

# Motor starting and protection – the right solution for your application

Keep things moving with protection and  
control – at every level.



- Essential solutions for stand-alone machinery
- Enhanced solutions for discrete automation
- Advanced solutions for process industries

—  
**When it comes to keeping total cost of ownership down and boosting profitability, continuous operation and energy efficiency are essential. This is just what our broad portfolio of motor starting and protection solutions delivers.**

**Thanks to our best in-class, innovative technology, our solutions prevent downtime and can stand up to any conditions. And with our Selected Optimized Coordination (SOC) tool, choosing the right solution for your needs couldn't be easier.**

**So don't compromise. Keep things moving with protection and control – at every level.**

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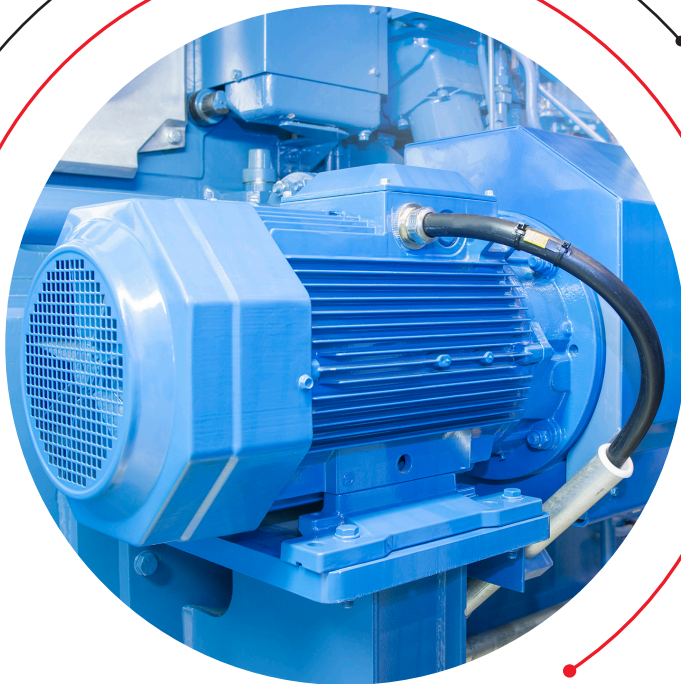
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# The vital role of high-efficiency motors in reducing energy consumption

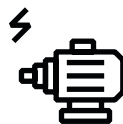
It is estimated that by 2050, the global population will rise to 9.7 billion, from 7.7 billion in 2019.<sup>1</sup> The global economy is expected to more than double over the same period.<sup>2</sup> Urbanization, automation, and the rise of living standards will increase the demand for energy globally. More than half of the world's population now lives in cities and towns, and the United Nations projects that the global urban population will increase to around 68 % by 2050.<sup>3</sup> If we continue with business as usual, this scale of expansion will accelerate climate change, and degrade the quality of air and water upon which all living organisms depend. To protect the environment without tempering economic growth, we need

to redouble our commitment to reducing the consumption of energy and natural resources. In keeping with global trends, the demand for electric motion is expected to grow significantly. According to the IEA, industry accounts for 37 % of global energy use and 24 % of global CO<sub>2</sub> emissions,<sup>4</sup> and buildings account for around 30% of energy consumption and 28 % of CO<sub>2</sub> emissions.<sup>5</sup> A large proportion of this activity is associated with electric motors. It is estimated that roughly 70 % of electricity consumed by industry is used by electric motor systems.<sup>6</sup> In commercial buildings, 38 % of electric energy consumption goes into powering motors.<sup>7</sup>



## 38 %

of electric energy use is for motors in commercial buildings.



## 70 %

of electricity consumed by industry is used in electric motor systems.

1. United Nations, Department of Economic and Social Affairs, Population Division, "World Population Prospects 2019: Highlights," [https://population.un.org/wpp/Publications/Files/WPP2019\\_Highlights.pdf](https://population.un.org/wpp/Publications/Files/WPP2019_Highlights.pdf).
2. Guillemette, Y. and D. Turner (2018), "The Long View: Scenarios for the World Economy to 2060," OECD Economic Policy Papers, No. 22, OECD Publishing, Paris, <https://doi.org/10.1787/b4f4e03e-en>.
3. United Nations, Department of Economic and Social Affairs, Population Division, "World Urbanization Prospects 2018: Highlights," <https://population.un.org/wup/Publications/Files/WUP2018-Highlights.pdf>
4. IEA, "Tracking industry 2020," <https://www.iea.org/reports/trackingindustry-2020>
5. UN Environment Programme, Global Alliance for Buildings and Construction, "Why buildings?," 2019 (2018 IEA data), <http://globalabc.org/media-globaladvocacy/why-buildings-our-key-messages>.
6. Fong, J.; F. Ferreira; A.M. Silva; and A.T. De Almeida, "IEC61800-9 System Standards as a Tool to Boost the Efficiency of Electric Motor Driven Systems Worldwide," *Inventions*, 2020, 5, 20, <https://www.mdpi.com/2411-5134/5/2/20/htm>.
7. Waide, P. and C.U. Brunner, "Energy-Efficiency Policy Opportunities for Electric Motor-Driven Systems," International Energy Agency working paper, Paris, 2011.

Electric motors have been in use for 150 years, and they have steadily improved over time. Over the past decade, however, they have undergone a period of exceptionally rapid technological advancement. The latest wave of improvements has opened the door to a significant reduction of the carbon footprint of industrial and commercial electric motors in the immediate future. An expanding range of highly energy-efficient electric motors (rated IE3 or higher) and the starters that can be used to run them are now available on the market.

These technologies hold the key to enabling many of the signatory countries of the Paris Agreement to meet their carbon reduction targets over the course of the next 10 years. The scope of their impact is potentially enormous. But to realize the full benefits of high-efficiency motors and starters, all stakeholders have critical roles:

- Public decision-makers and government regulators will need to incentivize their rapid adoption.
- Businesses, cities, and countries need to be aware of both the cost savings and environmental advantages and be willing to make the investment.

- Manufacturers like ABB will need to provide the necessary technologies and continue to drive innovation that improves energy efficiency.
- Investors need to reallocate capital towards companies better prepared to address the climate risk.
- Public education programs will be required to explain and promote the value of these upgrades.

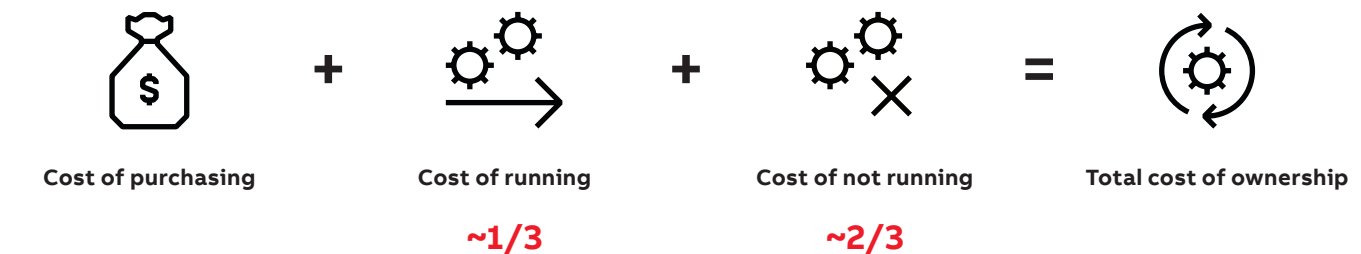
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Such steps have already been taken to support the uptake of electric vehicles and renewable energy sources. It is high time to do the same for a sustainable technology that promises to deliver even greater benefits for the environment and the global economy



# Reduce the total cost of ownership

## Easy selection of IE3/IE4 compatible solutions

The purchasing price makes up only a fraction of the total cost of ownership. Discover how ABB constant speed motor starting and protection solutions can help drive down the total cost of ownership of your installations.



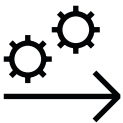
### Total cost of ownership

The cost of running an electric motor-driven system is reduced to three variables: purchase cost, cost of running and cost of not running. The proportion of the variables change depending on the products and applications.



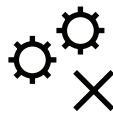
### Cost of purchasing

Even if the purchase price has the least impact on the total cost of ownership, using ABB products significantly decreases the design work and installation and commissioning effort, further driving down the cost of purchasing.



### Cost of running

Electrical motors are found everywhere – from simple pumps and fans to more sophisticated applications in the material processing or oil and gas industries. The energy costs contribute decisively to the total costs of a motor system. ABB has been offering premium efficiency IE3 motors for years, leading the way towards even higher energy savings, effectively reducing the cost of running an electric motor-driven system. ABB's low voltage motor starting and protection solutions are IE3/IE4 compatible, offering users of high-efficiency motors solutions with small footprints and low operation energy consumption.



### Cost of not running

The most overlooked costs are often the ones incurred by interrupting the process: equipment damage, lost revenue, late fees and lost opportunities, which impact the bottom line. Take an active step in driving down costs of not running with ABB's advanced solutions:

- Voltage sags, dips and surges pose no threat thanks to the AF contactors' electronically controlled coil
- Push-in Spring motor starting solutions provide vibration-proof and robust electrical contact with easier than ever wiring
- Universal Motor Controller, Tmax XT, softstarters and the Novolink modules for AF contactors offer advanced motor protection, integrated data and flexible communication as well as market leading software and connectivity to higher-level control systems

# Energy-efficient motor starting solutions

## Reduce CO<sub>2</sub> emissions with ABB's solutions

One of the biggest challenges of our time is the reduction of CO<sub>2</sub> emissions. ABB's motor starting solutions are ready for premium efficiency motors and help reduce the CO<sub>2</sub> footprint with energy-efficient technology.

