The right solution of motor starting and protection to prevent downtime and boosting profitability

โซลูชั่นการสตาร์ทและป้องกันมอบอั่งที่มีประสิทธิภาพที่ช่วยลดการสูญเสียและเพิ่มผลกำไร
Agenda

Energy-efficient motor starting solutions
Essential solutions
Enhanced solutions
Advanced solutions
Total cost of ownership
Complete solutions for control panels
About Myself

Product Marketing Team

Tour
Rangsan Srikaew

15Y
Sales and Product Marketing at ABB Low voltage product

Main product take care

- Motor starting & safety
  - Control & protection
  - Electronic relays and controls
  - Safety products
About Myself
Senior Service Engineer

分泌

Tarn Sanchai Chuchuay

11Y Join in ABB Service team

Main product after sale service
- Breaker for LV (SACE) : ACB, MCCB
- Switch for LV (Stromberg) : SWD, SWF, Enclosed, ATS
- Retrofitting Kit Solutions

ABB Electrification Products Certificate
- Level 3 Expert to service low voltage circuit breaker
Energy-efficient motor starting solutions

ABB’s solutions

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.
Energy-efficient motor starting solutions

ABB’s solutions

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 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.
Motor starting and protection

Keep things moving with protection and control - at every level.
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
A closer look at the levels

Essential solutions guarantee indispensable protection and control functions for motors up to 560 kW. Even in basic applications, ABB will improve operation continuity of your installation and cut the control panel assembly time. Ideal for applications such as: pumps, compressors, fans, HVAC, material handling etc.

Enhanced solutions increase 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

Advanced solutions increase safety and protection level of your machinery and equipment in addition to essential protection and control. Ideal for applications such as: wastewater, pulp & paper, mining & minerals, oil & gas, chemicals, cement & glass

Does 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. 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

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

Essential
Get the essentials right with fast, reliable installations

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 solutions
Get the essentials right with fast, reliable installations
Essential solutions
Get the essentials right with fast, reliable installations

- Essential
- Safety and protection
- Integrated and future ready
- Continuous operation
- Advanced
- Enhanced
- Easy to install

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Essential solutions
Get the essentials right with fast, reliable installations

Compressor  Ventilation  Water pump
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 the 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

**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
Essential solutions
Get the essentials right with fast, reliable installations

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

- Takes up less space in the control panel thanks to AF contactor widths reduced by up to 30%
- 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
## Essential solutions

### Key features · Protection

Short-circuit and overload protection with single device

<table>
<thead>
<tr>
<th>Short-circuit and overload protection with single devices</th>
<th>MS116</th>
<th>MS132</th>
<th>MS132-K</th>
<th>MS165</th>
<th>Tmax XT</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
<td><img src="image4.png" alt="Image" /></td>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>From 0.03 up to 15 kW, from ¾ up to 20 hp</th>
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<th>From 0.03 up to 15 kW, from ¾ up to 20 hp</th>
<th>From 4 up to 45 kW, from 7 ½ up to 60 hp</th>
<th>From 0.25 up to 355 kW, from ½ up to 400 hp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase loss sensitivity</td>
<td>Phase loss sensitivity</td>
<td>Phase loss sensitivity</td>
<td>Push-in Spring terminals</td>
<td>Phase loss sensitivity</td>
</tr>
<tr>
<td>Switch position ON/ OFF</td>
<td>Switch position ON/ OFF/ Trip</td>
<td>Vibration-proof according to IEC 60068-2-27 and IEC 60068-2-6</td>
<td>Magnetic trip indication</td>
<td>Switch position ON/ OFF/ Trip</td>
</tr>
<tr>
<td>Magnetic trip indication</td>
<td>Common accessories throughout the complete MS/ MO range</td>
<td>Self-tightening terminals</td>
<td>Common accessories throughout the complete range</td>
<td>Common accessories throughout the complete range</td>
</tr>
<tr>
<td>Common accessories throughout the complete MS/ MO range</td>
<td>ATEX &amp; IECEx certified</td>
<td>Tool-less connecting links</td>
<td>ATEX &amp; IECEx certified</td>
<td>UL Type E ratings and UL type F with AF contactors</td>
</tr>
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<td>ATEX &amp; IECEx certified</td>
<td>UL type E ratings and UL type F with AF contactors</td>
<td>Magnetic trip indication</td>
<td>UL Type E ratings</td>
<td>Electronic trip unit Ekip M LIU available up to 800 A</td>
</tr>
<tr>
<td>UL type E ratings and UL type F with AF contactors</td>
<td></td>
<td>UL Type E ratings</td>
<td></td>
<td>Short circuit, overload, phase loss and unbalance protections are embedded in the trip unit</td>
</tr>
</tbody>
</table>

