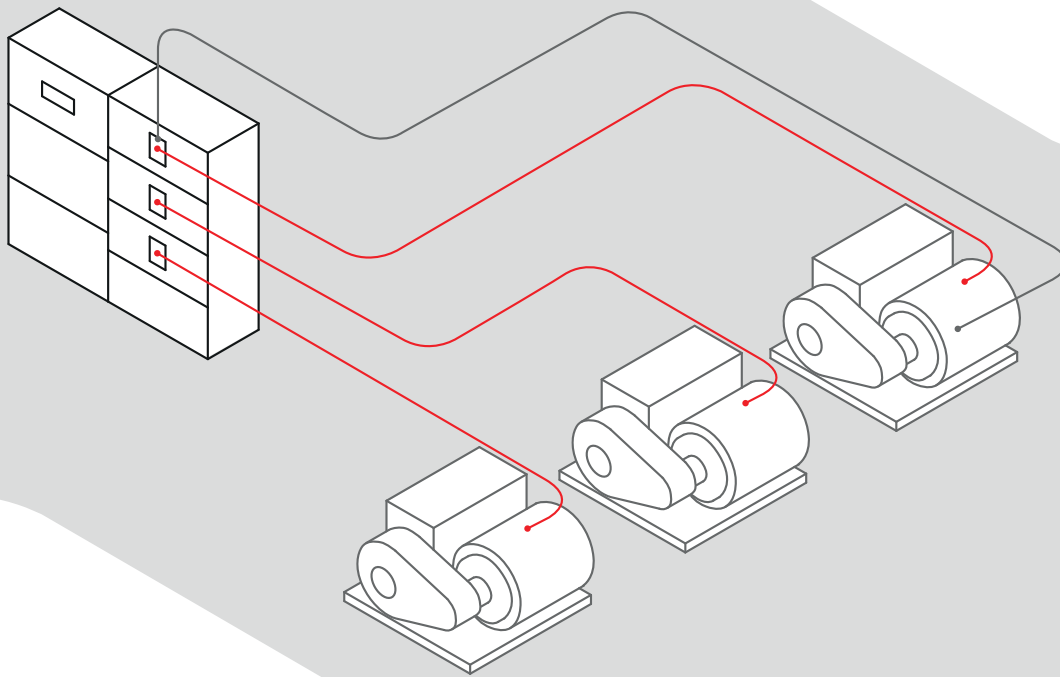


SAFETY AND RELIABILITY

# Motor Protection

## A solution for any system



Starting, switching and protecting a three-phase asynchronous motor is always guaranteed with ABB solutions.

Motors are the most used machines in industrial environment and the energy consumed by motors is about the 75% of the total consumption. That's why reduction in power consumption can be important for both the business management and the improvement of power efficiency. Such reduction can be achieved using variable-speed drives with inverters, implementing power factor correction to avoid incurring fines or, even more directly, using high-efficiency motors.

Furthermore, safety and reliability of any solution are important and must be considered when designing and selecting a system to manage motor starting and protection. Overloads may cause overtemperatures which could result in irreversible damages for the motors and

fire hazards, while start-up is a particularly critical phase for the motor itself. Even steady-state operation needs to be adequately monitored and protected to deal with any faults that might occur.

IEC 60947-4-1 Standard "Electromechanical contactors and motor-starters" defines the type of devices to be used. In particular, different factors must be taken into consideration:

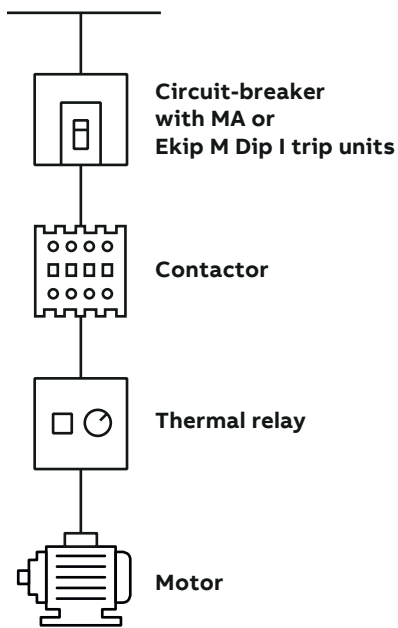
- the electrical specifications of the motor (type, power rating, efficiency, cos phi)
- the starting type and diagram
- the fault current and voltage in the section of the network where the motor is installed.

Circuit breakers and operating devices can be easily selected through the coordination tables provided by ABB (see QR Code on the last page).

When it comes to direct starting, ABB offers different solutions thanks to the M series trip units:

- Thermal magnetic MA
- Ekip M Dip I
- Ekip M Dip LIU
- Ekip M Touch LRIU

## Traditional system



A solution that provides a circuit breaker for short-circuit protection, a thermal relay for overload protection and a contactor for motor switching.

