



Motor control and protection Universal Motor Controller UMC100-FBP

Universal motor controller from ABB – the intelligent on-site solution.



Large industrial plants often have several thousand motors to provide the required motion. Any unplanned or sudden motor stops can lead to faults in the process sequence, which can be very cost intensive. Reliable management of these motors is therefore essential for ensuring that the production sequence is controlled.

ABB's new UMC100-FBP offers you the optimal solution.

UMC100-FBP is a flexible, modular and expandable motor management system for constant-speed, low-voltage range motors. Its most important tasks include motor protection, preventing plant standstills and reducing down time. Early information relating to potential motor problems means that unplanned plant standstills can be avoided. Swift diagnosis of the cause of the fault serves to reduce down time.

Typical areas of application include:

- The oil and gas industry
- The cement and paper industries
- The steel industry
- Mining
- The chemicals industry
- Water supply and distribution
- Power plant engineering
- The food and beverage industry

Due to the benefits it provides, the UMC100 is used world-wide in many segments and in projects with several thousand motor controllers.

Less time and energy required for planning, design and materials

The universal and modular structure of the UMC100-FBP is impressive even during the planning and design stage. The amount of wiring required is significantly reduced, as all the necessary protection, monitoring and control functions are integrated into a single device.

A single version for all current ranges and fieldbuses simplifies planning, inventory and servicing.

Simple integration in the tightest of spaces

Thanks to its compact design and integrated measurement system, the UMC100-FBP fits into even the tightest of spaces.

This is a huge advantage, particularly for applications involving plug-in low-voltage switchgear with limited space or for retrofitting existing systems to accommodate a modern motor management system

Optimally matched

The system's modular expandability enables optimal adaptation to the application. Even the basic UMC100-FBP device fulfils the requirements of most applications. All of the control functions required in the field are integrated and are simple to configure via parameters. Application-specific control functions can be realized with the programmable logic system.

In addition to the digital expansion modules, voltage modules are now available to measure the three-phase voltages. They extend the UMC100 to include functions such as overvoltage/undervoltage protection, underload protection, power and energy.

Electronic motor protection

The UMC100-FBP provides comprehensive, electronic motor protection. It operates fully independently and ensures that the motor is protected at all times, even if the control system or fieldbus fails.

The precise electronic measurement system enables optimal utilization of the motors. Constant trip behaviour is ensured by the high long-term stability of the tripping characteristics.

Open communication

The UMC100-FBP is equipped with an interface for connecting a communication adapter – the FieldBusPlug (FBP).

Selecting the relevant FieldBusPlug enables the motor controller to communicate using the widespread standard fieldbuses Profibus DP, DeviceNet, Modbus, CANopen or via Ethernet networks with the TCP Modbus protocol.

UMC100-FBP can also be used without communication as a stand-alone with full functionality.

High plant availability

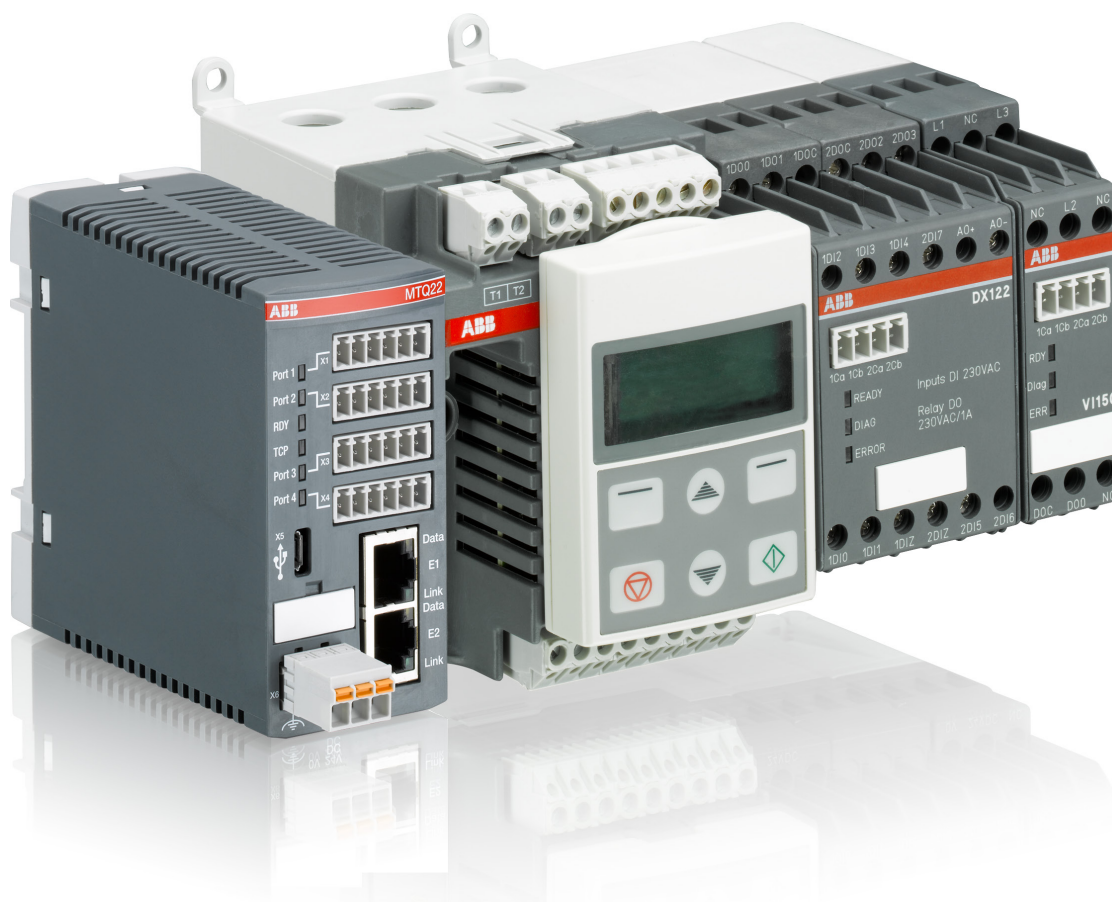
The UMC100-FBP continuously transmits comprehensive operational, service and diagnostic data from the motor to the control system. This means that faults can be detected early on and can be avoided by suitable measures, or their effects can be limited. This increases the plant's availability.

