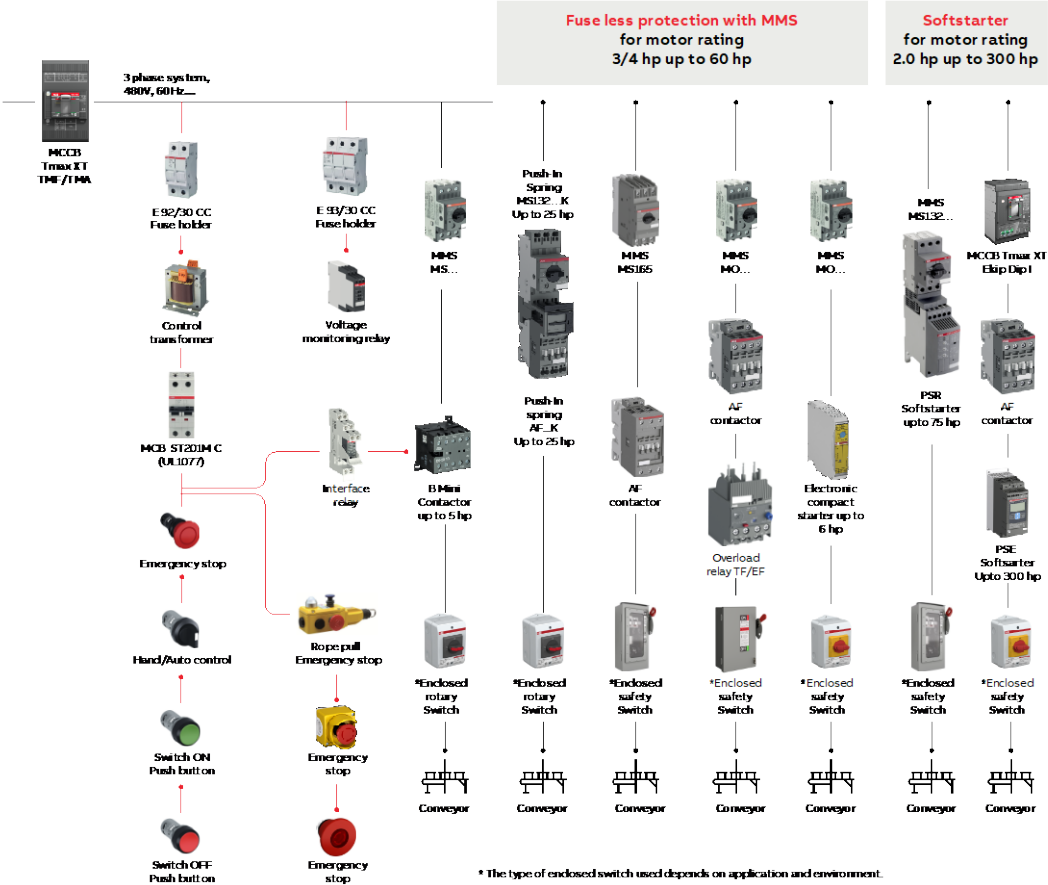
Application for Conveyor Systems

UL



ENHANCED

ABB's Enhanced Solution
for Conveyor



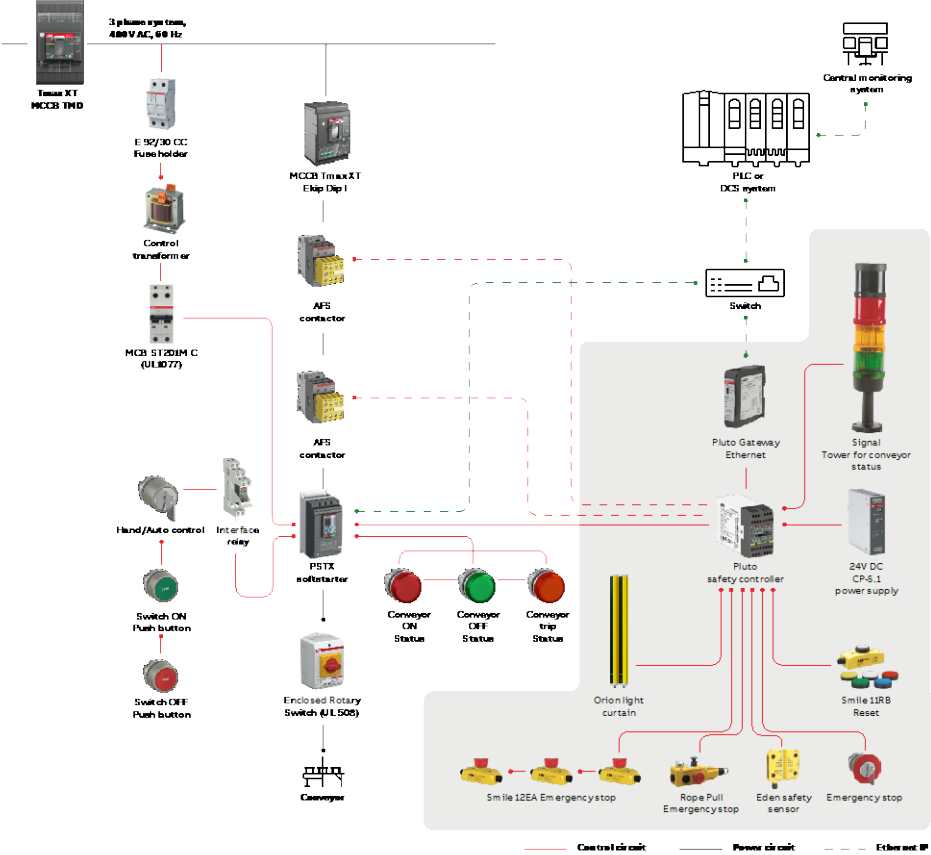
Application for Conveyor Systems

UL



ADVANCED

**ABB's Advanced Solution
for Conveyor with
Softstarter and Pluto
safety controller**