2011	2015	2017	2021
IE2 minimum	IE3 or IE2 + variable speed drive (for motors 7.5-375 kW)	IE3 / IE4 or IE2 + variable speed drive (for motors 0.75-375 kW)	IE3 / IE4 (for motors 0.75-1000 kW)



### IE3 premium and IE4 super premium efficiency motors

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.

**~75 %**  
of all motors are used in full  
speed applications



### Selected optimized coordination (SOC) 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 brochure can be selected there. 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.



[Link to SOC tables](#)

up to **80 %**  
reduced coil energy consumption  
with the AF contactor range

more than **1800**  
tested and validated  
coordination tables available

# ABB's broad portfolio of motor starting and protection solutions are fully scalable, whatever the extent of your operations

- Continuous operation and energy efficiency
- Best in-class, innovative technology
- Prevents downtime and can stand up to any conditions
- Choosing the right solution for your needs is easy



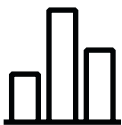
## Advanced

Get ahead with smart data and predictive applications, to keep your plant running



## Enhanced

Get robust protection with enhanced safety, control and monitoring



## Essential

Get the essentials right with fast, reliable installations



Integrated and future ready



Safety and protection





## Keep things moving with protection and control solutions from ABB – at every level.

Does the downtime of your application lead to financial losses or equipment damage? Keep your plants running and maximize uptime with **advanced solutions** for motor protection and control. Advanced solutions will allow you to detect problems earlier and prevent plant stand-stills with

integrated protection functions as well as extensive diagnostic and status information.

Ideal for segments such as: wastewater, pulp & paper, mining & minerals, oil & gas, chemicals, cement & glass

**Enhanced solutions** increase the safety and protection level of your machinery and equipment in addition to essential protection and control.

Ideal for applications such as: elevator machinery, cranes, food & beverage, machines for metal and wood processing, printing machines

**Essential solutions** guarantee indispensable protection and control functions for motors up to 560 kW.

Ideal for applications such as: pumps, compressors, fans, HVAC, material handling etc.

Even in basic applications, ABB will improve operation continuity of your installation and cut the control panel's assembly time.



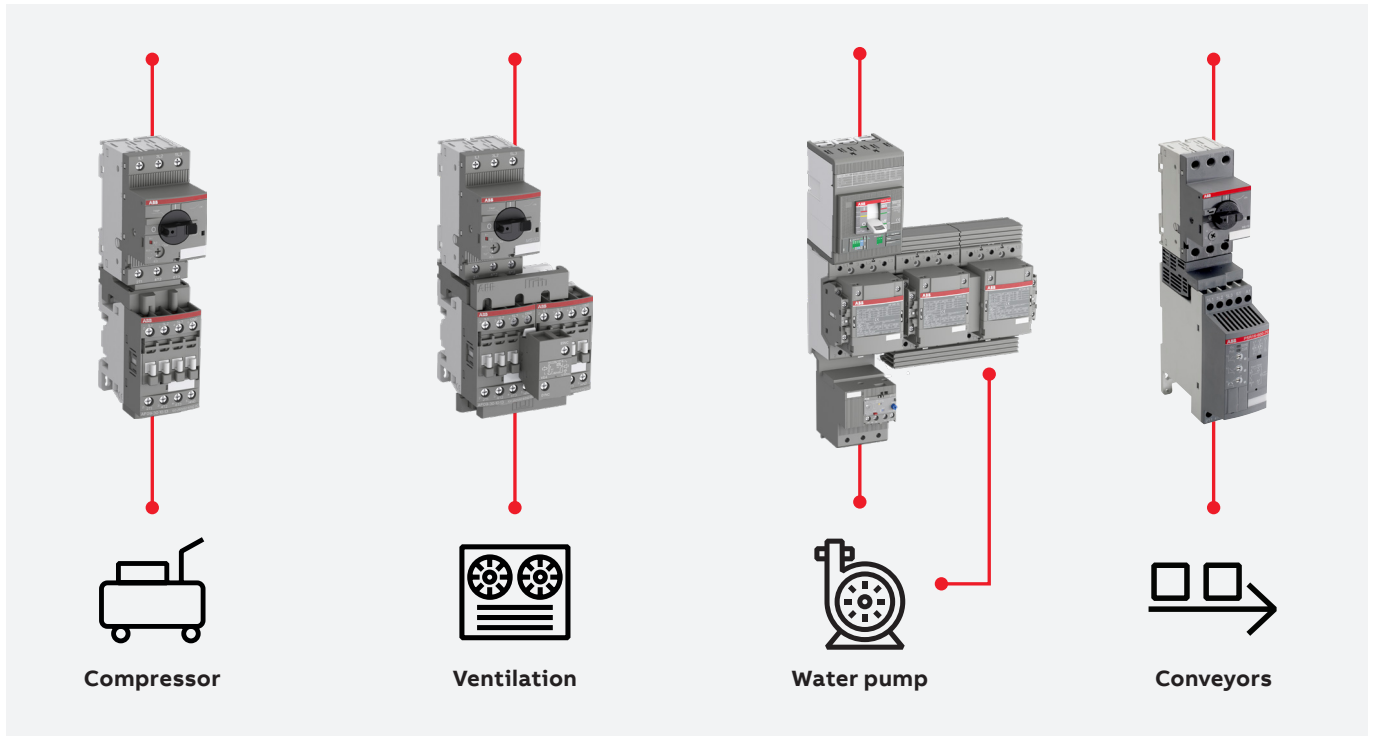
**Continuous operation**



**Easy to install**

# Essential solutions

Get the essentials right with fast, reliable installations



## Easy to install

Cut control panel assembly time by up to 50 %. This provides savings on labor costs, cuts the total cost of installation, and reduces time to market.

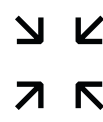
- Wide range of easy-to-use accessories and connection sets
- Push-in Spring technology opens up new possibilities. With its unmatched ease of use, wiring becomes far more intuitive
- PSR softstarter saving you time during installation and setup is done through three potentiometers making it very fast and easy



## Continuous operation

Ensure continuous operation so that your machines are even more competitive in the market, thanks to reliable connections, reliable power and a reliable partner.

- AF contactors ensure distinct operation in unstable networks and are a major advancement in motor control and power switching
- Push-in Spring motor starting solutions provide vibration-proof and robust electrical contact with easier than ever wiring
- More than 1800 tested and validated coordination tables available in the SOC tool, so that you can quickly and easily choose the right ABB solution
- PSR softstarters will reduce mechanical wear and tear on the application and increase availability as well as uptime



## Space saving

Compact design requires less space in the control panel, allowing you to reduce control panel dimensions and costs.

- Interlocking reversing pairs don't require spacing between contactors
- Connection kits for reverse/star-delta starters and kits for starter and short circuit protection device (SCPD) connection require less space
- Thanks to 80 % coil consumption reduction of AF contactors less heat is dissipated, so that the installation density in the panel can be increased
- The PSR softstarter can be connected to the manual motor starter to build compact and essential motor protection



# Essential solutions

## Key features

### Protection

#### Short-circuit and overload protection with single devices

MS116

MS132

MS132-K

MS165

Tmax XT



#### Motor power at 400 V AC (IEC) and at 480 V AC (UL)

From 0.03 up to 15 kW,  
from ¼ up to 20 hp

From 0.03 up to 15 kW,  
from ¼ up to 20 hp

From 0.03 up to 15 kW,  
from ¼ up to 20 hp

From 4 up to 45 kW,  
from 7 ½ up to 60 hp

From 0.25 up to 355 kW,  
From ½ up to 400 hp

#### Key features

Phase loss sensitivity, switch position ON/OFF, common accessories throughout the complete MS/MO range

Phase loss sensitivity, switch position ON/OFF/Trip, magnetic trip indication, common accessories throughout the complete MS/MO range, ATEX & IECEx certified, UL type E ratings and UL type F with AF contactors

Push-in Spring terminals, vibration-proof according to IEC 60068-2-27 and IEC 60068-2-6, self-tightening terminals, tool-less connecting links, phase loss sensitivity, switch position ON/OFF/Trip, UL type E ratings

Phase loss sensitivity, switch position ON/OFF/Trip, magnetic trip indication, common accessories throughout the complete range, ATEX & IECEx certified, UL type E ratings and UL type F with AF contactors

Electronic trip unit Ekip M LIU available up to 800 A, short circuit, overload, phase loss and unbalance protections are embedded in the trip unit. Wide range of internal and external accessories, high breaking capacity

### Control

#### Contactors

M and B mini

AF09..K ... AF38..K

AF09 ... AF1650 (AC-3)\*



#### Motor power at 400 V AC (IEC) and at 480 V AC (UL)

From 4 up to 5.5 kW, From 3 up to 7.5 hp

From 4 up to 18.5 kW, from 5 up to 25 hp

From 4 up to 560 kW, From 5 up to 900 hp

#### Key features

Very compact dimensions, several connection types, reversing solutions available, standard/low consumption/extended operating limit coils, wide set of accessories

Push-in Spring terminals, vibration proof, electronic AC/DC coil, wide control voltage range, only 4 coils cover 24 V–500 V AC and 20 V–500 V DC

Electronic AC/DC coil, wide control voltage range, only 4 coils cover 24 V–500 V AC and 20 V–500 V DC

\* AC-1 ratings available up to 2850 A.