Rapid fault detection and rectification

A comprehensive diagnostic system facilitates fault localization and rectification in the event of a fault. This means that downtime can be reduced to a minimum.



UMC100-FBP



The highlights

- Compact design with integrated measuring system
- Overload protection for nominal motor currents up to 850 A
- Integrated thermistor protection
- Integrated ground fault protection
- Up to 14 digital inputs and 9 outputs
- Voltage measurement up to 690 V
- Power factor ($\cos \varphi$), energy
- Flexible communication via all fieldbuses
 - Ethernet Modbus TCP
 - PROFIBUS DP
 - DeviceNet
 - Modbus RTU
 - CANopen
- Worldwide approvals, ATEX

Main areas of application



Due to the benefits it provides, the UMC 100 is used worldwide in many segments and and projects

Cement factories

- Robust and compact design
- Several inputs, e.g. for querying the position of the damper limit switches

The oil and gas industry, chemicals

- Programmability
- Ground fault monitoring
- Undervoltage detection and configurable restart following voltage restart
- Protection of motors in hazardous environments (ATEX)
- Use in IT networks

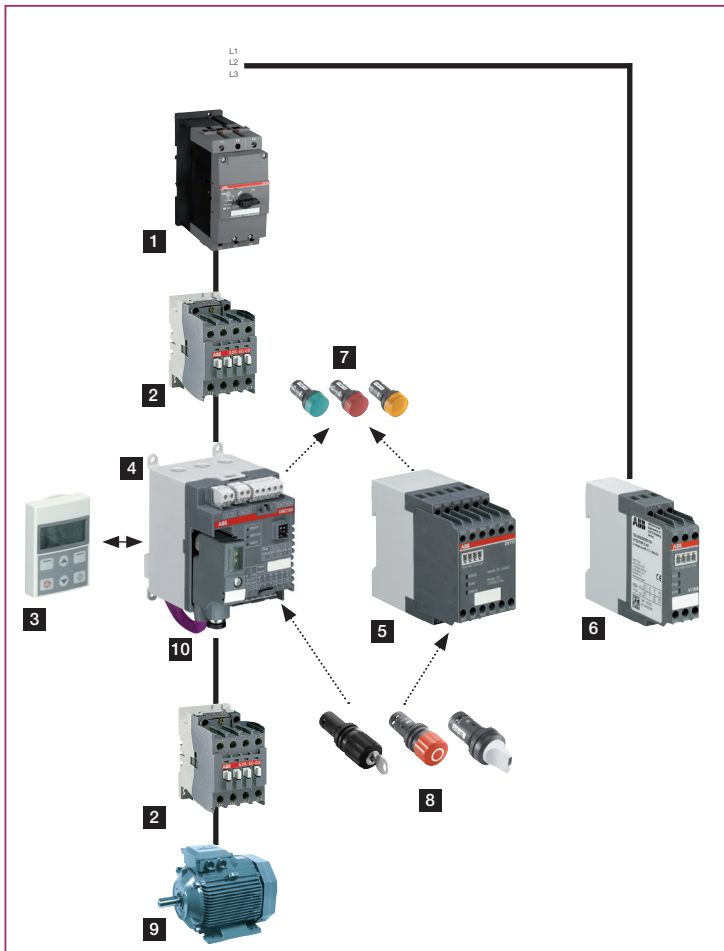
Water supply and treatment

- Pump controls as required
 - Underload detection
 - Cos ϕ
- Pump cleaning application

Mining

- Rated motor voltage of up to 1000 V
- Can be used at altitudes of up to 5000 m (goldmines in Peru)
- Ground fault monitoring

A modular system to suit all requirements



Application

- 1** Short-circuit protection
- 2** Contactor
- 3** Control panel
- 4** Universal Motor Controller
- 5** Expansion module DX111/122
- 6** Voltage module VI150/VI155
- 7** Signal units
- 8** Command elements
- 9** Motor
- 10** Communication adaptor (FieldBusPlug)

With a single basic unit and perfectly coordinated accessories, the UMC 100 meets all the requirements that are relevant in the area of motor management

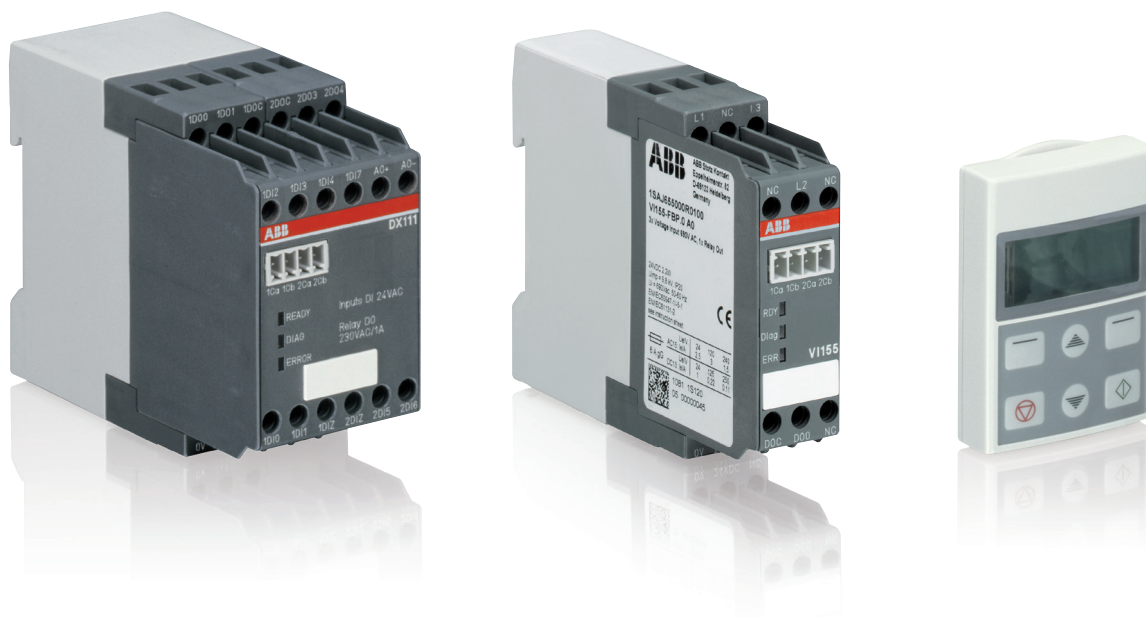
A single UMC100-FBP basic unit for all motor currents and fieldbus systems simplifies planning, construction and inventory.