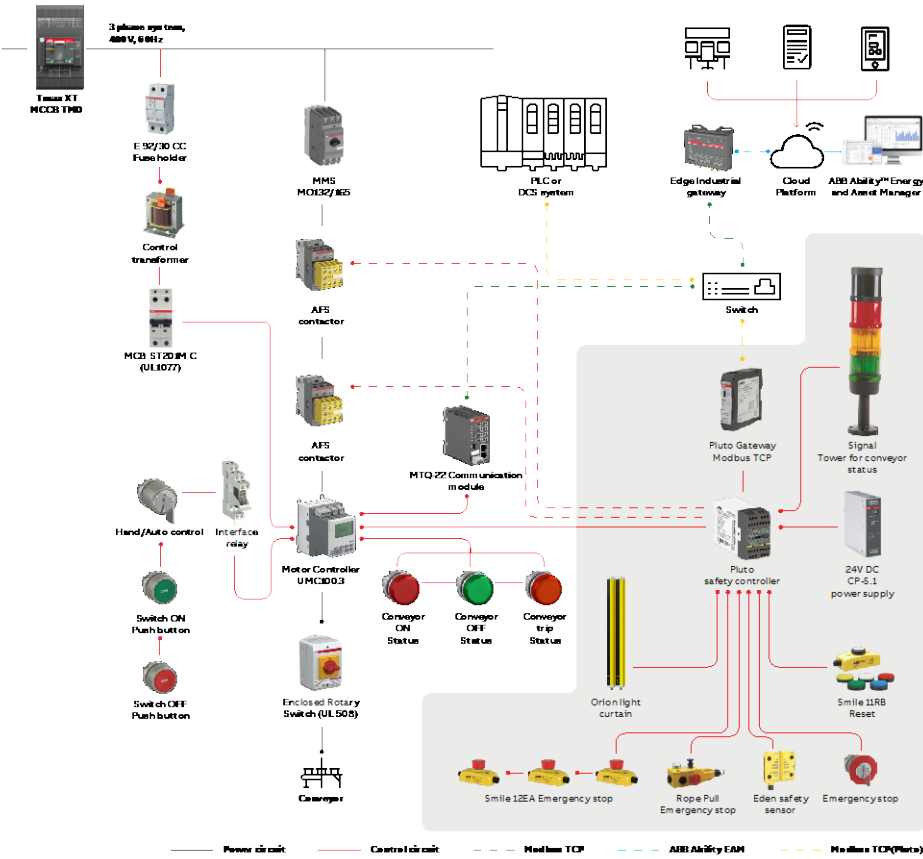
Application for Conveyor Systems

UL



ADVANCED

**ABB's Advanced Solution
for Conveyor with
UMC100.3 and Pluto
safety controller**

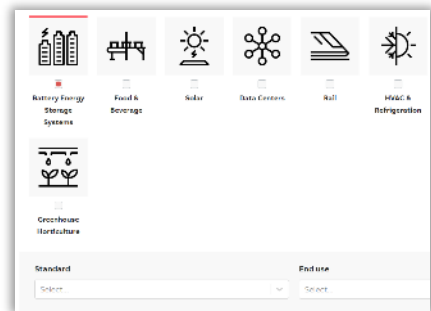
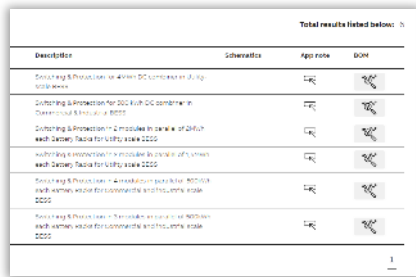
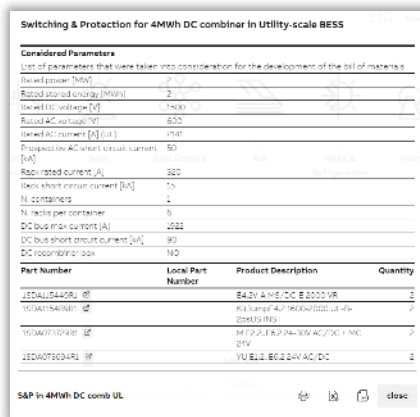


Not only 1 pre-configured package!