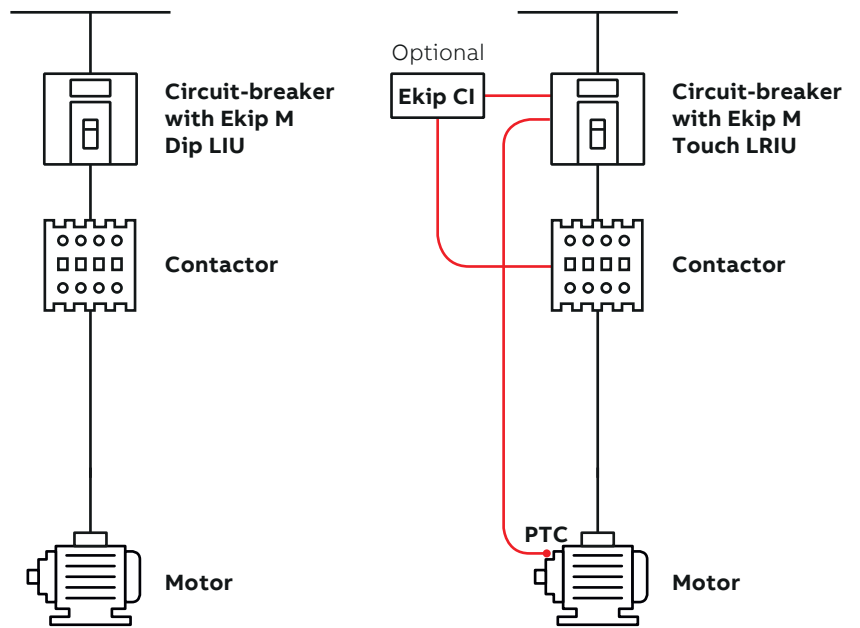
### Thermal magnetic MA

Available up to 630A, it implements exclusively the protection against short-circuit. With the possibility to set adjustable thresholds higher than the standard power distribution version, it stands out for compactness and exceptional performances in terms of breaking capacity and limitation of the specific let-through energy. They can be used in a wide start-up range, up to 250kW at 400V.

### Ekip M Dip I

Available for the Tmax XT molded case circuit breakers range up to 1600A, it represents the first level of electronic trip unit that guarantees a finest adjustment of the thresholds and immunity to the room temperature in comparison with MA trip units. It allows the selection of the most suitable tripping values for any type of motor for rated current up to 1250A and 560kW at 400V.

## Advanced protection systems



Compared to the traditional system, these advanced solutions integrate additional protection functions. ABB supplies two different solutions with different performances.

### Ekip M Dip LIU

This electronic trip unit available up to 800A, in addition to the previous solution with short-circuit protection only, includes overload protection so that a thermal relay is not needed.

The overload protection is in accordance with the indications and classes defined by IEC 60947-4-1 Standard.

Moreover, thanks to U protection, also the phase loss of the system is monitored in order to promptly protect the motor against phase loss and unbalance.

### 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 the circuit breaker.

This solution is even able to interact directly with the contactor and gives the chance to be connected to a PTC sensor to monitor the temperature of the motor and to open the contactor in case of overtemperature.

## Ekip M Touch LRIU is the best solution

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.

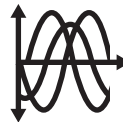


**Rotor blockage protection**, which ensures the operating conditions defined by IEC 60947-4-1 Annex 2.

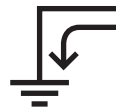
- The “Jam” condition to protect the motor against rotor jamming during normal operation to ensure the start-up phase to be properly performed.
- The “Stall” condition to protect and operate the motor against rotor jamming upon start-up.



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

...moreover, with 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 measures with Ekip M Touch LRIU

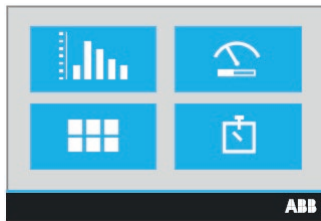


Ekip M Touch LRIU enables connectivity through several communication protocols and, moreover, thanks to ABB Ability™ Electrical Distribution Control System, data are always and quickly available on the cloud.



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

## Components to get an advanced protection system with Ekip M Touch LRIU



### **Ekip M Touch trip units**

A new generation of protection trip units easy to program and read.



### **Ekip Supply**

The module to enable an auxiliary supply to be easily connected.

### **Ekip CI**

The module to interact with the contactor, and to realize PTC sensor connection.

### **Ekip Cartridge**

The device to accommodate the external modules and connect them to the trip unit.

### **For more details**

Coordination tables