The UMC100-FBP basic unit meets all the key requirements with regard to motor protection and control.

- Compact design with integrated current transformer
- 6 inputs and 4 outputs – enough for all starter functions that occur in practice
- PTC input
- Integrated motor starter functions
- Additional programmability
- Flexible communication via all common fieldbus systems

Further requirements for functionality in complex applications are met via the simple expandability of the UMC100-FBP – for example, more I/Os for additional process signals, further protection and monitoring functions through motor voltage measurement.

Easy expandability



More functionality with complete flexibility

Digital modules DX111 / DX122

- These compact modules increase the number of inputs and outputs of the basic unit
- Inputs for 24 V DC and 110/230 V AC
- Additional analog output for instrument

Voltage modules VI150/VI155

- Extension modules for 3-phase voltage measurements up to 690 V in grounded and ungrounded networks
- Extend UMC100 to include functions such as undervoltage/overvoltage protection, underload protection, power factor, power and energy. Measurement of the total harmonic distortion (THD)

UMC100-Pan control panel

- Display of measured values, status and diagnosis
- Operation
- Access to all parameters
- Choice of 7 languages
- Upload/download parameters (save)

CEM11 ground fault detection

- As an alternative to the ground fault monitoring that is integrated in the basic unit, CEM11 also allows lower ground fault currents to be monitored and enables use in networks with high impedance



The functions in detail

The UMC100-FBP in detail



Motor protection

- The UMC100-FBP provides comprehensive motor protection for three-phase AC motors
- Overload protection with adjustable tripping class 5E, 10E, 20E, 30E, 40E in accordance with EN/IEC 60947-4-1
- Locked rotor protection
- Phase failure detection
- Asymmetry detection
- Phase sequence detection
- Undercurrent/overcurrent protection
- Thermistor motor protection with PTC
- Ground leakage detection – internally or using CEM11-FBP sensor
- Limitation of the motor starts per time unit
- Rated motor current 240 mA to 63 A with a single version, no accessories required
- Rated motor current > 63 A with external current transformer
- Independent motor protection, fully operational even without bus connection

In combination with voltage module VI150/VI155

- 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 parametrizable blocks
- Direct, reversing, star-delta starters
- Pole reversal/Dahlander pole-changing
- Actuator
- Inching
- 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

Control stations

- Individual configuration of control points
- Operation via DCS
- Local control
- Control panel





Motor status/communication

Quick and comprehensive access to all data via control station, fieldbus and/or laptop

Operating data

- Motor status
- Motor current
- Thermal load
- Maximum starting current
- Run-up time
- Time to trip
- Remaining cool down time

Operating data with voltage module VI150/VI155

- Phase voltages
- Active power
- Apparent power
- Power factor
- Energy

Service data

- Counter for motor operating hours
- Number of starts
- Number of overload trips

Diagnostic data

- Comprehensive and detailed error messages and warnings
- Log for previous 16 errors
- Plain text display on the control panel



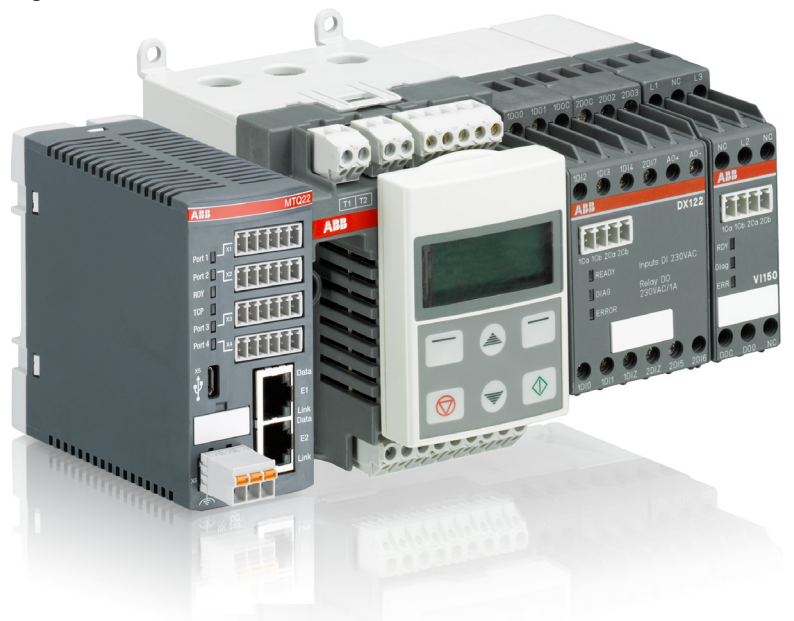
Open communication

UMC100-FBP is a basic device that can use various communication methods; the FieldBusPlug communication adapter means that the fieldbus system is freely selectable.