### Key features

- Phase loss sensitivity
- Switch position ON/ OFF
- Common accessories throughout the complete MS/ MO range
- 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
- 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
# Essential solutions

## Key features · Protection

### Short-circuit protection

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MO132</td>
<td>XLP fuse switch</td>
</tr>
<tr>
<td>MO165</td>
<td>OS switch fuse</td>
</tr>
<tr>
<td>XLPES</td>
<td>Tmax XT</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Power Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>From 0.03 up to 15 kW, from ½ up to 20 hp</td>
<td>Supports IEC fuse standard NH Fuses 000-4a</td>
</tr>
<tr>
<td>From 4 up to 45 kW, from 7 ½ up to 60 hp</td>
<td>Available as base mounted and for different busbar distances</td>
</tr>
<tr>
<td>From 1.2 up to 110 kW</td>
<td>Electronic fuse monitoring available</td>
</tr>
<tr>
<td>From 5.5 up to 1000 kW, from 7 ½ up to 500 hp</td>
<td>Wide range of cable connection terminals and other snap on accessories</td>
</tr>
<tr>
<td>From 0.25 up to 450 kW, from ½ up to 500 hp</td>
<td>Supports many IEC and UL fuse standards</td>
</tr>
</tbody>
</table>

### Overload protection

<table>
<thead>
<tr>
<th>Protection Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TF - Thermal overload relay</td>
<td>Supports IEC fuse standard NH Fuses 000-4a</td>
</tr>
<tr>
<td>EF - Electronic overload relay</td>
<td>Available as base mounted and for different busbar distances</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Power Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>From 0.06 up to 110 kW and from ½ up to 150 hp</td>
<td>Magnetic MA/MF trip units up to 500 A</td>
</tr>
<tr>
<td>From 0.06 up to 710 kW and from ½ up to 900 hp</td>
<td>MA adjustable, MF fixed</td>
</tr>
</tbody>
</table>

### 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
- UL type F ratings with AF contactors and EF/TF overload relays
- 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
- High breaking capacity
- 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

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## Essential solutions

### Key features · Control

### Contactors

<table>
<thead>
<tr>
<th>M and B mini</th>
<th>AF09..K...AF38..K</th>
<th>AF09...AF1650 (AC-3)*</th>
</tr>
</thead>
</table>

### 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**

- **Electrical 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.*
Enhanced solutions
Get robust protection with enhanced safety, control and monitoring
Enhanced solutions
Get robust protection with enhanced safety, control and monitoring

- Continuous operation
- Integrated and future ready
- Safety and protection
- Easy to install
- Advanced
- Enhanced
- Essential
Enhanced solutions
Get robust protection with enhanced safety, control and monitoring
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 your three-phase network
- Prevent overheating, overload and insufficient cooling. Irregularities are signaled early to avoid plant downtime

Speed up your projects
Reduce time in 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 your productivity like never before
- With more than 1800 tested and validated coordination tables available in the SOC tool, you can quickly and easily choose the right ABB solution
Enhanced solutions
Get robust protection with enhanced safety, control and monitoring

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 PLC thanks to AF contactor versions with low consumption coil, external or built-in PLC interface. No need for interface relays, which requires 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 · Monitoring and Protection

Electronic relays

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**Thermistor motor protection**
- Dynamic interrupted wire detection
- Short-circuit monitoring of sensor circuit
- Nonvolatile 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
- Interrupted wire detection
**Enhanced solutions**