ABB Applications stand for **FASTER & EASIER CONFIGURATION**.

Our **reference architectures** come with complete lists of **Bill of Materials (BOM)** and **schematics** to help you in speeding up your projects!

Try our new Application Finder to find the Application you are looking for and the related Bill of Materials.



Find your reference architecture by filtering out your search by segment, end use and standard.

Select the reference architecture that best reflects your needs.

Download the related Bill of Materials to save time on the catalogs.

Application Finder
Find your reference
Architecture in one search!



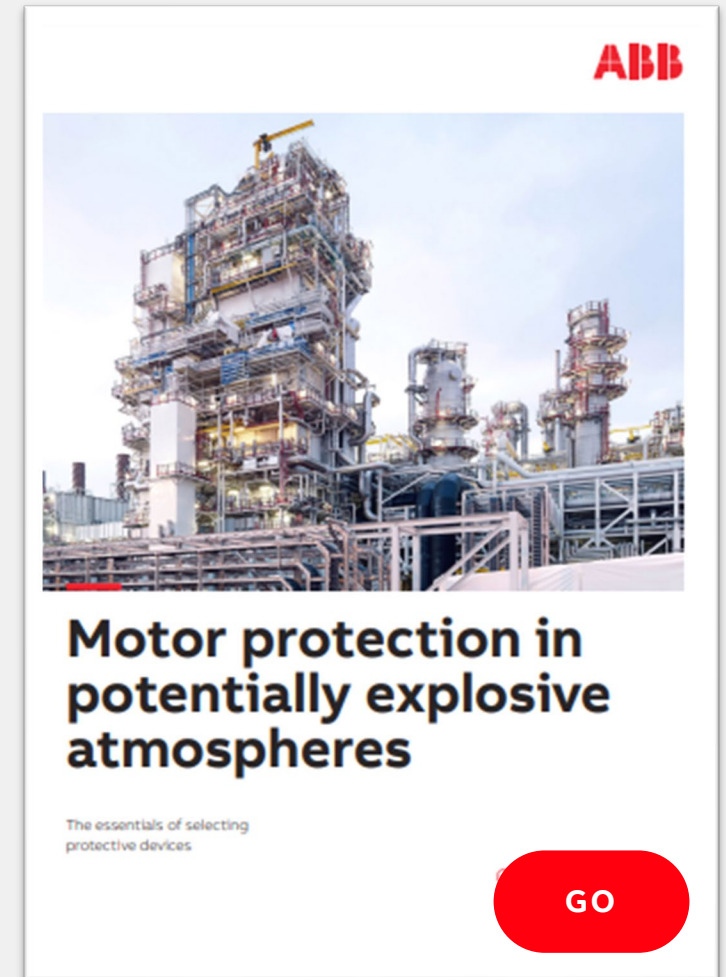
GO

Applications with specific requirements

Applications with specific requirements

Potentially Explosive atmospheres

Electrical equipment installed in locations with potentially explosive atmospheres must be designed and tested to ensure that it will not cause arcing or high temperatures that could provide a source of ignition.