Modbus[®] TCP

Ethernet Modbus TCP



Open communication

The UMC100 motor controller is not dependent on a specific communication environment. It has an interface for connection to a fieldbus-specific FBP fieldbus connector or an MTQ22 Ethernet interface. This means that a single version of the motor controller is suitable for communication via all relevant fieldbus systems and now also Ethernet. This simplifies planning, project engineering, development and customer service.

All plugs have LEDs for the indication of status of communication and connected device. On the frequently used withdrawable application the indication of status is also shown on pulled input.

Different cable length of field bus plug allow the optimal matching.

The fieldbus connectors are available for:

- Profibus DP
- DeviceNet
- Modbus RTU
- CANopen



They meet all the specifications of the respective fieldbus organizations and are certified.

A PDQ22-FBP version is available for applications with Profibus DP in addition to the standard PDP22-FBP fieldbus connector. This allows you to connect up to four UMC100s to one Profibus DP node while only occupying one fieldbus address.

This is a cost-effective solution particularly for devices that are located close to one another. The PDQ22-FBP and the devices are connected together using standard cables.

- All devices connected to a node can be configured and maintained independently of each other.
- Status indication for communication and each connected device
- Fewer slave addresses required on the fieldbus
- Lower infrastructure costs due to the reduction in the number of slaves, i.e. more motors are possible per fieldbus master yet fewer repeaters are required



New - UMC100 and Ethernet

Fieldbus systems are used worldwide in large plants and have proven their strength in countless projects. However, in the face of mounting demands on communication, these systems are gradually reaching their limits. Ethernet paves the way to the future and, as an integrated technology, is increasingly finding its way from the control system into the switch cabinet. Access by several clients, for example for an additional SCAD system or an HMI that displays the data from multiple motor controllers, can thus be realized more easily.

One solution – many advantages

With the new MTQ22-FBP Ethernet interface, up to four UMC100 motor controllers can be connected to one Ethernet network.

An integrated switch allows it to be used in various network topologies, such as bus, star or ring. Thanks to support from the Media Redundancy Protocol (MRP), redundancy is not an issue. A USB interface allows simple configuration of the adapter using a PC. Communication is by means of the globally established Modbus TCP protocol.

Flexible communications

- Globally established Modbus TCP protocol
- Integrated switch
- Supports bus, star and ring topologies
- Network redundancy is enabled through direct support for the MRP protocol in accordance with EN/IEC 62439-2
- Simple configuration of access rights and IP addresses using the software



UMC100 motor controller

Only one motor controller version for all fieldbuses and Ethernet. This enables

- Simple planning
- Simple project engineering
- Simple management of replacement parts
- Older versions such as UMC22 can also be connected, allowing easy retrofitting in existing systems and thus better investment protection

Plug-in applications

Motor controllers in motor control centers (MCC) are frequently used in plug-in applications.

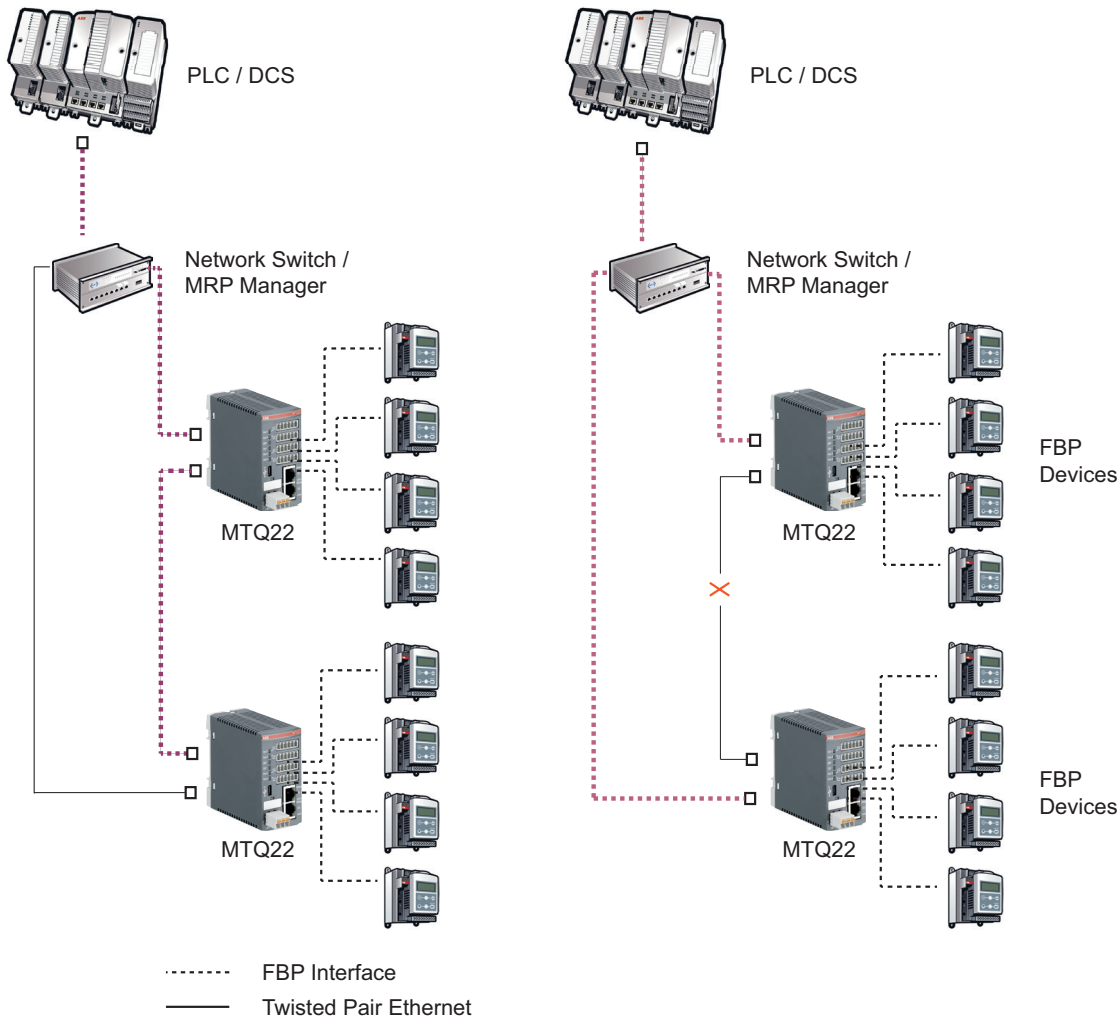
Separating the motor controllers from communication provides significant advantages here.