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**Protection**


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**Short-circuit protection**

MO132

MO165

XLP fuse switch

OS switch fuse

Tmax XT




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**Motor power at 400 V AC (IEC) and at 480 V AC (UL)**
From 0.03 up to 15 kW,  
from ¼ up to 20 hpFrom 4 up to 45 kW,  
from 7 ½ up to 60 hp

From 1.2 up to 110 kW

From 5.5 up to 1000 kW,  
from 7 ½ up to 500 hpFrom 0.25 up to 450 kW,  
from ½ up to 500 hp

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**Key features**

Switch position ON/OFF/  
Trip, common accessories  
throughout the complete  
MS/MO range, UL type F  
ratings with AF contactors  
and EF/TF overload relays

Switch position ON/OFF/  
Trip, common accessories  
throughout the complete  
MS/MO range, UL type F  
ratings with AF contactors  
and EF/TF

Supports IEC fuse standard  
NH Fuses 000-4a. Available  
as base mounted and for  
different busbar distances.  
Electronic fuse monitoring  
available. Wide range of  
cable connection terminals  
and other snap on  
accessories

Supports many IEC and  
UL fuse standards. Front,  
side and motor operated  
versions. Special terminals:  
left-right or back-back. Knife  
contact technology, modular  
structure. Adjustable shaft,  
interlocked fuse cover, wide  
range of accessories

Magnetic MA/MF trip units  
up to 500 A. MA adjustable,  
MF fixed. Adjustable  
electronic trip unit with  
short-circuit protection  
Ekip M Dip I is up to 1600  
A. Wide range of internal  
and external accessories,  
high breaking capacity

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**Protection**


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**Overload relays**

TF - Thermal overload relay

EF - Electronic overload relay




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**Motor power at 400 V AC (IEC) and at 480 V AC (UL)**

From 0.06 up to 110 kW and from ½ up to 150 hp

From 0.06 up to 710 kW and from ½ up to 900 hp

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**Key features**

Trip class 10, separate stop button, manual / automatic reset  
selectable, test function, sealable cover, ATEX & IECEx certified types

Trip class 10E, 20E, 30E, separate stop button, manual / automatic reset  
selectable, test function, sealable cover, ATEX & IECEx certified types

# Essential solutions

## Key features

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### Control

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#### Softstarters

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PSR softstarter - compact range




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PSCR softstarter - optimized for scroll compressors




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**Motor power at 400 V AC (IEC) and at 480 V AC (UL)**

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From 1.5 up to 55 kW, from 2.0 up to 75 hp

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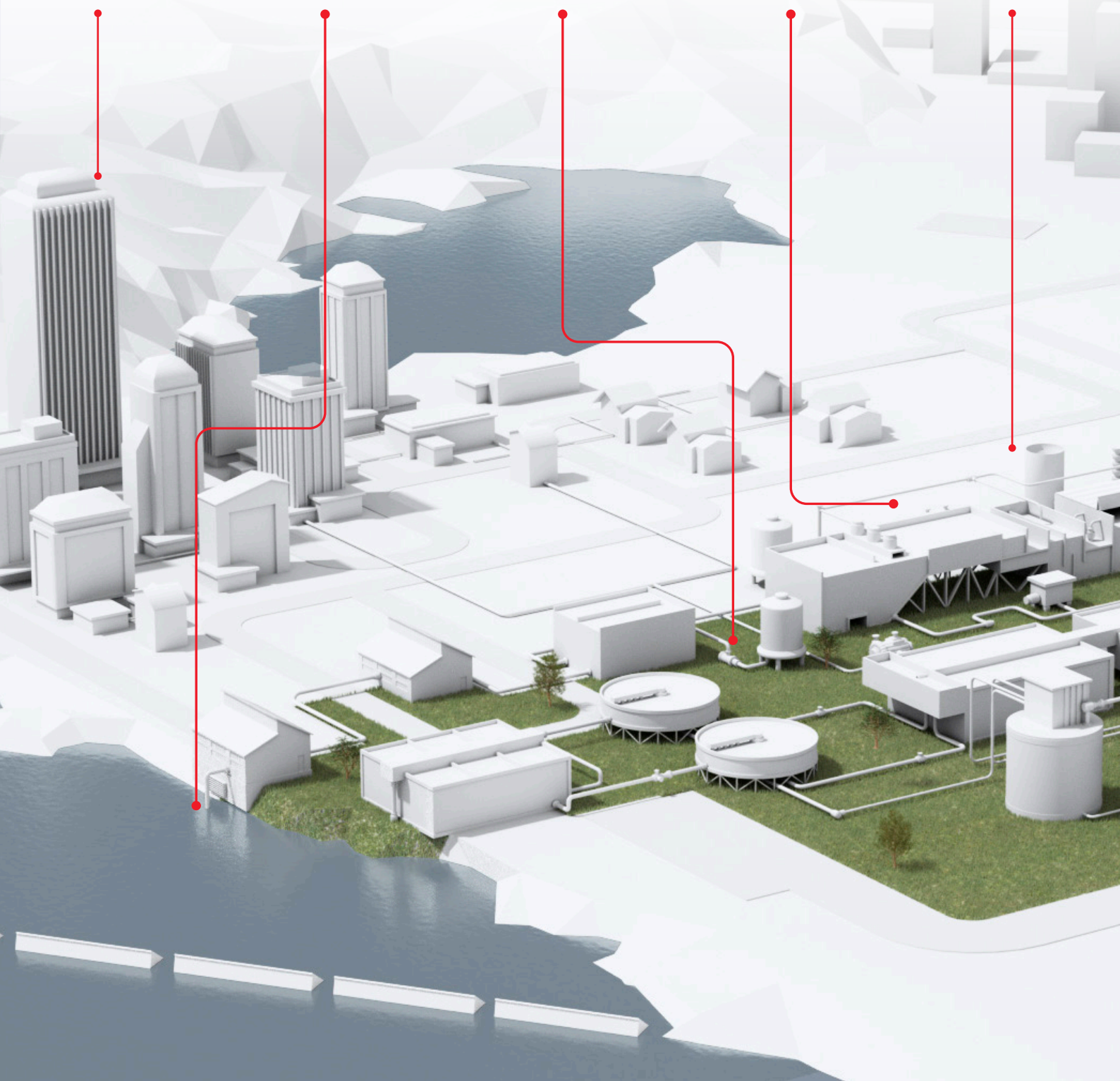
#### Key features

Two-phase controlled, soft start and stop with voltage ramp, built-in bypass for energy saving and easy installation, easy set-up by three potentiometers, run and top of ramp relays available for monitoring

Easy and reliable, 60 °C ambient temperature, temper proof: no risk of parameters getting changed after installation

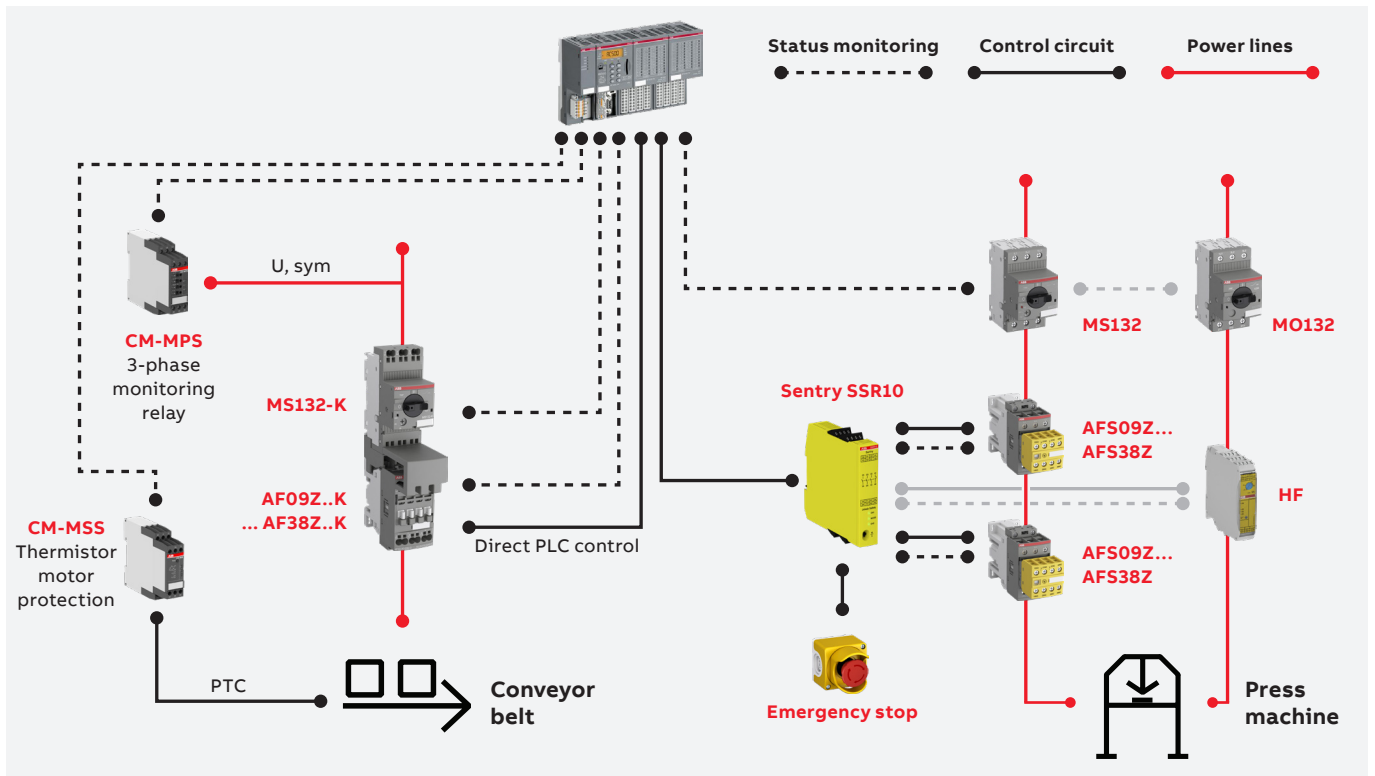
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While they may not be highly visible, electric motors are ubiquitous, an integral part of both global industry and our everyday lives

