



# Universal Motor Controller UMC100.3

High performance motor control and protection for your application

# Keeping the motors running 24 hours a day

## Secure uptime of your application

ABB's control products protect, control and automate critical business processes to make any application more productive. Rely on us as partner, providing you flexible and universal products. Especially ABB's Universal Motor Controller solution provides an easy to use device that keeps your application running.



### Continuous operation

**The installation of ABB products can help keep the wheels in motion 24 hours a day. We are focused on ensuring that our products can be easily maintained, whether that is through designing the product so it can be replaced while the system remains operational, providing built-in monitoring functions and efficient service solutions.**

The UMC100.3 provides comprehensive, electronic motor protection. It ensures that the motor is protected at all times, even if the control system or fieldbus breaks down.

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. A comprehensive diagnostic system facilitates fault localization and rectification in the event of a fault to help keeping the system running and reduce downtime.



### Improve installation efficiency

**In everything we do, we think of the customer and the application first. Our engineers constantly look for ways to simplify the installation process by developing innovative product designs which facilitate the product assembly and avoid mounting errors.**

The universal and modular structure of the UMC100.3 is impressive even during planning, design and maintenance stage. The amount of wiring required is significantly reduced, as all the necessary protection, monitoring and control functions are integrated into a single device.

There is just one single version for all current ranges and for any kind of communication, fieldbuses as well as Ethernet. This simplifies planning, inventory and servicing.



### Speed up your business

**We provide simplified code management for more efficient purchasing processes through a common coding system which allows customers to order the same product all over the world. We simplify design (and assembly) process by providing customers online access to drawings and coordination tables.**

The system's modular expandability enables optimal adaptation to the application. Even the basic UMC100.3 device fulfills 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.

The basic UMC100.3 device can easily be expanded by different types of expansion modules that provide more I/Os, analog and temperature measurement. Furthermore the UMC100.3 can be expanded to measure the three motor phase voltages enabling functions like under-/overvoltage, underload, powerfactor as well as measurement of power and energy.



# ABB's intelligent motor management for continuous operation

## Keeping the motors running with UMC



Any unplanned or sudden motor stops can lead to faults in the process sequence, which can be very costly. ABB's Motor Controllers stand for motor protection, motor control, fieldbus and Ethernet communication and fault diagnosis. The UMC is used in many segments with several thousand motor controllers installed worldwide.

### ABB's new UMC100.3 offers you the optimal solution for your motor control center (MCC) applications

UMC100.3 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 and swift diagnosis ensure continuous operation of any application such as:

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

Due to the benefits it provides, the UMC100.3 is used worldwide in many segments and in projects with several thousand motor controllers.

### High plant availability

The UMC100.3 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.

### Open communication

The UMC100.3 is equipped with an interface for mounting a communication adapter. Selecting the relevant adapter enables the motor controller to communicate using the widespread fieldbuses Profibus DP, DeviceNet or Modbus RTU. Even communication via Ethernet networks is possible using the Modbus TCP or Profinet protocol.

UMC100.3 can also be used without communication as a stand-alone motor controller, e.g. in simple pumpstations.

### Made in Germany approved worldwide

The Universal Motor Controller is developed and produced in the federal republic of Germany. Approvals and certificates ensure the worldwide use of the product which has been proven in a lot of applications and in huge projects with thousands of motor controllers all around the world. With our long time experience of project management ABB gives you the best possible support.

# Main areas of application



A worldwide usage in a large variety of segments is guaranteed by choosing the Universal Motor Controller. Its flexibility as well as its global recognition due to plenty of applications and standards the device is according to make the Universal Motor Controller unique.

## 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

## Pulp and paper plants

- Modular design
- Flexible communication

## Mining

- Rated motor voltage of up to 1000 V
- Can be used at altitudes of up to 5000 m heights (e.g. goldmines in South America)
- Ground fault monitoring

## Water supply and treatment

- Pump controls as required
  - Underload detection
  - Cos  $\varphi$
- Pump cleaning application

## Others

- Steel plants
- Ships



# Product benefits

## Advantage of intelligent MCCs

**Intelligent Motor Management Systems provide any kind of information about the motor and its status. These information is transferred to the superior control system (DCS) and also directly available on the operator panel in the MCC.**

This allows to detect upcoming motor problems early and thus to prevent the possibility of unexpected motor stops. In case of an unexpected motor stop a comprehensive diagnosis helps the customer to identify the exact reason and to solve the problem in a short time.