- The Ethernet adapter can be installed outside of the plug-in application, meaning no sensitive communications take place within the application
- Simple, practical connection system
- Communication is not interrupted if the ring topology is redundant or several plug-in applications are withdrawn

Example of application

No interruption of the lines

Even if lines are interrupted, all users can still be reached!



Withdrawable applications

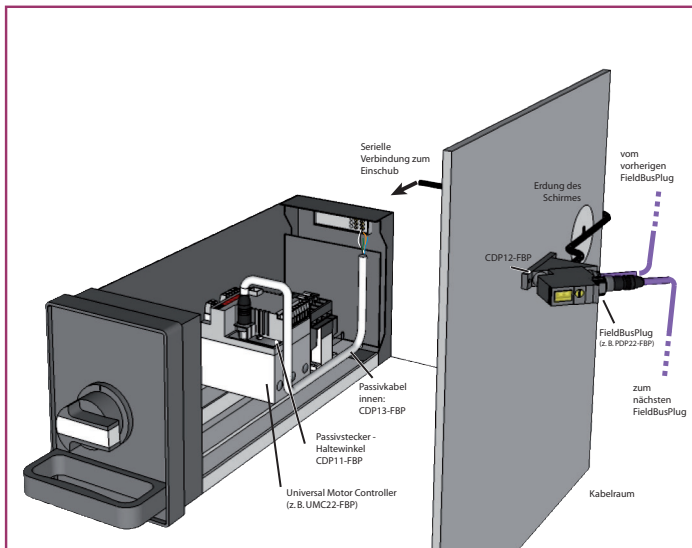
The UMC100-FBP is ideally suited for plug-in applications in Motor Control Centers. Here, the UMC100-FBP is positioned within the slot while the FieldBusPlug fieldbus connection is mounted externally.

Communication is undertaken by means of a simple serial link.

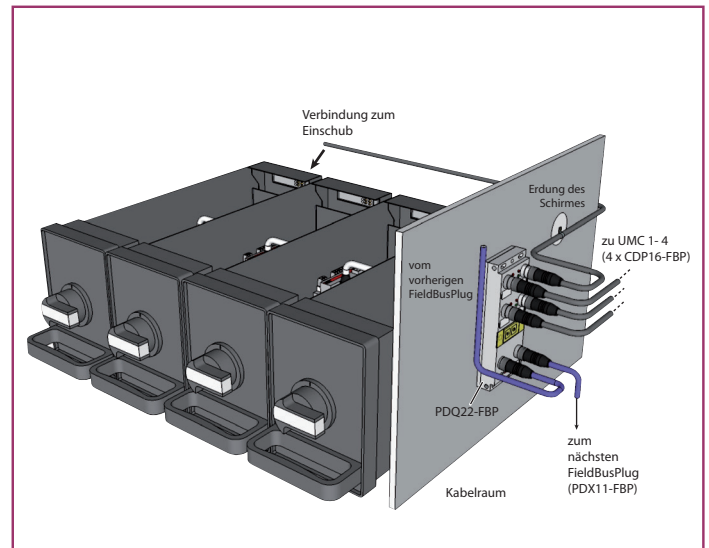
This separation results in the following advantages:

- Fieldbus communication is undertaken directly from slave to slave without drop lines
- Maximum fieldbus performance and baud rate is guaranteed
 - without the need for special adaptation
- If one of the drawers is removed, the fieldbus slave continues to operate
- Accidental exchange of the plug-in modules is detected and signaled to the control system