Key features · Control and protection

Electronic Compact Starter

**HF starter with overload protection**

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

- 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

**HF emergency stop application**

- 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
## Enhanced solutions

### Key features · Control

**Contactors**

<table>
<thead>
<tr>
<th>AF09Z ... AF38Z</th>
<th>AF09Z..K ... AF38Z..K</th>
<th>AF40 ... AF1650</th>
</tr>
</thead>
</table>

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

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<th>From 4 up to 18.5 kW, from 5 up to 25 hp</th>
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<th>From 18.5 up to 560 kW, from 30 up to 900 hp</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Versions for PLC 24 V DC ≥ 250 mA, or other specific applications: low consumption coil, 24 V DC fast operating time</td>
<td>- Push-in Spring terminal</td>
<td>- Built-in or external PLC interface</td>
</tr>
<tr>
<td>- Semi F47: voltage dips and voltage sags immunity</td>
<td>- Vibration proof</td>
<td>- Electronic AC/DC coil</td>
</tr>
<tr>
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<td>- Versions for PLC 24 V DC ≥ 250 mA, or other specific applications: low consumption coil, 24 V DC fast operating time</td>
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<td>- Only 4 coils cover 24 V–500 V AC and 20 V–500 V DC</td>
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</tbody>
</table>
Enhanced solutions

Key features · Control Contactors

**AFS09Z... AFS38Z**

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 hp
- Complying standard EN ISO 13849 and EN 62061 “Safety of Machinery”
- Dedicated for safety applications: mirror and mechanically linked contacts, factory-mounted, cover-shield, guaranteeing the right contactor status and preventing unexpected operations
- Versions for PLC 24 V DC ≥ 250 mA: low consumption coil, 24 V DC fast operating time

**AFS09... AFS750**

- From 4 up to 400 kW, from 5 up to 500 hp
- Complying standard EN ISO 13849 and EN 62061 “Safety of Machinery”
- Dedicated for safety applications: mirror and mechanically linked contacts, factory-mounted, cover-shield, guaranteeing the right contactor status and preventing unexpected operations
- Electronic AC/DC coil, Wide control voltage range
- Built-in PLC interface available AFS116...AFS750
Advanced solutions
Get ahead with intelligent, predictive operations thanks to integrated data and advanced connectivity
Advanced solutions

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

- Continuous operation
- Safety and protection
- Easy to install
- Enhanced
- Integrated and future ready
- Essential

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

### Universal Motor Controller UMC100.3

Advanced motor protection, control and connectivity with the Universal Motor Controller

### Tmax XT circuit breaker

Advanced motor protection, connectivity and metering integrated in Tmax XT circuit breaker with Ekip M Touch LRIU trip unit
Advanced solutions
Get ahead with intelligent, predictive operations thanks to integrated data and advanced connectivity

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
- Ensure continuity of service and equipment protection at all times with the advanced electronic trip unit and intelligent motor management systems
Advanced solutions
Get ahead with intelligent, predictive operations thanks to integrated data and advanced connectivity

Speed up your project
Design, commissioning and maintenance are easy, cutting costs and saving you time. Flexible design allows you to find a tailor made solution.

- With the UMC100.3, simple software configuration means that you’re always in control. Parameters can be set via quality FDI-based software or directly using the operating panel.
- With the SACE Tmax XT range, simplified installation of frames, integration of circuit breakers into a communication network, trip unit settings performed via LCD and Bluetooth, and Ekip Mobile connectivity can save you up to 40% time overall.
Advanced solutions
UMC100.3 application example

Connection to DCS,
ABB Ability™ System 800xA

Universal Motor Controller UMC 100.3

Industrial Ethernet
- EtherNet/ IP™
- Profinet IO
- Modbus TCP

Fieldbus
- Modbus RTU
- DeviceNet™
- Profinbus DP

Voltage module
Digital module
Analog / temperature module

Manual motor starter
AF contactors
Universal Motor Controller UMC 100.3
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.
Detect problems early

Intelligent Motor Management Systems provide information about the motor and connected loads and its status. This information is transferred to the superior control system (DCS) and is directly available on the operator panel in the MCC. This allows you to detect upcoming problems and prevent plant standstills, as well as increase plant availability.
Advanced solutions
UMC100.3 key features