All this information is also available as full text information on the operator panel on the front side of the MCC. This content is displayed in the most important languages.

## Modular product design

**With only one single basic unit and perfectly coordinated accessories, the Universal Motor Controller meets all the requirements that are relevant in the area of motor management**

Starting with the Universal Motor Controller basic device for all motor currents and fieldbus systems simplifies planning, construction and inventory. It already meets all the key requirements with regard to motor protection and control. Higher functionality requirements in complex applications are met via the simple expandability of the Universal Motor Controller – for example, more I/Os for additional process signals, further protection and monitoring functions through motor voltage measurement.

### The highlights

- Compact design with integrated measuring system
- For three-phase and single-phase motors
- Basic device including most required features
- Easy to extend for advanced functionalities
- Perfect solution for motor control centers (MCC)
- Flexible communication via all common fieldbus systems
  - Profibus DP
  - DeviceNet
  - Modbus RTU
- And via Ethernet
  - Modbus TCP
  - Profinet
- Worldwide approvals, ATEX

## Open communication -

### All channels directed from one device

**Since there is plenty of information in MCCs available this information needs to be transferred in a fast way. Established fieldbus as well as Ethernet network systems ensure this kind of communication.**

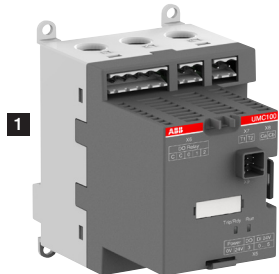
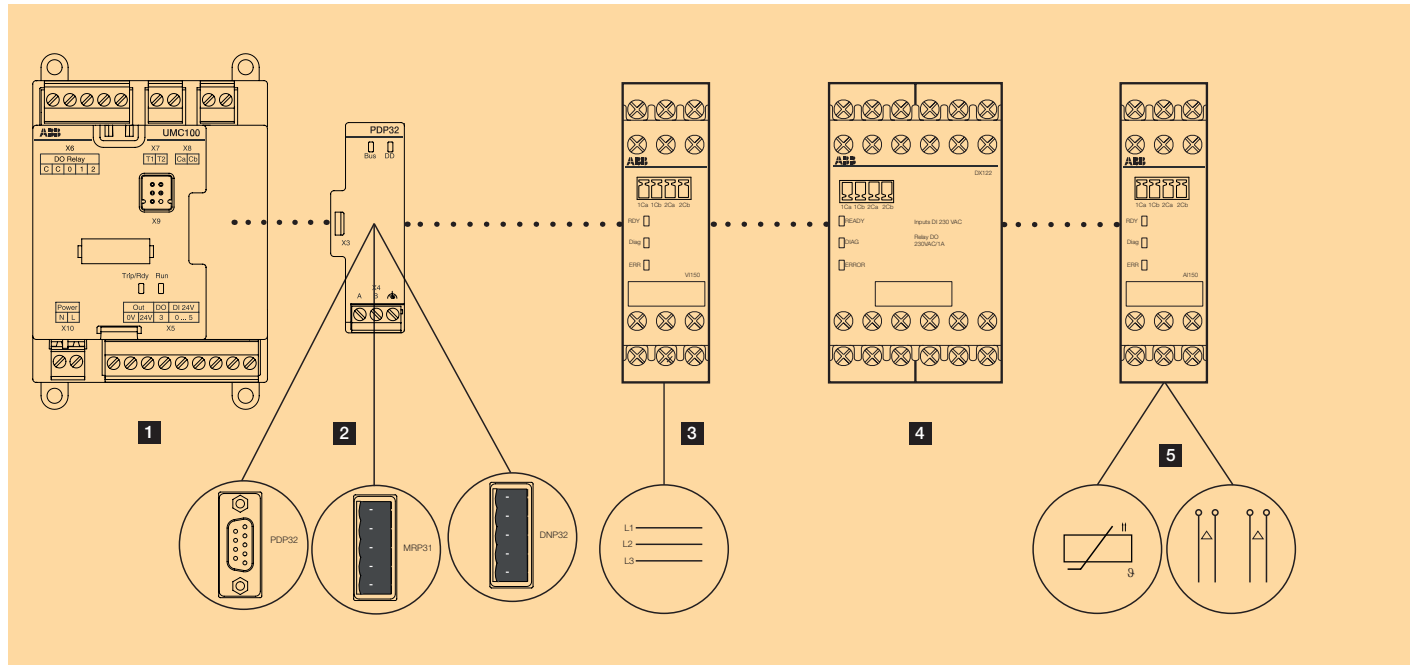
The Universal Motor Controller has an interface that allows to plug-on either a fieldbus communication interface or to connect an Ethernet network interface. One single version of the motor controller is suitable for any kind of serial communication. Therefore the time needed for planning, project engineering, development and maintenance is dramatically reduced.