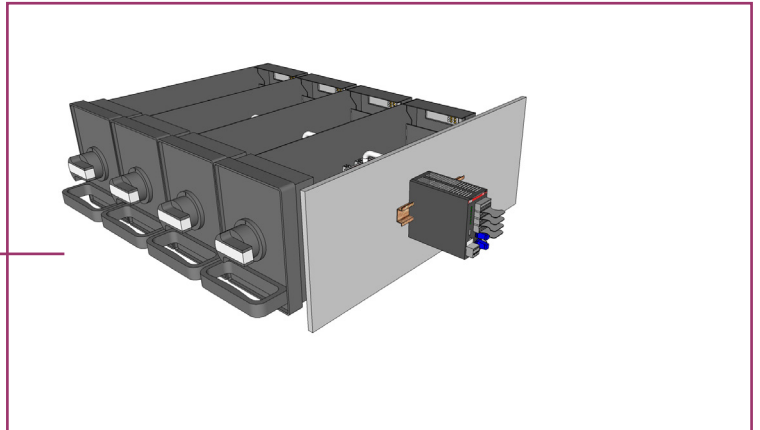
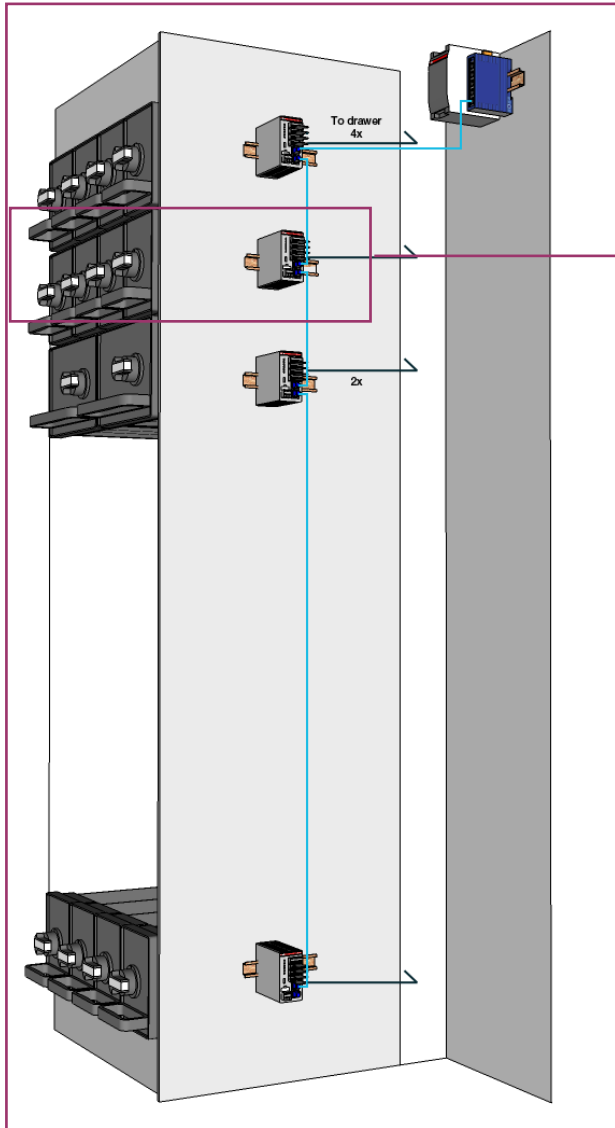
Withdrawable application with fieldbus plug



Withdrawable application with Profibus Interface PDQ22-FBP



Withdrawable application with Ethernet



Retrofit

Due to its compact dimensions with an integrated measurement system, the UMC100 is extremely well-suited for updating and modernizing existing switchgear.

- Programmable logic for optimal adaptation to the existing control concept
- Inputs for various voltages AC/DC
- Control of any existing instruments
- Optionally with or without communication via fieldbus

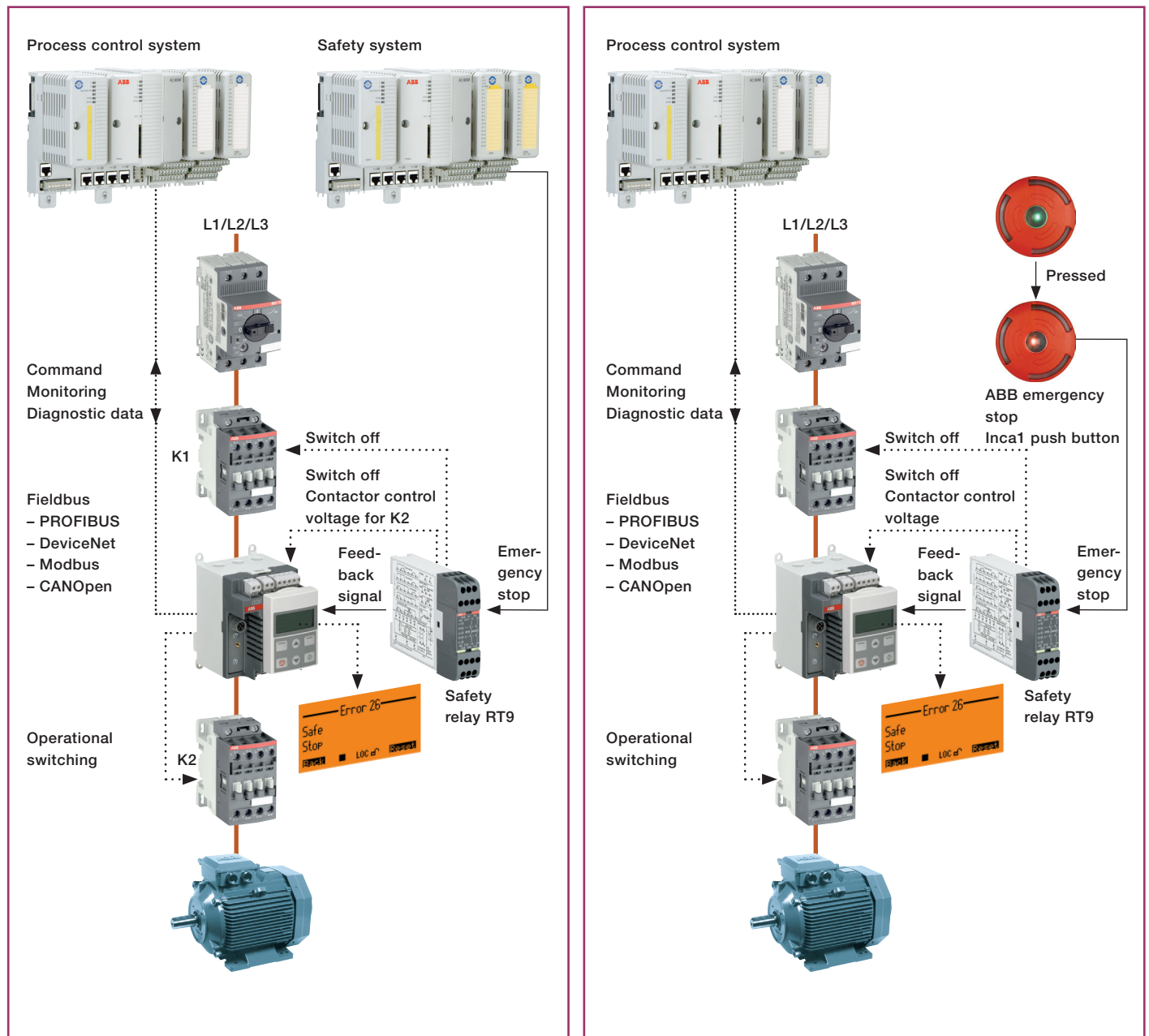
Safe disconnection of motors

The requirements for safety-oriented applications are gaining increasing importance in process automation. For example, due to new regulations and specifications, the safe disconnection of motors for the protection of people, the machine, and the environment is becoming more and more important.