**Fans****Pumps****Compressors****Conveyors****Smoke exhaust fans**

# Enhanced solutions

Get robust protection with enhanced safety, control, and monitoring



## Safety and protection

Enhanced safety and protection for solutions with higher specification requirements.

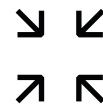
- Integration in machine manufacturer's systems complying with main standards EN ISO 13849, EN 62061 and IEC/EN 61508
- Trouble-free and economic operation of machines and installations thanks to the monitoring of all important parameters in three-phase networks
- Prevent overheating/load and insufficient cooling. Irregularities are signaled early to avoid plant downtime
- Softstarter coated PCBA protect sensitive electronics from corrosive environments



## Speed up your projects

Reduce time in the planning, designing, assembly and delivery of custom panels to market.

- Use the same starters in Europe, Asia and North America as one contactor coil now handles 100 V – 250 V AC / DC, 50 / 60 Hz
- Push-in Spring allows you to insert both ferruled and rigid cables without the need to use any tools, boosting productivity like never before
- PSE softstarter saving you time during installation and space in your panel. The keypad is language neutral and illuminated for easy set-up and operation in the field. The compact design makes installation fast and easy



## Space-saving

Space is usually very limited for control panels, but our compact solutions are designed to easily fit into your application.

- Motor starters can be controlled directly by a PLC thanks to AF contactor versions with low consumption coil, external or built-in PLC interface. No need for interface relays, which require extra space
- Motor starters up to 3 kW / 3 hp require 90 % less space thanks to ABB's HF electronic compact starter. At just 22.5 mm width, it still provides motor starting functionalities with embedded protection and safety





# Enhanced solutions

## Key features

### Protection



The short-circuit and overload protection device used for enhanced solutions. Includes the same protection products and can be selected from the essential solutions group, on pages 10 and 11.

### Monitoring and protection

#### Electronic relays

CM-MSS

CM-MPS

CM-TCN



#### Key features

##### Thermistor motor protection

Dynamic interrupted wire detection, short-circuit monitoring of sensor circuit, non-volatile fault storage, remote reset, screw or push-in terminals available, ATEX-certified

##### Three phase monitoring relay

Over-/ undervoltage, phase unbalance, phase sequence monitoring, phase failure detection, screw or push-in terminals available

##### Temperature monitoring relays

Different types of sensors and monitoring functions (over-/under-temperature, window monitoring), open- or closed-circuit principle configurable, short-circuit monitoring and interrupted wire detection

### Control and protection

#### Electronic Compact Starter

HF starter with overload protection

HF emergency stop application

#### Softstarter

PSE softstarter



#### Motor power at 400 V AC (IEC) and at 480 V AC (UL)

From 0.18 up to 3 kW,  
from 0.4 up to 3 hp

From 0.18 up to 3 kW,  
from 0.4 up to 3 hp

From 7.5 up to 200 kW,  
from 10 up to 300 hp

#### Key features

Width of only 22.5 mm, direct and reverse switching of motors up to 3 kW/400 V AC, integrated overload (trip class 10 A) and phase unbalance protection, fault auxiliary, three reset modes, LED indication

Safety variants offer same functionality as standard variants, emergency-stop rated up to SIL 3 (IEC 61508-1) and PL e (ISO 13849-1), ATEX certification

Voltage ramp and torque control for both start and stop, phase controlled, current limit, kick-start, built-in bypass for energy saving and easy installation, analog output for display of motor current, built-in Modbus RTU

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**Control**


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**Contactors**

AF09Z ... AF38Z

AF09Z..K ... AF38Z..K

AF40 ... AF1650

AFS09Z... AFS38Z

AFS09... AFS750




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**Motor power at 400 V AC (IEC) and at 480 V AC (UL)**
From 4 up to 18.5 kW,  
from 5 up to 25 hpFrom 4 up to 18.5 kW,  
from 5 up to 25 hpFrom 18.5 up to 560 kW,  
from 30 up to 900 hpFrom 4 up to 18.5 kW,  
from 5 up to 25 hpFrom 4 up to 400 kW,  
from 5 up to 500 hp

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**Key features**

Versions for PLC  
24 V DC  $\geq 250$  mA, or other  
specific applications: low  
consumption coil, 24 V  
DC fast operating time,  
Semi F47: immunity from  
voltage dips and sags

Push-in Spring terminal,  
vibration proof, versions for  
PLC 24 V DC  $\geq 250$  mA, or  
other specific applications:  
low consumption coil,  
24 V DC fast operating time,  
Semi F47: immunity from  
voltage dips and sags

Built-in or external  
PLC interface, electronic  
AC/DC coil, wide control  
voltage range, only 4  
coils cover 24 V–500 V  
AC and 20 V–500 V DC

Dedicated for  
safety applications: mirror  
and mechanically linked  
contacts, factory-mounted,  
cover-shield, guaranteeing  
the right contactor status  
end preventing unexpected  
operations. Versions for  
PLC 24 V DC  $\geq 250$  mA: low  
consumption coil,  
24 V DC fast operating time

Dedicated for safety  
applications: mirror  
and mechanically linked  
contacts, factory-mounted,  
cover-shield, guaranteeing  
the right contactor status  
end preventing unexpected  
operations, electronic AC/  
DC coil, wide control voltage  
range. Built-in PLC interface  
available AFS116...AFS750

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**Control**


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**Novolink™**
New


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 Novolink™ smart modules for AF contactors
 

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**Key features**


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Snaps onto 24 V DC contactors from AF09 to AF96, remote  
control and monitoring via X2X directly from within a B&R PLC,  
provides relevant maintenance counters like motor operating  
hours, switching cycles, trip counters etc., allows monitoring  
of short circuit protection devices using a digital input

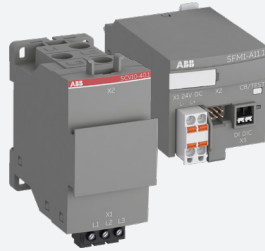
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## Advanced solutions

Get ahead with intelligent, predictive operations thanks to integrated data and advanced connectivity



Universal motor controller UMC100.3



Novolink modules for AF contactors



Softstarter PTSX



Breaker SACE Tmax XT



### Integrated and future ready

Data and precise measurements accessible via flexible communication options ensure reliable operations and efficient energy management. Adapt to future needs without big investments.

- The UMC100.3 is compatible with more communication protocols than any other motor controller. This allows you to have software that enables predictive maintenance and acts as an intelligent data hub
- The SACE Tmax XT range enables you to monitor and manage a wealth of information easily, no matter where you are and allows you to easily upgrade trip units to suit your changing needs



### Continuous operation

Detect problems earlier and prevent plant stand-stills with integrated protection functions as well as extensive diagnostic and status information.