## Compact design - Measurement system and many I/Os integrated

**Thanks to its compact design with an integrated measurement system, the Universal Motor Controller fits into even the tightest of spaces.**

This is a huge advantage, particularly for applications involving plug-in low-voltage switchgear due to the limited space that is needed. For the planning of new systems as well as the retrofitting of existing systems to accommodate a modern motor management system the Universal Motor Controller is the ideally choice.

# Main components



## Universal motor controller UMC100.3

- Built-in widerange measuring system, up to 63 A nominal current
- Supply voltages:  
24 V DC  
110-240 V AC/DC
- 6 digital inputs and 4 outputs integrated - enough for many applications



## Communication interfaces

- PDP32.0 - Profibus DP
- DNP31.0 - Devicenet
- MRP31.0 - MODBUS
- Ethernet Interfaces MTQ22/PNQ22



## Voltage modules VI150/VI155

- 3-phase voltage measurement, up to 690 V
- Provide voltage dependent protection functions
- Power, energy, powerfactor
- Measurement of total harmonic distortions (THD)

# Accessories of UMC100.3

## More functionality with complete flexibility

4



### Digital modules DX111 / DX122

- Compact modules that increase the number of digital inputs and outputs
- Inputs for 24 V DC and 110/230 V AC
- Plus configurable analog output

5



### Analog / Temperature module AI111

- 3 analog inputs
- configurable for temperature sensors and standard signals
- 2 modules AI111 can be connected to one UMC100.3

## Further components



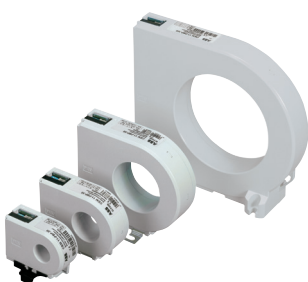
### UMC100-Pan control panel

- Monitors all values, status and diagnosis
- Motor control
- Full parameter access
- Speaks your language - Choice of 8 menu languages
- USB port for PC connection
- UP/Download of parameters and logic



### Current transformers CT4L / CT5L

- For nominal motor currents > 63 A up to 850 A
- Linear type 3-phase transformers



### Earth leakage sensors CEM11

- 4 versions available with diameters from 20 mm to 120 mm
- Simple residual current adjustment with rotary switch, including test position
- Direct connected to a digital input of the motor controller
- Flexible mounting

# The functions in detail

## The UMC100.3 in detail



### Motor protection

- The UMC100.3 provides comprehensive motor protection
- Overload protection for single and three-phase AC motors according 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 >63 A with external current transformer CT4L / CT5L
- Selectable tripping classes 5E, 10E, 20E, 30E, 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

- 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)
- Softstarter mode

### 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 and operation modes

- Individual and flexible configuration
- Remote operation via DCS or PLC
- Local control via pushbuttons
- Local control via control panel UMC100-PAN
- Force local via input signal

### 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 and standstill hours
- Number of starts
- Number of overload trips
- Energy

### Diagnostic data

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

### Open communication

UMC100.3 is a basic device that can use various communication methods; the communication protocol is selected by plugging-on the right fieldbus communication interface or connecting to an Ethernet network interface.

## Modbus® TCP



## Modbus® RTU



# UMC100.3 and communication Fieldbus and Ethernet

## One motor controller - many communication possibilities

The UMC100.3 motor controller is not dependent on a specific communication environment. Communication is done by devices called communication interfaces. This has the advantage that a single version of the motor controller is suitable for any kind of communication via all relevant fieldbus systems and Ethernet networks.

## Fieldbus communication

Fieldbus interfaces are available for Profibus DP, DeviceNet and Modbus RTU. They keep to the relevant standards, are tested and approved by those organizations to ensure a proper function with other devices on a fieldbus.