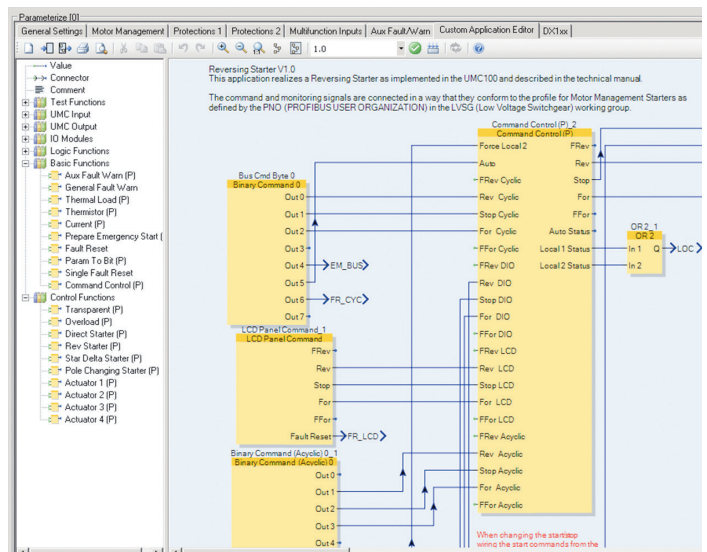
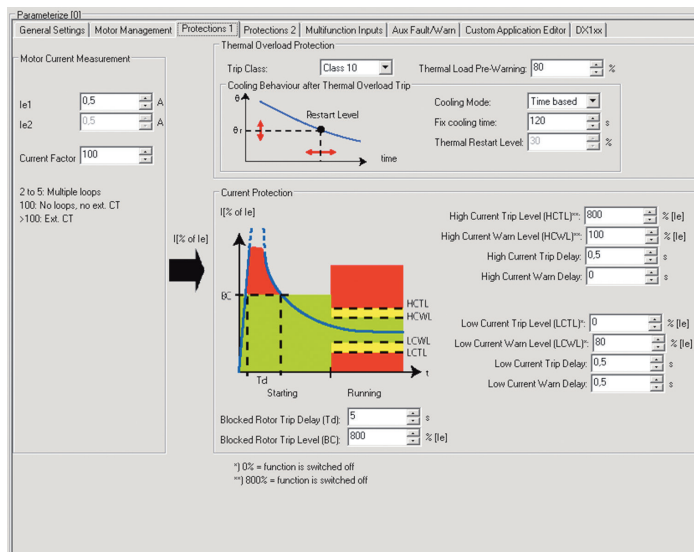
The UMC100, together with the flexible RT9 safety relay from ABB, meets these requirements and complies with standards EN 62061:2005 and EN ISO 13849-1:2008 for functional

safety up to SIL 3 and PL e. The emergency stop signal can come from either a separate safety system or from an emergency stop switch on site.

- Coordinated operating and safety functions
- Message texts on the control panel enable rapid diagnosis on site
- Clear diagnostic message to the process control system



Parameter assignment and programming



Parametric assignment

For most applications it is sufficient to select and parametrically assign one of the UMC100's standard integrated control functions. This is realized independently from the applicable control system and fieldbus system by means of GSD and EDS configuration files or even more conveniently via a DTM device (DTM/FDT technology). All of the parameters can be configured via the control station.

Asset Vision Basic and DTM

ABB Asset Vision Basic as FDT frame application, together with the DTM (Device Type Manager) are comprehensive tools for straightforward parameter assignment and programming of the UMC100 as well as all devices equipped with DTM. It enables creation of configurations, up/downloading, reading out of diagnostic data, and - if configured - even control of the UMC100 - either centrally via the control system, via the fieldbus or directly on-site at the switching cabinet.

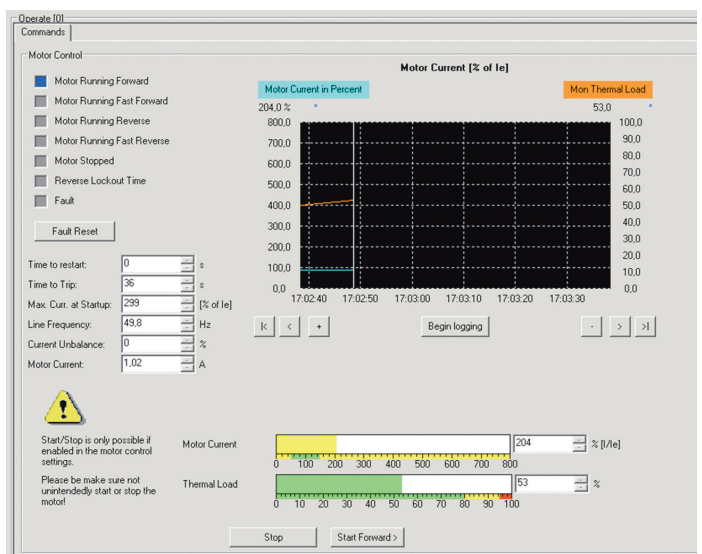
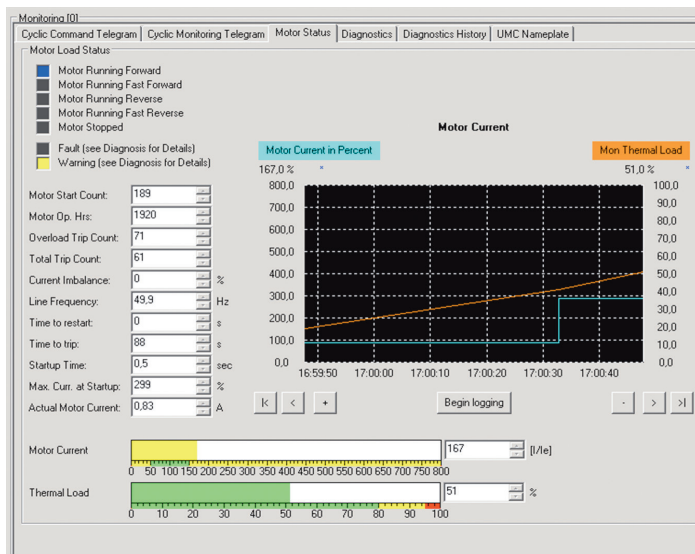
The clear interface facilitates simple configuration of all parameters and error texts required for the control station. In doing so, the graphical display supports you with prompts and by checking the data.