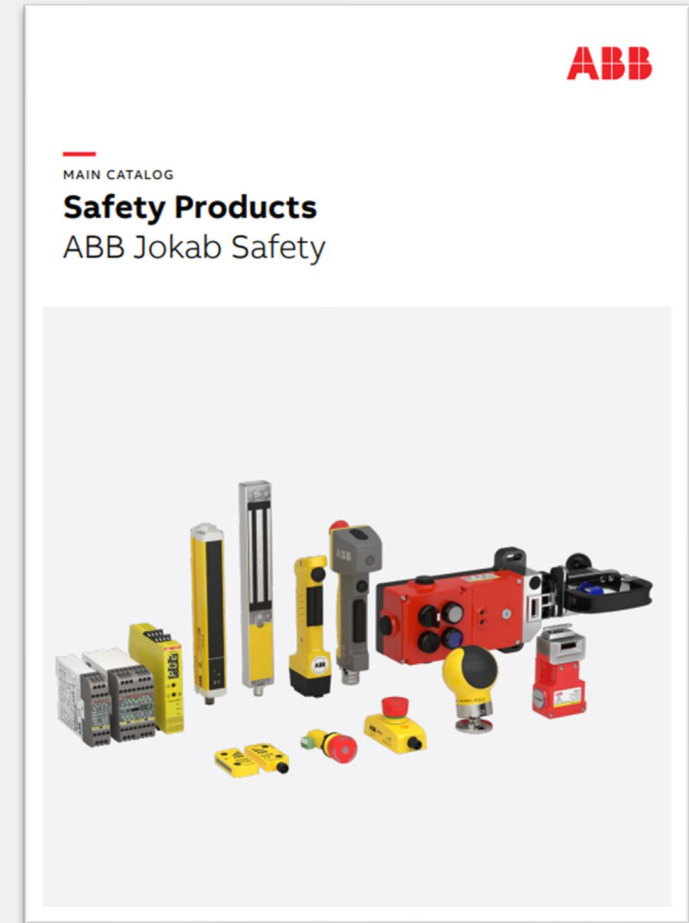


Applications with specific requirements

Safety functions and Performance Level (PL)

Building a protection system that works in practice and provides sufficient safety requires expertise in several areas.

The design of the safety functions in the protection system is critical in order to ensure they provide sufficient protection.

[GO](#)

Safety functions and Performance Level (PL)

Products assortment for Harsh applications

A large part of ABB Safety products is suitable to be used in harsh applications (i.e. Splash Zone).



[Find out more](#)



[Find out more](#)

EDEN – NEW COATED VERSION



M-KEY



ORION WET-* & ORION WET-K*



LINESTRONG Z



TINA ADAPTERS (EXCL. 2B AND 7)



SAFEBALL –WITH PROTECTION COAT (ACCESSORY)



SENSE 7Z



ESTRONG

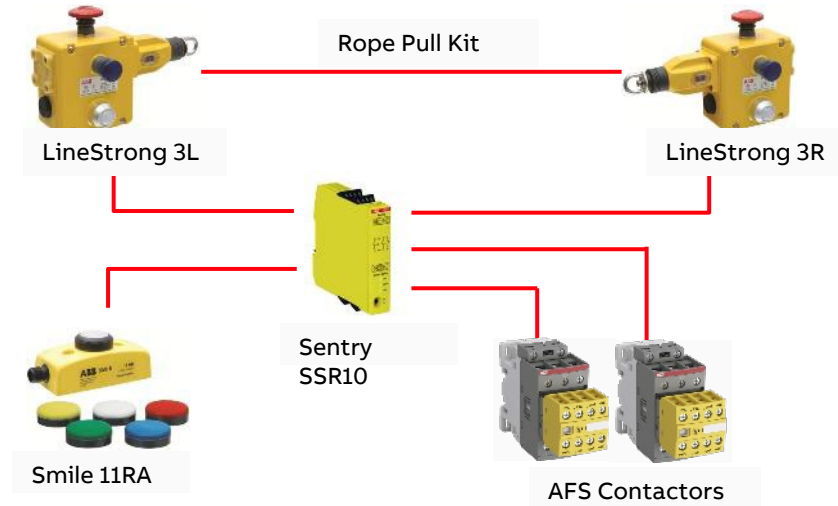


HD5



Safety functions and Performance Level (PL)

Pull Rope on Conveyors - Example



Aggregate conveyors often requires Pull Rope or trip cords on both sides to provide emergency stop actuation.

Application Requirements:

- Conveyor will be just above waist level and spans 110 meters.
- LEDs and emergency stop are needed on the rope pulls
- Location of rope pull will be out of the elements (ex rain)
- Temperature fluctuation is minimal.