The interfaces can be mounted in 2 ways:

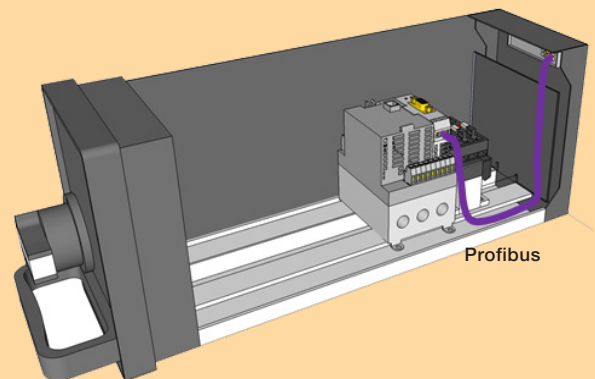
- direct in the motor controller
- separate in the cable chamber of an MCC



## Direct mounting

The most simple and easiest way is to mount a communication interface directly in the UMC100.3. In this case the interface is powered out of the UMC100.3 and the combination behaves like a motor controller with an integrated communication.

This solution fits best for projects using fixed installations.

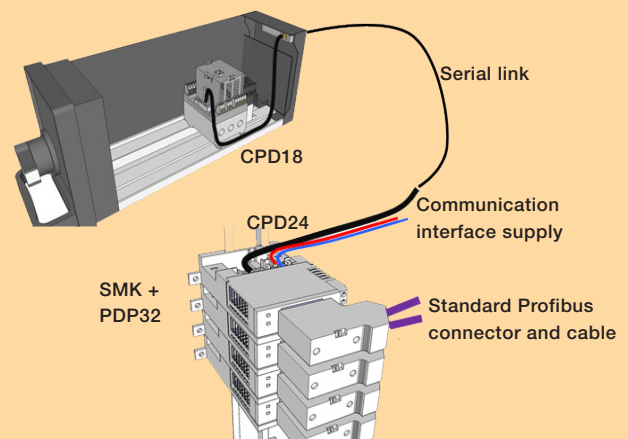


## Separate mounting

The communication interfaces can also be mounted separately from the UMC100.3 in the cable chamber of a MCC. The interface is mounted on an adapter SMK3. The connection to the UMC100.3 is done via a simple serial link cable.

This solution has several advantages in the often used withdrawable installations:

- avoiding droplines on the fieldbus which typically reduce the performance and baudrate on a fieldbus
- fast replacement of a drawer due to automatic slave addressing



### Overcoming the limits of the fieldbus technology

Fieldbus systems are applied world wide in large plants and have proven their benefits in countless projects but the growing costumers' requirements are pushing fieldbus systems to their limits.

Ethernet systems are guiding the way to the future and are more and more used as the standard technology making their way from a control system straight into to the control panel. There are 2 Ethernet communication interfaces that provide the connection to Ethernet using the protocols Modbus TCP and Profinet.

Up to 4 motor controllers UMC100.3 can be connected to one Ethernet interface MTQ22 or PNQ22 by using a simple serial connection cables. An integrated switch supports the usage in different network topologies like Star, Bus and Ring. Redudancy can be supplied due to the Media Redundancy Protocol (MRP). The interfaces are mounted outside the drawer to avoid critical high-speed communication inside the drawer.

### Benefits

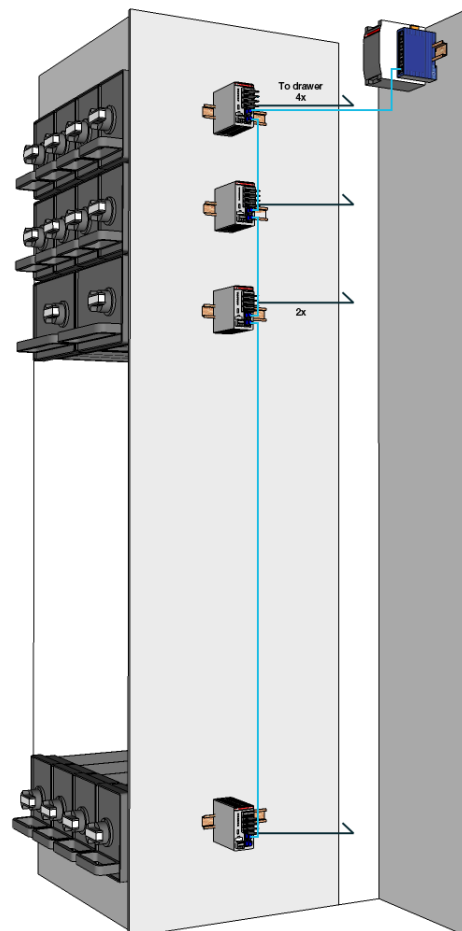
- Integrated two-port Ethernet switch
- Ring topology provides cable redundancy on Ethernet side
- The used MRP protocol is quite common and standardized according to EN/IEC 62439-2
- No network disconnection when drawers are taken out
- No Ethernet cables inside the drawer
- Simple wiring and drawer connection