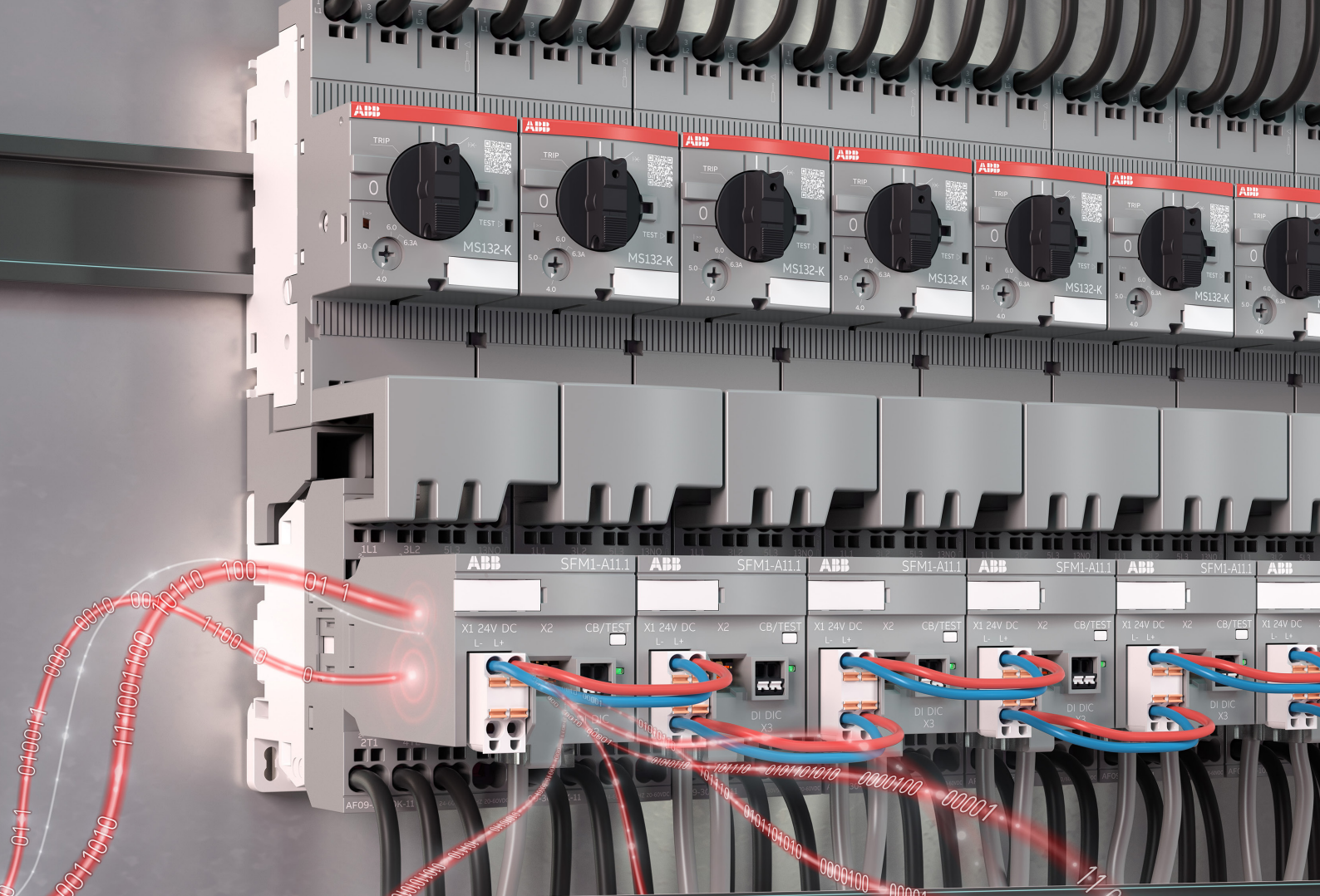
- Protect your motors at all times with the UMC100.3, even if your control or communication system (Ethernet or Fieldbus) breaks down
- With the SACE Tmax XT up to 30 % more data is available on the cloud, making diagnosis and maintenance much easier
- Softstarters help increase your motors lifetime by protecting it from electrical stress. Starting currents are easily optimized to your load, application and motor size



### Speed up your project

Design, commissioning, and maintenance are easy, cutting costs and saving you time. ABB's flexible designs allow you to have a tailor-made solution.

- With the UMC100.3, simple software configuration means that you are always in control. Parameters can be set via quality FDI-based software or directly using the operating panel
- With the SACE Tmax XT range, trip unit settings performed via front display and bluetooth and Ekip Mobile connectivity, can save you up to 40 % time overall
- Reduce your installation time and panel size by having all features you need built into your softstarter



Trip Ack

**Trip**

OFF

4

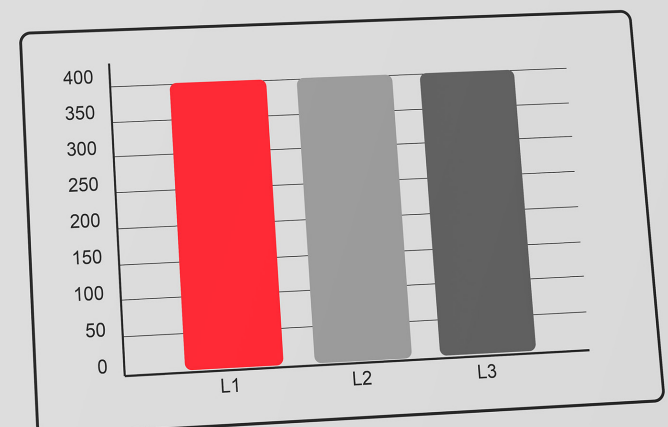
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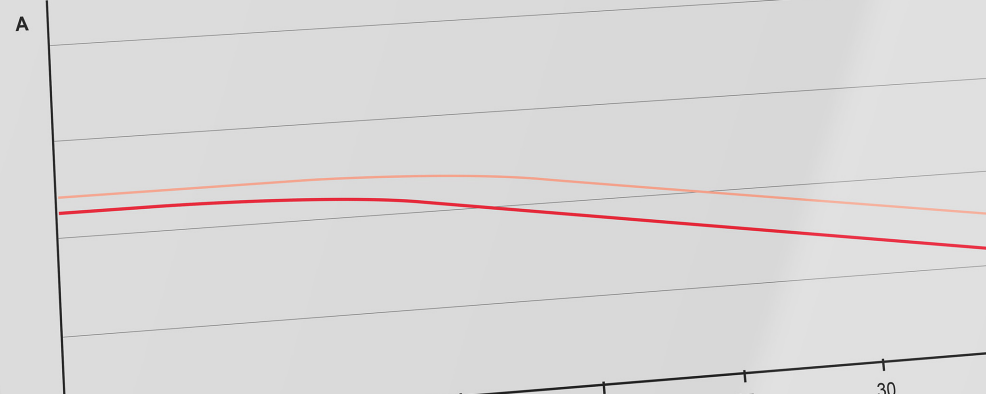
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507 h

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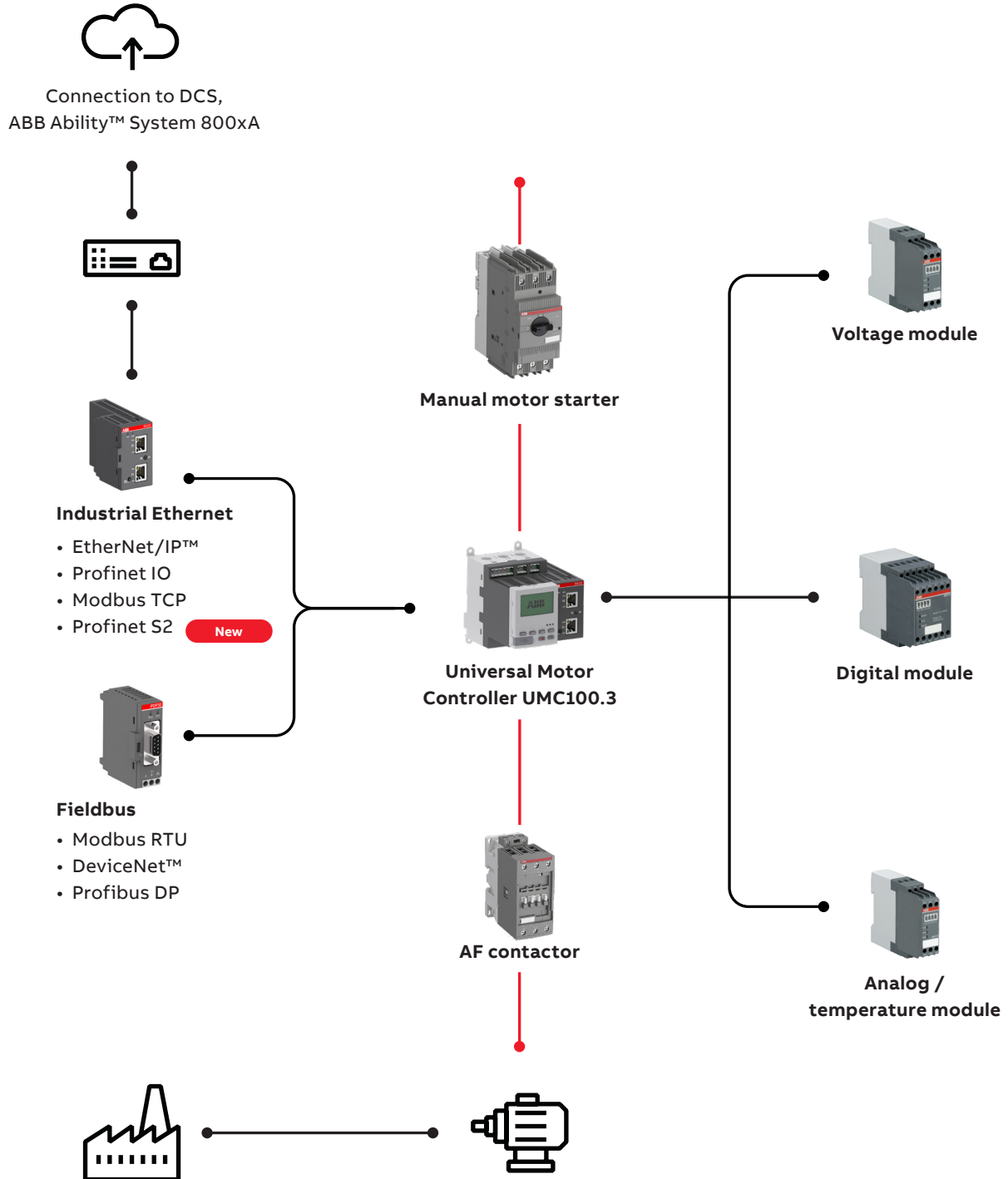


Motor current



# Advanced solutions

## UMC100.3 application example



# Advanced solutions

## UMC100.3 key features



### 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 into distributed control systems (DCS)

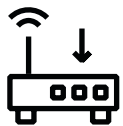
The UMC100.3 connects to ABB Ability™ System 800xA which acts as a gateway for ABB Ability™ Energy and Asset Manager. Due to the support of many communication systems, it also fits into other control systems and programmable logic controllers (PLC).