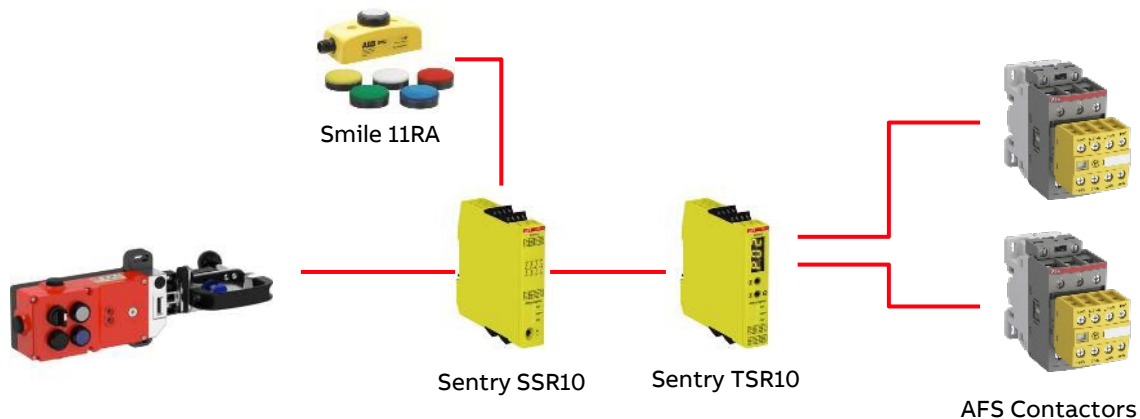
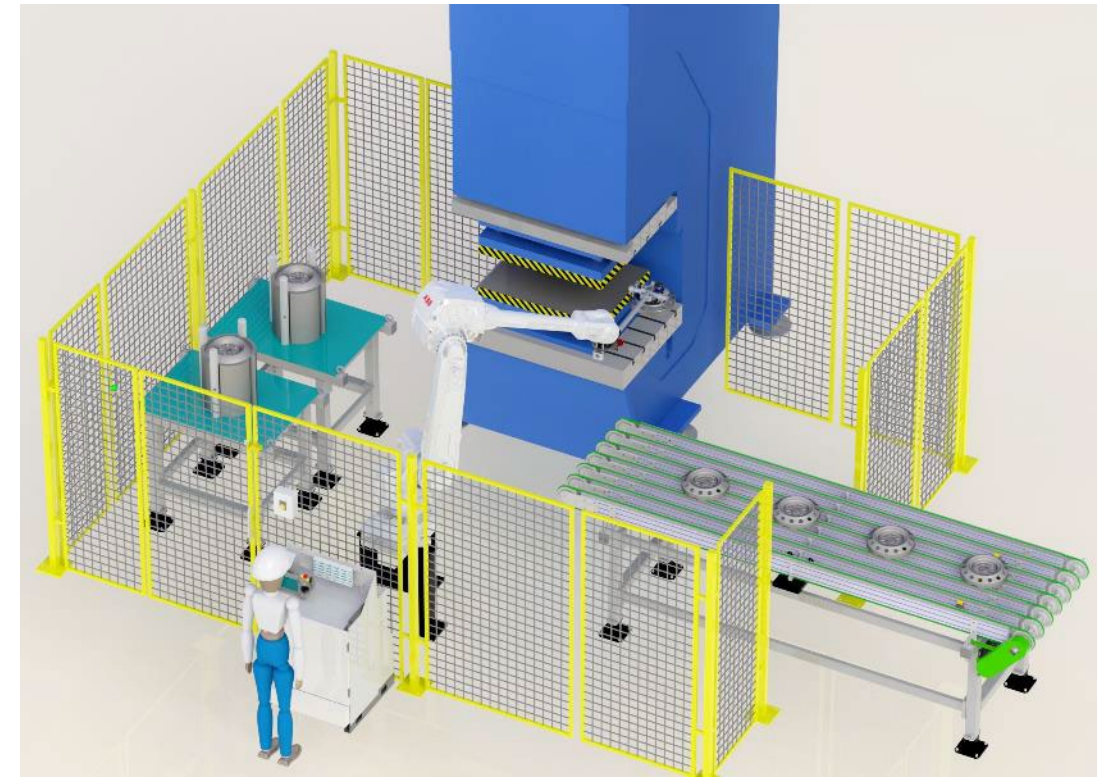
Safety functions and Performance Level (PL)

Time delay unlock Safety gate - Example

There are machines with long inertia or run-down time that requires minimum distances that can't be achieved by sensors. In those cases, physical guards locked by a solenoid switch are needed to keep operators away until the machine is fully stopped. For example, a stamping press machine with flywheel and an operator entrance door.

Application Requirements:

- Entrance door needs to be guarded with a solenoid lock.
- Delayed power to unlock solenoid is needed due to machine inertia.
- Rough environment so a metal switch is needed.
- Minimal cable needed back to main panel



Safety functions and Performance Level (PL)

Make your Motor Starting production safe - Example

For safety functions designed in accordance with IEC/EN 62061, the level of reliability is expressed as the Safety Integrity Level, SIL. There are a total of 4 levels, but in the IEC/EN 62061 standard SIL 3 is the highest level. SIL is similar to PL (performance level) and uses the same PFH_D (probability of dangerous failure per hour) to express the reliability of components and systems