### Profinet IO

- Standardized system integration via GSDML
- Timestamping and sequence of events in ABB DCS AC800xA

### Modbus TCP

- Supports multimaster functionality
- Master supervision with timeout



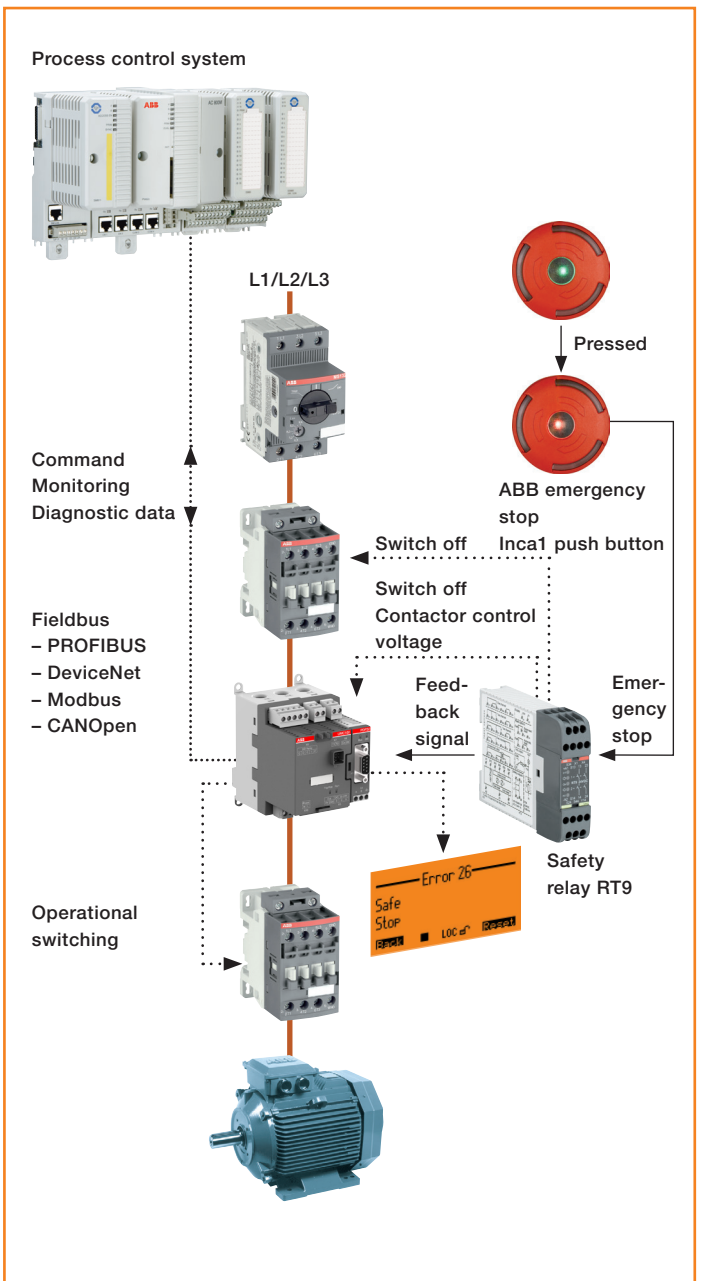
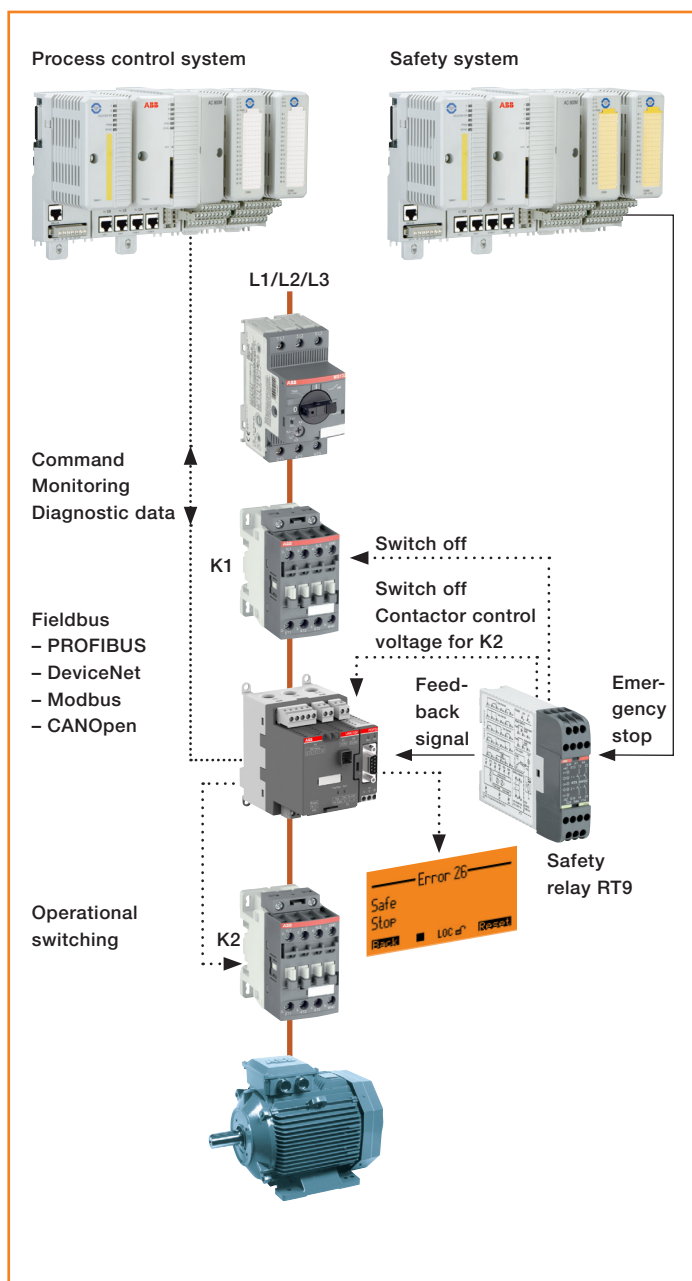