### 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 and operating and monitoring modes allow a fast and easy configuration of the UMC100.3, testing and online diagnosis. Project management is included for the handling of larger projects and the localized software allows for multilingual use.

New



### Communication modules

Fieldbus interfaces are available for Profibus DP, DeviceNet and Modbus RTU. Ethernet interfaces are available for EtherNetIP™, Modbus TCP and Profinet IO. They meet all the relevant standards and are tested and approved by the relevant certification bodies, to ensure a proper function with the control system. The modules can be mounted in two ways:

- Directly onto the UMC100.3
- Separately in the cable chamber of an MCC



### 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 ( $\cos \varphi$ )
- Voltage-based detection of phase failure, asymmetry and sequence



### Motor control

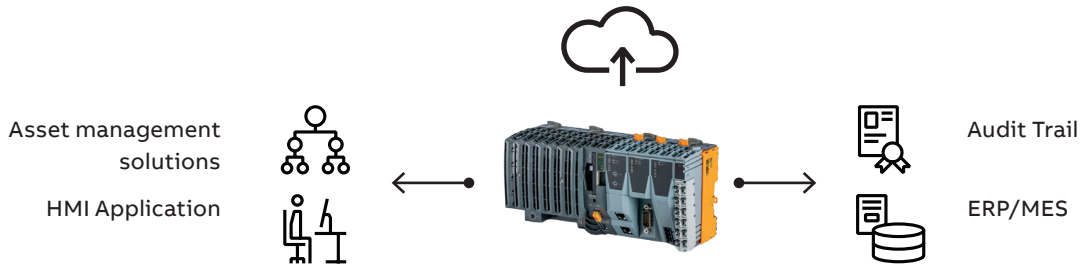
- Integration of the most important motor control functions as ready, easily parameterizable blocks
- Direct, reversing, star-delta starters
- Pole changing Dahlander / Actuator mode
- Inching / jog mode
- Adjustable restart strategy (load shedding)

### 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

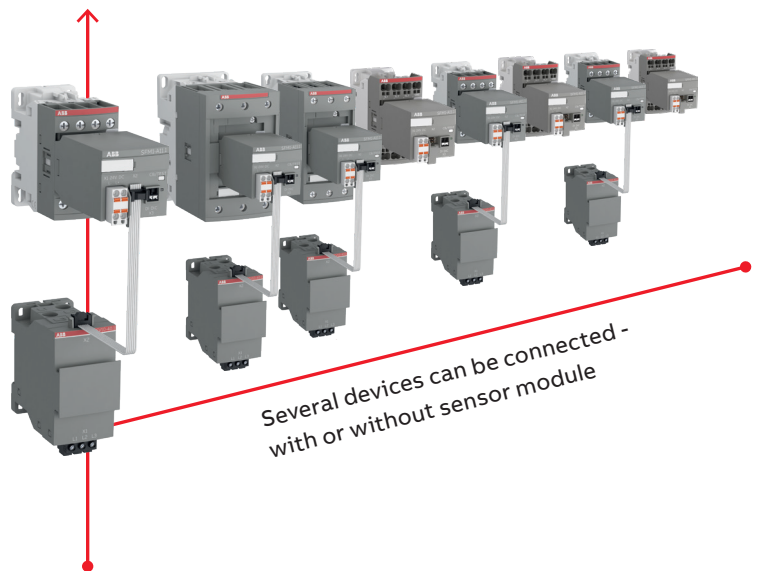
# Advanced solutions

## Novolink™ smart modules for AF contactors



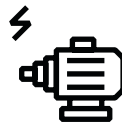
**100%**

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**

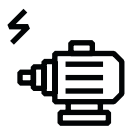


**Speed of installation**  
Reduction of control side wiring. Integration of multiple functions into one device. Reduction of required PLC I/O signals.



# Advanced solutions

## Novolink™ key features

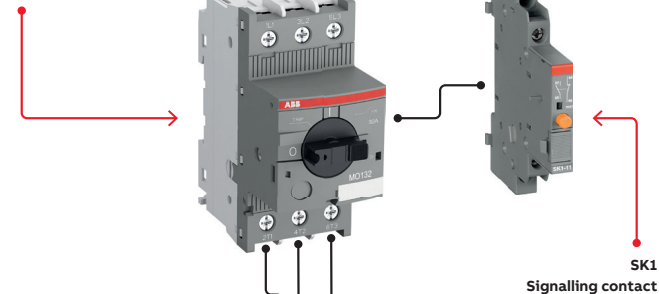


### Smart function device SFM1

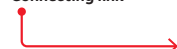
This contactor module snaps onto contactors from AF09 to AF96 with 24 V DC operated coils. It is seamlessly integrated into the B&R automation system via the X2X bus.

- Provides relevant maintenance counters like motor operating hours, trip counters and more data
- 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

MO132  
Manual motor starter



BEA  
Connecting link



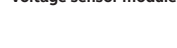
AF09...AF96  
contactors



Smart Function  
Module



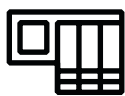
Smart Current /  
Voltage sensor module



### Smart current voltage device SCV10

This high-end motor protection device provides an optional extension to the contactor module. This allows assessment of the status of connected equipment.

- Measure line voltages, phase currents, power, frequency, total harmonic distortions and other relevant parameters
- An advanced thermal model of the motor 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
- Integrated voltage measurement up to 690 V AC
- Cos-phi and real power allows to monitor and protect pumps and other connected loads
- Earth fault and frequency measurement
- Measures load situation in each phase

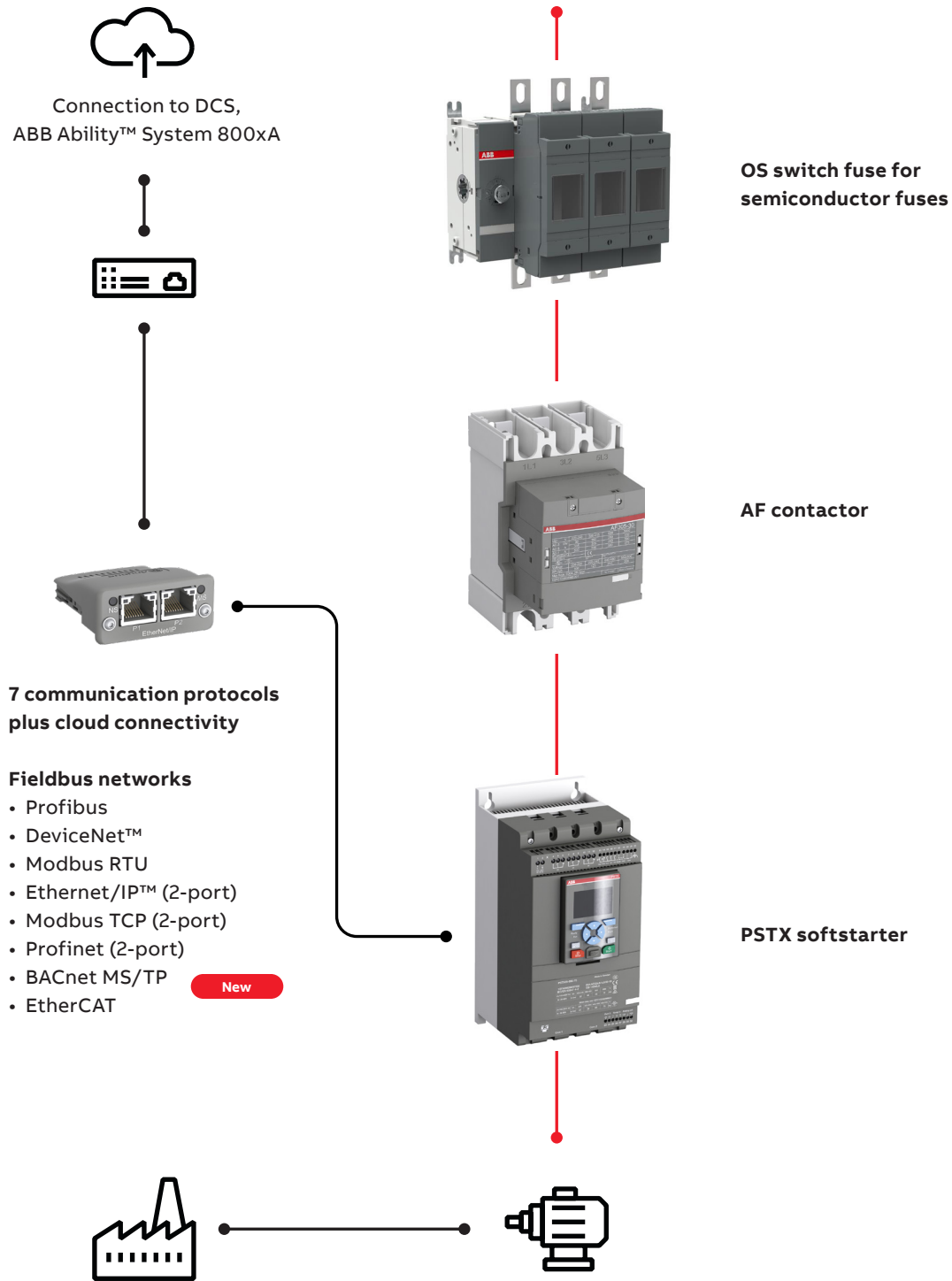


### Effortless commissioning with B&R PLCs

Novolink devices can connect easily to X20BT9400 with ready-made SFM-CAB-RJT B cables. On one side, the SFM-CAB-RJT B 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

# Advanced solutions

## PSTX softstarter application example



# Advanced solutions

## PSTX softstarter key features



### Heavy duty design

Handle heavy applications such as centrifugal fans, mills, and mixers.