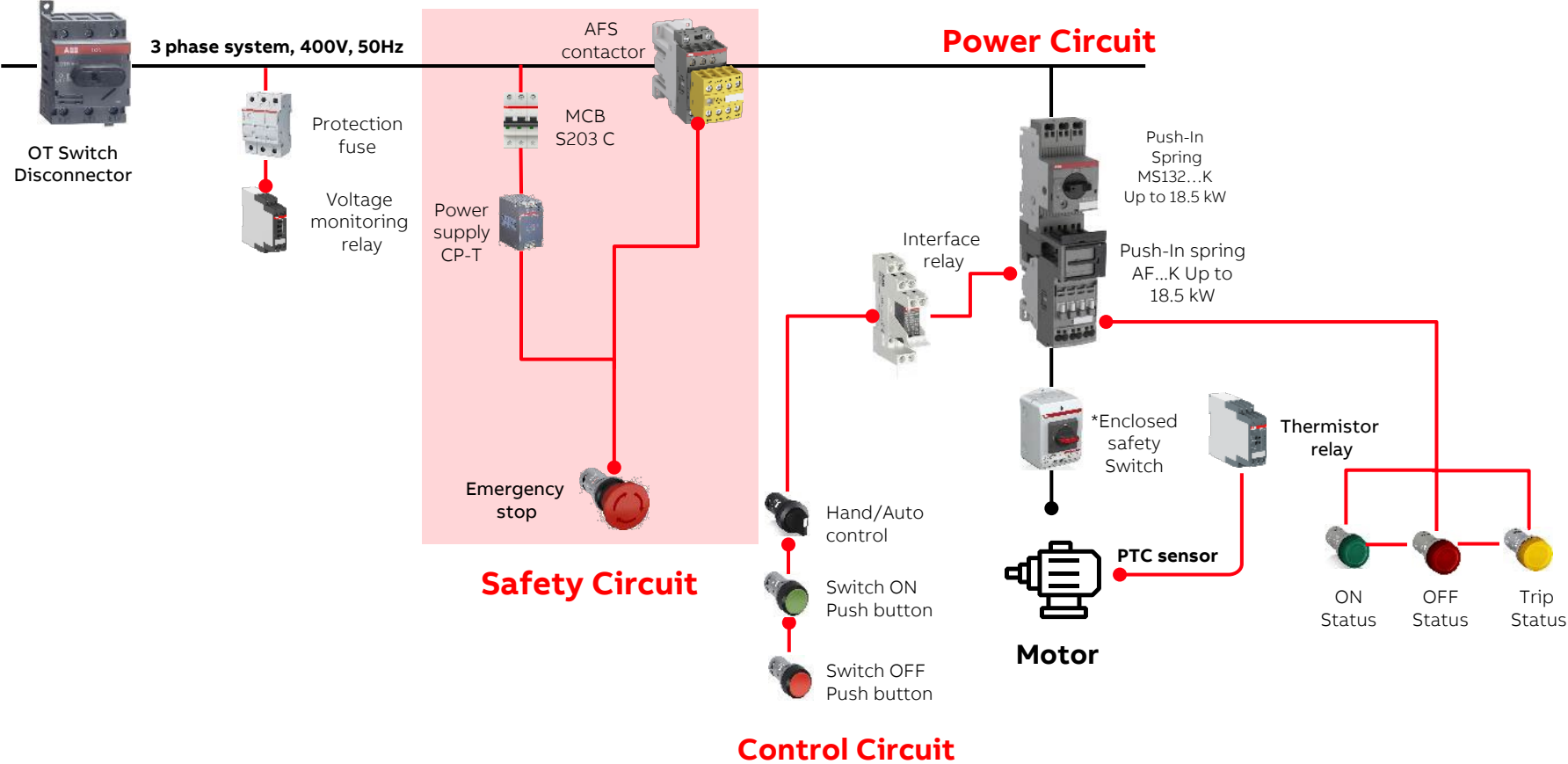
The safety function consists of a number of sub-elements. If in the assessment it has been established i.e. that SIL3 shall be used, every individual sub-element in the safety function must fulfill the SIL3 requirements, and the safety function must in its entirety fulfill the SIL3 requirements.



Safety functions and Performance Level (PL)