Programming

For special applications, it is possible to create an optimally adapted control function with the help of the editor integrated into the DTM. A comprehensive library of function blocks is available to you for this purpose. It is possible to access all of the existing variables in the UMC100 and the expansion modules. Comments can be inserted as required.

All of the control functions integrated into the UMC100 are available as templates and can be very easily adapted to requirements. It is possible to create your own library of special control functions by means of importing / exporting these templates.

Diagnostics and operation



Diagnostics and maintenance

Comprehensive and clear diagnostics help to avoid faults and make it possible to rectify them quickly in the event of errors.

Quick display of all data:

- Operating data
 - Motor status and current, thermal load
 - Status of all I/O signals
- Diagnostic data
 - Errors, warnings
- Service data
 - Operation hours
 - Number of starts
 - Number of overload trip
 - Energy

The display of control signals facilitates diagnosis during commissioning.

It speaks your language

The control panel enables the display of all data on-site. Errors and warnings are displayed as clear text in the configured language. Individual texts can be assigned to external errors.

Operation

The DTM can also be used to operate the motor if it is configured to do so.

- Start forwards/backwards
- Stop
- Error reset

In addition, the most important operating data are displayed in the same window



UMC100 system overview



Basic device UMC100-FBP

Main power

Voltage	max 1000 V AC
Frequency	45...65 Hz
Rated motor current	0.24...63 A, without accessories Greater currents with external transformer
Tripping classes	5E, 10E, 20E, 30E, 40E in accordance with EN/IEC 60947-4-1
Short-circuit protection	Separate fuse on network side

Control unit

Supply voltage	24 V DC
Inputs	6 digital inputs 24 V DC 1 PTC input
Outputs	3 digital relay outputs 1 digital transistor output
Interfaces	1 for ABB FieldBusPlug 1 for UMC100-PAN control station 1 for expansion module



Expansion modules

The UMC100 can be expanded to include digital expansion module DX111 or DX122 and voltage module VI150 or VI155. Communication takes place via a simple two-wire line. The maximum distance allowed between the UMC100 and the expansion module is 3 m.

Digital expansion modules DX111 / DX122

Expands the UMC100 to include additional digital inputs and outputs and an analog output

Supply voltage	24 V DC
Inputs	DX111 8 digital inputs 24 V DC DX122 8 digital inputs 110/230 V AC
Outputs	4 digital relay outputs 1 analog output, 0/4...20 mA, / 0...10 V configurable



Voltage modules VI150/VI155

Voltage modules for determining phase voltages, power factor ($\cos \varphi$), active power, apparent power, energy, harmonic content (THD)

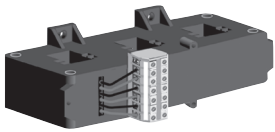
VI150	for use in grounded networks
VI155	for use in grounded and ungrounded networks
Supply voltage	24 V DC
Voltage inputs	L1, L2, L3
Rated voltage range	150 ... 690 V AC
Outputs	1 digital relay output





UMC100-PAN control panel

Installation on the device or on the switching cabinet door
 Graphics-enabled and backlit display, 3 LEDs for status indication
 Freely configurable error messages
 Multilingual: German, English, French, Italian, Portuguese, Spanish, Russian



Current transformer CT4L / CT5L

Only required for rated motor currents >63 A
 Linear transformer, 3-phase with terminal block, designed for connecting leads Cu 2.5 mm²



CEM11 earth leakage sensors

Summation current transformer for connecting to a digital input
 Mounting with bracket on DIN busbar or wall

Models

CEM11-FBP.20	80 – 1,700 mA	20 mm Ø
CEM11-FBP.35	100 – 3,400 mA	35 mm Ø
CEM11-FBP.60	120 – 6,800 mA	60 mm Ø
CEM11-FBP.120	300 – 13,600 mA	120 mm Ø



Fieldbus connector FBP

For communication with fieldbus systems, supply with 24 V DC via fieldbus cable
 Installation on the UMC100; for plug-in systems, the fieldbus connector is mounted externally

Assembled connectors with various cable lengths. M12 connection technology for reliable contacting
 Extensive range of accessories available

Models

PDP22-FBP	Profibus DP V0/V1
DNP21-FBP	Devicenet
MRP21-FBP	Modbus RTU
COP21-FBP	CANopen
PDQ22-FBP	Profibus DP V0/V1 (for the connection of 1 to 4 UMC100s)



MTQ22-FBP

Ethernet Modbus TCP (for the connection of 1 up to 4 UMC100)
 Modbus TCP protocol
 Supports all network topologies (Star, Bus, Ring)
 No special Ethernet connections needed in MCC
 Easy to handle in withdrawable applications

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