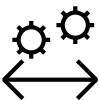
### Coated PCBs

Protecting from dust, moisture, and corrosive atmospheres.



### HMI: A user-friendly and clear display

saves you time and resources during both setup and operation. The detachable keypad is standard on all PSTX softstarters with IP66 and 4x outdoor for tough environments.



### Jog with slow speed forward & reverse

The slow speed forward and backward jog feature will make you more flexible when operating, e.g. conveyor belts and cranes.



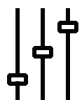
### Torque control function

The torque control function is the best possible way to stop pumps without water hammering and pressure surges.



### Built-in bypass saves time and energy

When reaching full speed, the PSTX will activate its bypass. This saves energy while reducing the softstarter's heat generation. On the PSTX, the bypass is built in and verified by ABB, saving you time during installation and space in your panel.



### Three types of current limit

PSTX offers three types of current limit: standard, dual, and ramp. This gives you full control of your motor when starting it up. It also allows you to use your motor in weaker networks.



### Complete motor protection

The PSTX offers complete motor protection and is able to handle both load and network irregularities. PT-100, earth fault protection and over/under voltage protection along with many other functions keep your motor safer than ever.



### Built-in application enhanced features

Time to use your processes to their full potential. The PSTX features many application enhancing features, including torque control, standstill brake, dynamic brake, motor heating, pump cleaning, underload, and lock rotor protections to securing the uptime of your system.

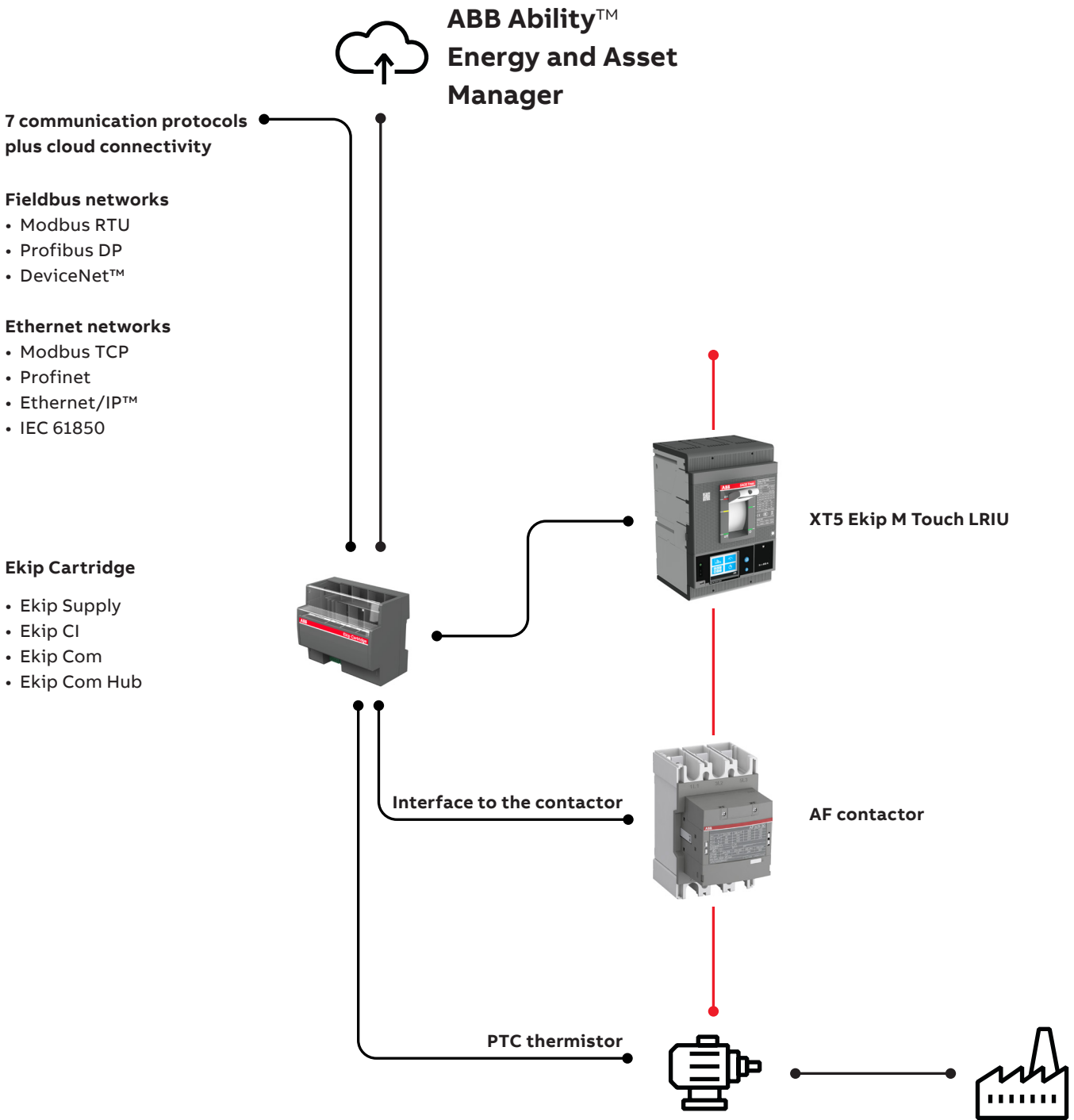


### Flexible communication

Built-in Modbus and Anybus as an option for all major communication protocols such as Modbus RTU, Profibus, Profinet, Ethercat, BACnet, Ethernet, and DeviceNet.

# Advanced solutions

## Tmax XT Ekip M Touch LRIU application example



# Advanced solutions

## Tmax XT Ekip M Touch LRIU



New

### Ekip M Touch LRIU

It allows a large number of specific protections, thus ensuring high trip accuracy and extremely reliable operations, while granting a complete motor protection fully integrated into Tmax XT2-XT4-XT5-XT7 circuit breakers, up to 1250 A.

This solution is even able to interact directly with the contactor and can also be connected to a PTC sensor, to monitor the temperature of the motor and open the contactor in case the motor overheats.

### Ekip M Touch LRIU allows several protection functions:



**Overload protection**, with thresholds complying with IEC 60947-4-1 and relevant Annex 2. The tripping time is defined by choosing the appropriate trip class. Moreover, with the thermal memory function always active, the unit trips in a shorter time than the time set for a cold fault condition whenever a new overload occurs before the thermal memory automatically resets.



**Locked rotor protection**, which ensures the operating conditions defined by IEC 60947-4-1 Annex 2.

- The “Jam” condition to protect the motor against rotor jamming during normal operation, to ensure the start-up phase is properly performed
- The “Stall” condition to protect and operate the motor against rotor jamming upon start-up



**Short-circuit protection**, which guarantees an immediate trip when a short-circuit occurs, thus ensuring the correct start-up in the presence of high current values flowing for some milliseconds.



**Phase unbalance protection**, which acts against unbalances among the currents circulating in the phases.



**Earth fault protection**, which trips in case of faults between the phases and the earthing conductor.



**Undercurrent protection**, which prevents damages to the motor under conditions of reduced or null load.

### Ekip CI module

The Ekip CI module can be installed into the Ekip Cartridge giving the chance of additional functionalities:



**PTC connection:** with thresholds complying with IEC 60947-8, it is possible to connect a PTC (PT100) sensor to the trip unit. When the temperature is exceeded the trip unit opens the circuit breaker.



**Interface to the contactor:** motor protection and operation are optimized when both contactor and circuit breaker are used. In case of fault, instead of opening the circuit breaker, the trip unit commands the contactor, which can guarantee a consistently higher operation numbers than a circuit breaker (about 1 million).