How to enhance your circuit with Safety - SIL 1 / PLc

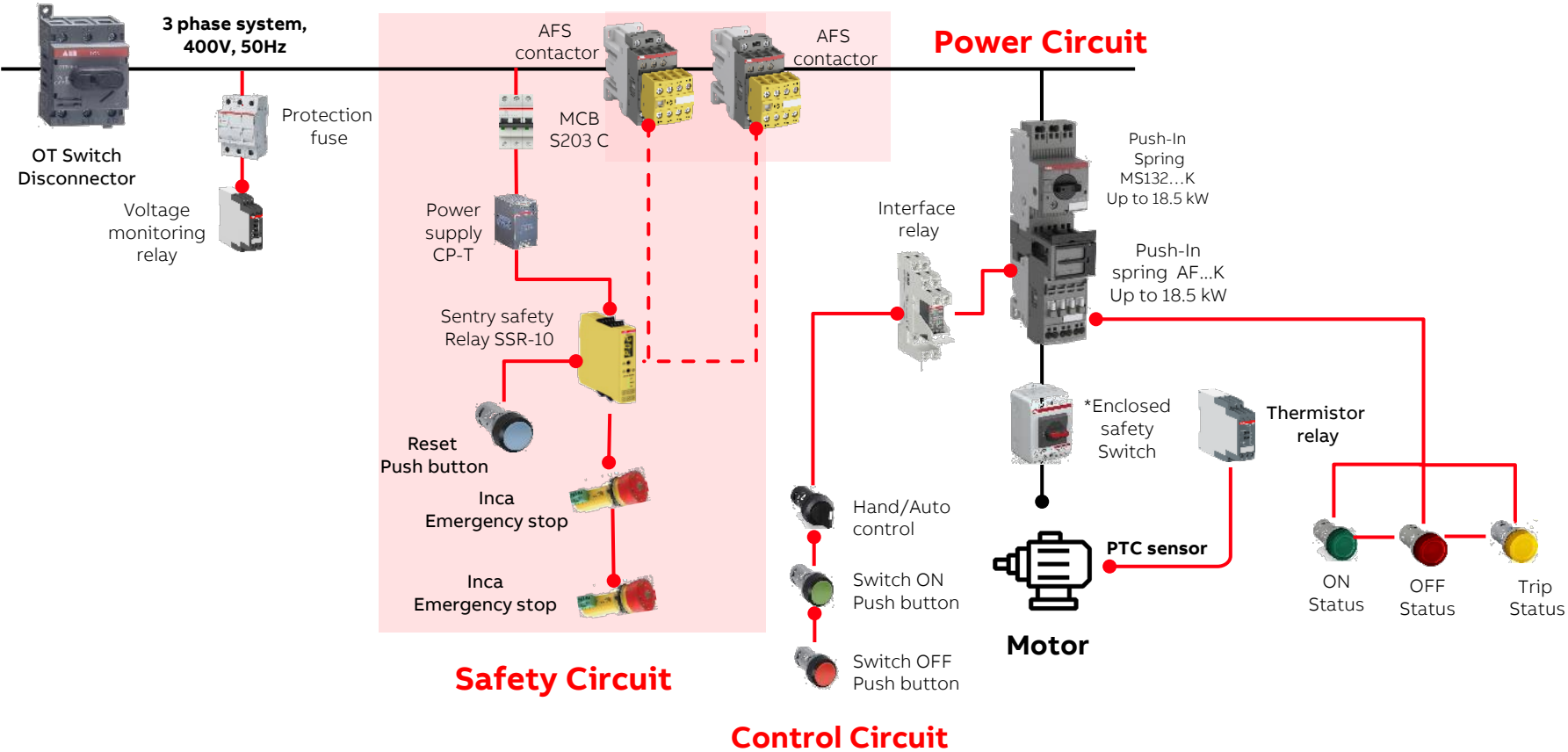
Example of how to enhance motor starting circuit to meet SIL1



Safety functions and Performance Level (PL)

How to enhance your circuit with Safety - SIL 2 / Ple with dedicated sentry safety relay

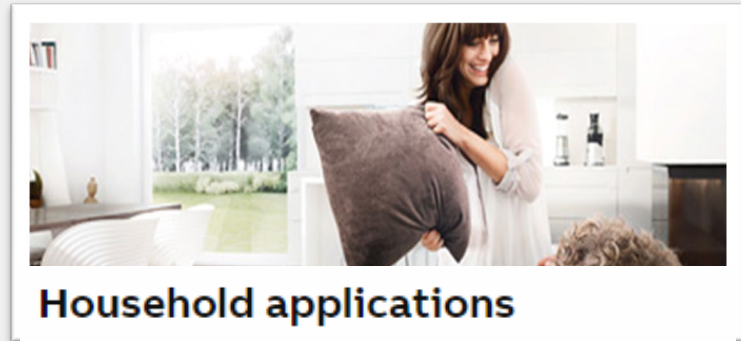
Example of how to enhance motor starting circuit to meet SIL3



Applications with specific requirements

Household applications

The choice of the electromechanical equipment installed in household appliances must be designed in accordance with specific standards.

[GO](#)[GO](#)