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 UMC100.3, testing and online diagnosis. Project management is included for the handling of larger projects and the localized software allows for multilingual use.
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 relevant standards and are tested and approved by 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

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).
Advanced solutions
UMC100.3 key features

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
- Voltage-based detection of phase failure, asymmetry and sequence
Advanced solutions
UMC100.3 key features

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
Tmax XT5 Ekip M Touch LRIU application example

- 7 communication protocols plus cloud connectivity
- Fieldbus networks: Modbus RTU, Profibus DP, DeviceNet™
- Ethernet networks: Modbus TCP, Profinet, Ethernet/IP™, IEC 61850
- Ekip Cartridge: Ekip Supply, Ekip CI, Ekip Com..., Ekip Com Hub
- Interface to the contactor
- PTC thermistor
- ABB Ability™ Energy and Asset Manager
- XT5 Ekip M Touch LRIU
- AF contactor
- Tmax XT circuit breaker
Advanced solutions

Tmax XT Ekip M Touch LRIU key features

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 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.
Advanced solutions
Tmax XT Ekip M Touch LRIU key features

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

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 avoids damages to the motor under conditions of reduced or null load.

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.
**Advanced solutions**  
Tmax XT Ekip M Touch LRIU key features

**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).
Advanced solutions
Tmax XT Ekip M Touch LRIU key features

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.).
Reduce the total cost of ownership
Reduce the total cost of ownership
Easy selection of IE3 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.

Cost of purchasing + Cost of running + Cost of not running = Total cost of ownership

~1/3 + ~2/3 = Total cost of ownership
Reduce the total cost of ownership

Easy selection of IE3 compatible solutions

**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 word and installation and commissioning effort, further driving down the cost of purchasing.
Reduce the total cost of ownership
Easy selection of IE3 compatible solutions

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 industry.

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 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 contactor’s electronically controlled coil
- Push-in Spring motor starting solutions provide vibration-proof and robust electrical contact with easier than ever wiring
- Universal Motor Controller and Tmax XT offer advanced motor protections, integrated data and flexible communication offering including market leading software and ABB Ability™ cloud connectivity
Complete solutions for control panels
Complete solutions for control panels

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

- Measuring and monitoring relays
- Interface relays and optocouplers
- Tmax XT molded case circuit breakers
- Contactors and Manual Motor Starters
- Softstarters and Drives
- Time relays
- Power Supplies
- SR1, IS2 automation boards
- Safety products
- Network analyzers, multimeters and energy meters
- Modular DIN-rail components
- Motor Controllers:
  - UMC100.3
  - HF range
Complete solutions for control panels

Time relays

Choose ABB as the 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.

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.

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.

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.
## Complete solutions for control panels

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<th>Network analyzers, multimeters &amp; energy meters</th>
<th>Modular DIN-rail components</th>
<th>Universal Motor Control UMC100.3</th>
<th>Softstarters and Drives</th>
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<tr>
<td>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.</td>
<td>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.</td>
<td>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 and effective data source for modern predictive maintenance systems in any plant.</td>
<td>ABB drives provide flexibility to help you optimize your processes and control, and reliable for less 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.</td>
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</tbody>
</table>
## Complete solutions for control panels

### Manual Motor Starters

Manual Motor Starters are mainly used to switch motors ON/OFF manually and to provide fuseless protection against short-circuit, overload and phase failures. Fuseless protection saves costs, space and ensures a quick reaction under short-circuit condition by switching the motor off within milliseconds. Starter combinations are setup 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.

### 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 1600A there’s a solution for every purpose.

### 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 and electromagnetic field, whereas optocouplers use light.
Complete solutions for control panels

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.

Electronic compact starters HF

ABB’s electronic compact starter packs more functions into less space. The compact unit is just 22.5 mm wide and is suitable for three-phase motor loads up to 3 kW - 400 V AC.

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

OT switch-disconnections

ABB offers switch-disconnectors from 16 to 4000 A 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.
ABB on social media

Website:  www.abb.co.th  
Facebook:  ABB Thailand  
Line official:  @askabb