### Connectivity and measurements with Ekip M Touch LRIU



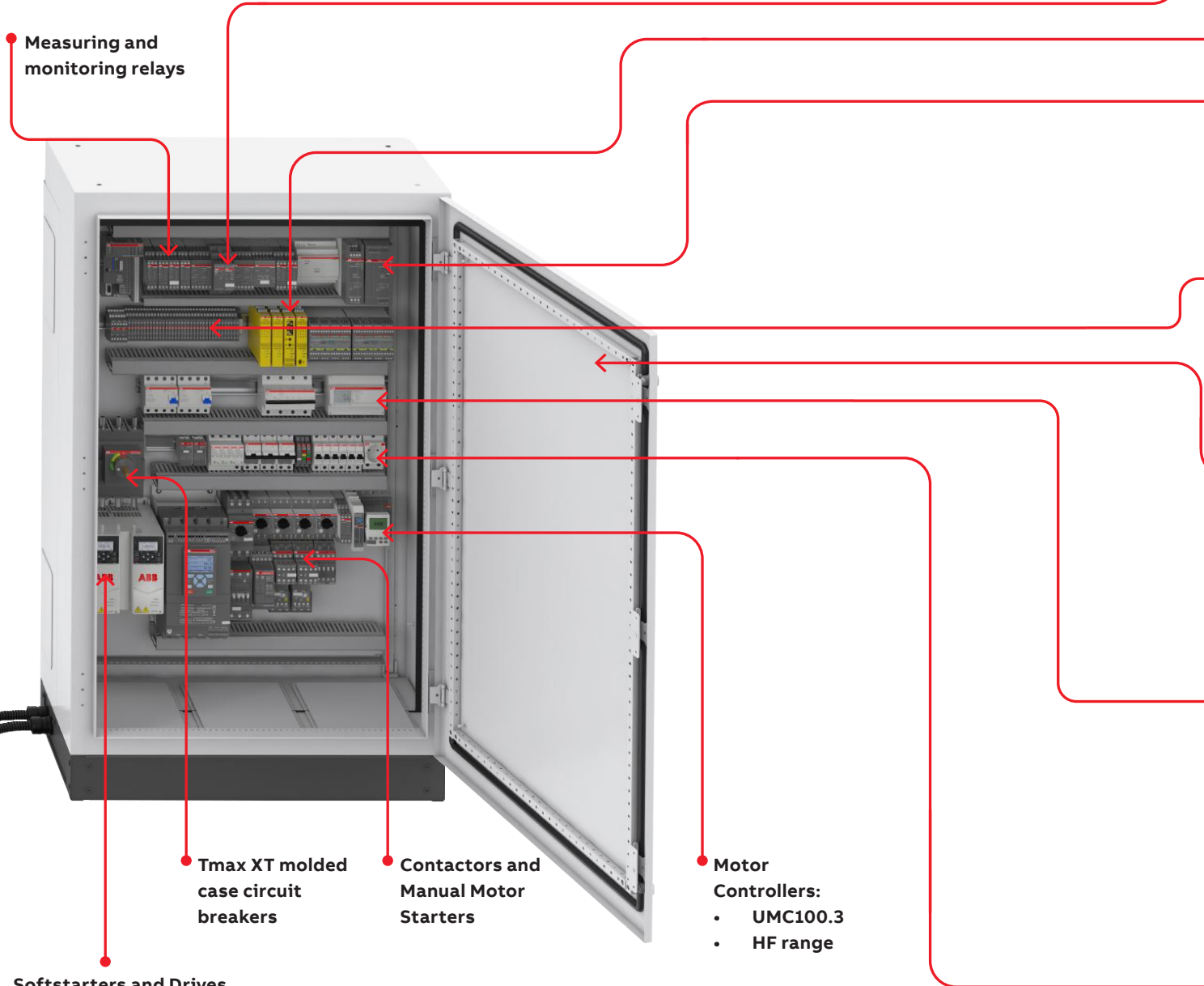
Ekip M Touch LRIU enables connectivity through several communication protocols, and thanks to ABB Ability™ Energy and Asset Manager, data is always quickly available on the cloud.



Ekip M Touch LRIU also allows measuring of the main parameters of the system with extreme accuracy (current, voltage, energy, power, power factor, etc.).

# Complete solutions for control panels

ABB's broad portfolio offers all you need for your application, at every level.



## Softstarters and Drives

ABB drives provide flexibility to help you optimize your processes and control, as well as increasing reliability and reducing downtime. You also get premium service and expertise, anywhere on the globe. ABB's softstarters increase a motor's lifetime by protecting it from electrical stresses. With everything that you need in one unit, from bypass contactor to overload protection, a single softstarter makes for a compact and complete starting solution.



### Time relays

Choose ABB as your partner for all your low voltage timing control needs to leverage our wide variety of product options. From economic to high-end solutions – the range offers maximum value. On-delay, off-delay and a range of other functions cover all requirements.



### Safety products

ABB develops and supports the world with premium, intelligent machine safety products and has many years of experience with the practical application of safety requirements and standards from both authorities and production. Delivering everything from a single safety solution to complete safety systems for single machines or entire production lines is a given. The extensive range of safety products is designed to make your machine safety system easy to build and maintain.



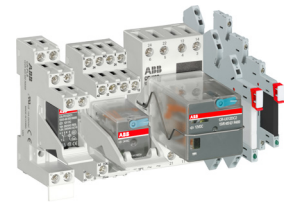
### Power Supplies

Choose ABB as your power supply partner and leverage our wide variety of product options. From economic to high-end solutions, the CP range offers maximum value. Their excellent reliability in daily use is well proven even under the toughest of conditions.



### Interface relays and optocouplers

ABB offers a complete range of interface relays and optocouplers for increased flexibility and choice. This portfolio includes pluggable relays for easy interchangeability and optocouplers for an extended electrical life. The portfolio includes electromechanical relays and optocouplers - the electromechanical relays operate using an electromagnetic field, whereas optocouplers use light.



### SR1, IS2 automation boards

ABB's range of automation & multipurpose boards is extremely versatile and used in industrial automation applications but also in segments like Food & Beverage, Solar, Oil & Gas etc. Thanks to high degrees in protection (IP) and mechanical strength (IK) automation & multipurpose boards can be used even in harsh environments. International approvals and certifications are available for the whole range.



### Network analyzers, multimeters and energy meters

ABB's Network Analyzers and Multimeters range of System pro M compact® includes a comprehensive offer of front panel and DIN-Rail devices designed to monitor when, where, and how power and energy are consumed by measuring and analyzing in real-time the main electrical parameters of the network and the power quality KPIs. Customers can also benefit from scalable solutions for energy and asset management thanks to the connection of M4M power meters with ABB Ability™ Energy and Asset Manager cloud-computing platform.



### Modular DIN Rail components

System pro M compact® is a complete assortment of first-class quality products such as miniature circuit breakers, residual current devices, surge protection devices, control, signaling, measuring, and smart accessories. Using the full System pro M compact® from ABB will unleash a world of advantages for protection as well as smart and efficient solutions.



### Measuring and monitoring relays

No matter what measuring or monitoring function is needed – physical or electrical – ABB protects your equipment and ensures processes run smoothly. ABB relays are designed to detect overloads, temperature, liquid, and other potentially damaging fluctuations.

Choose from a large range of products that provide reliable protection, cost savings, and maximum availability for processes and equipment. No matter what the environment, ABB's high quality products are built and tested to give you uninterrupted monitoring.



### Tmax XT molded case circuit breakers

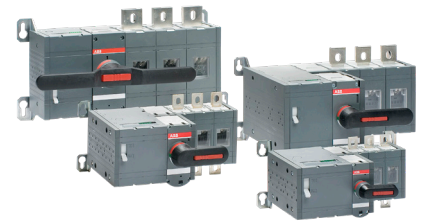
The SACE Tmax XT series of Moulded Case Circuit Breakers (MCCBs) are designed to maximize ease of use, integration, and connectivity while reliably delivering safety and quality.

Rather than just offering standalone protection, they are seen as key elements of the system that give you complete flexibility, extreme breaking capabilities and reliable performance under pressure. With seven different sizes and protection features of up to 1600 A there's a solution for every purpose.



### OT switch-disconnections

ABB offers switch-disconnectors from 16 to 4000 A are suitable for diverse applications such as machinery, power distribution, switchboards, motor control centers, or photo-voltaic installations. These devices are globally available and always supported by our skilled and dedicated worldwide service network.



### Universal Motor Control UMC100.3

The Universal Motor Control UMC100.3 is future ready – and ready to take motor control to the next level. With outstanding user experience, unrivaled communication, and simple configuration, smooth running of your operations has never been so effortless.

Intelligent ABB motor controllers combine motor protection and control functions, fieldbus and Ethernet communication, and fault diagnosis in just one device. It provides detailed operational, diagnostic, and service data continuously, providing an effective data source for modern predictive maintenance systems in any plant.



### Electronic Compact Starters HF range

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.

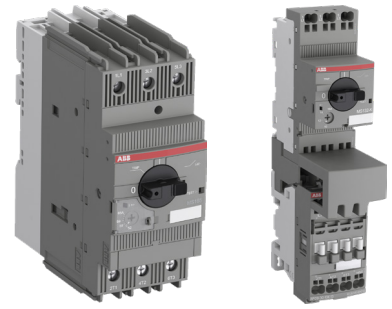
Direct on-line and reversed starter with overload protection and emergency stop versions are available, making the range a perfect fit for high frequent and reliable long life switching of such applications as paper machines, conveyors, pumps, compressors and machine tools.





**Manual Motor Starters**

Manual Motor Starters are mainly used to switch motors ON/OFF manually and to provide fuseless protection against short circuits, overload- and phase failures. Fuseless protection saves costs and space and ensures a quick reaction under short circuit conditions by switching the motor off within milliseconds. Starter combinations are set up together with contactors and are available with screw or Push-in Spring terminals.

**AF contactors**

Featuring AF technology as standard, AF contactors establish 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.



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**You can find the address of your local  
sales organization on the ABB homepage**

**[abb.com/lowvoltage](http://abb.com/lowvoltage)**



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