Household applications

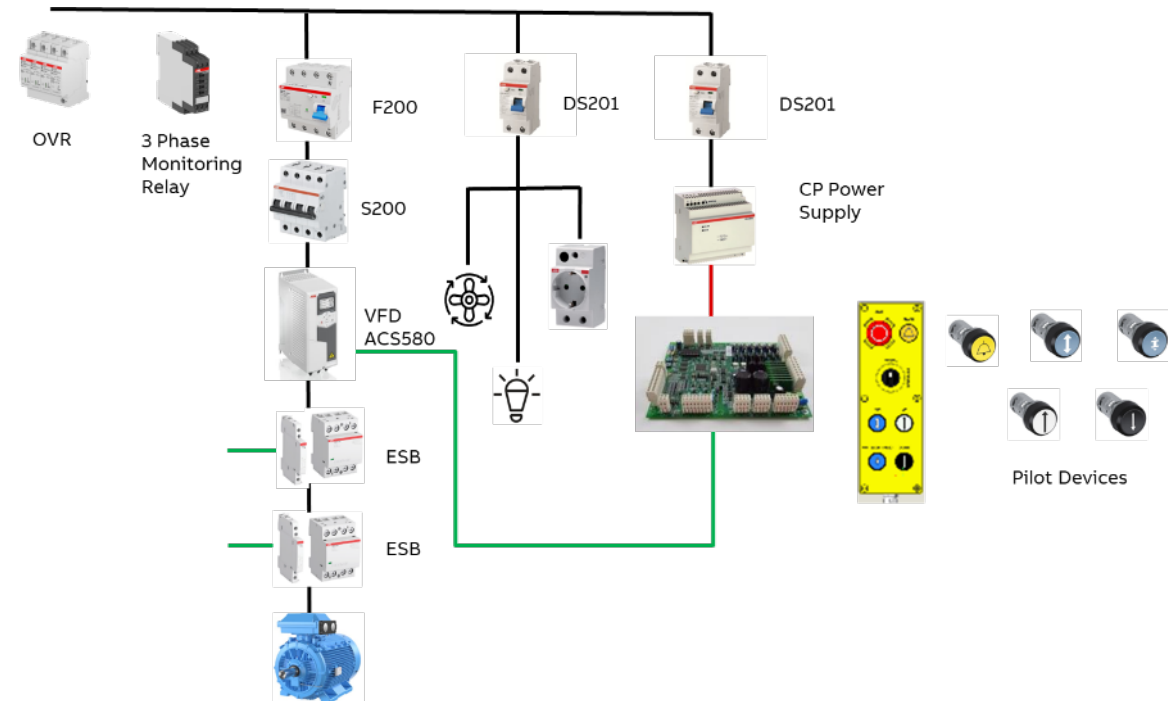
Applications for Machine Room-Less Elevators - IEC

Hoisting machine located within the top of the elevator shaft, without machine room required for traction elevators

Asynchronous motor with General purpose drive

Contactor

- Contactor's operates load free
- Mainly AC-1 application, AC-3 required in case of fault conditions
- Common contact configuration
 - 3NO poles and 1NC auxiliary for contactor status
 - 3NO poles and 1NO auxiliary for brake control



Household applications

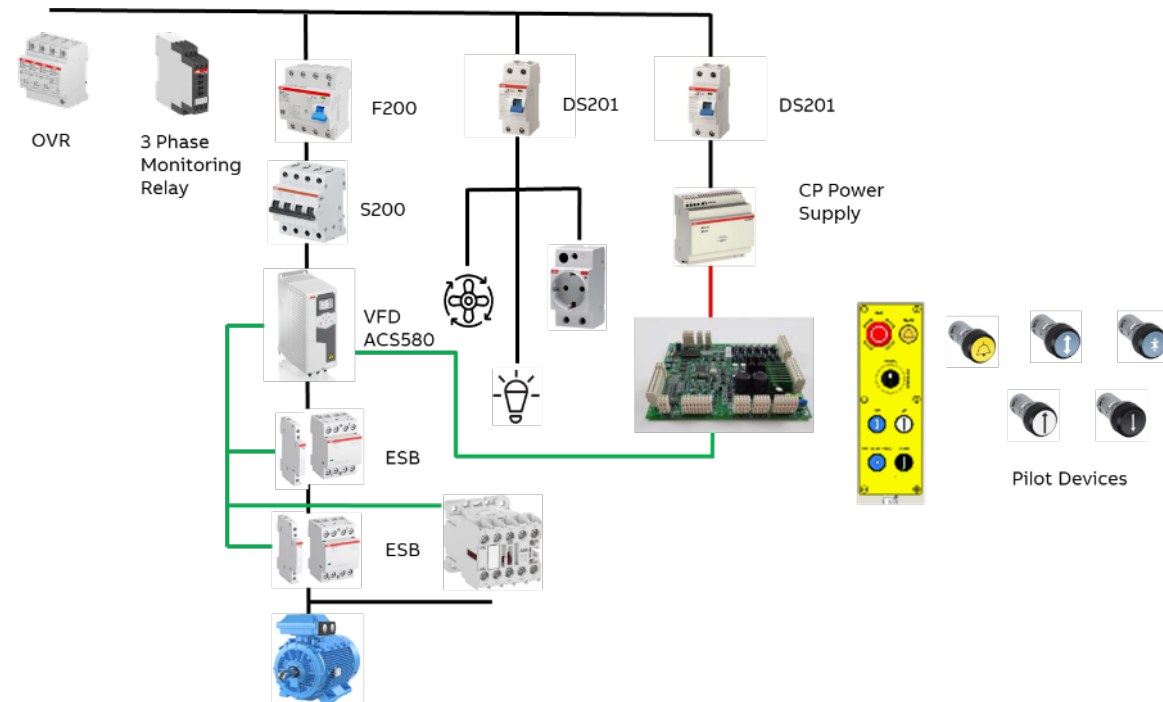
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 - 3NO poles and 1NO auxiliary for brake control



ABB

Links of interest



SOC - Selected Optimized Coordination



Library

Cadenas