# Safe disconnection of motors

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



# Parameterization and programming

## Parametric assignment

For most applications it is sufficient to select and parametrically assign one of the UMC100.3'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 UMC100.3 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 UMC100.3 - 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 UMC100.3 and the expansion modules. Comments can be inserted as required.

All of the control functions integrated into the UMC100.3 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 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.

## Operation

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

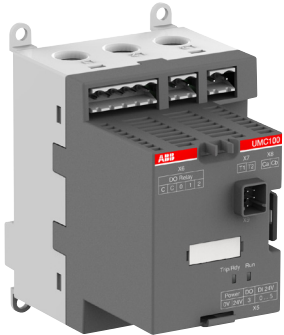
- Start forwards/backwards
- Stop
- Error reset

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



- Installation on the UMC100.3 itself or on the switching cabinet door
- Indication of operational states is shown by 3 LEDs
- Status of the application could be read easily on the backlit display
- User defined diagnosis messages
- USB port to parameterize the UMCs.
- Localized software for multilingual use (German, English, French, Italian, Polish, Portuguese, Spanish, Russian)

# UMC100.3 system overview



## Basic device UMC100.3

### Main power

Voltage	max 1000 V AC
Frequency	45...65 Hz
Rated motor current	0.24...63 A, without accessories Higher 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, 110-240 V AC/DC
Inputs	6 digital inputs 24 V DC 1 PTC input
Outputs	3 digital relay outputs 1 digital transistor output

## Expansion modules

The UMC100.3 can be expanded with maximum 4 expansion modules: One digital expansion module DX111 or DX122, one module VI150 or VI155 and 2 analog modules AI111

Communication takes place via a simple two-wire line. The maximum distance allowed between the UMC100.3 and the expansion module is 3 m.



### Digital expansion modules DX111 / DX122

Expands the UMC100.3 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



### Analog module AI111

Expand the UMC100.3 with analog and temperature inputs

Supply voltage	24 V DC
Inputs	0-10 V, 0/4-20 mA PT100, PT1000, 2- or 3-wire connection KTY83, KTY84, NTC





### Ethernet communication interfaces

Mounted in the MCC cable chamber; connection of 1 to 4 motor controllers UMC100.3 via simple cables  
 MTQ22 for Modbus TCP  
 PNQ22 for Profinet IO



### Fieldbus communication interfaces

Can be mounted direct on the UMC100.3 or separate in the cable chamber of the MCC.  
 Connection for standard fieldbus cables with 9-pole Sub-D (Profibus DP) or terminal blocks  
 PDP32 for Profibus DP  
 DNP31 for DeviceNet  
 MRP31 for Modbus RTU

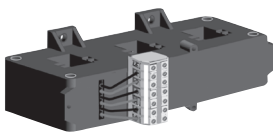


### CEM11 earth leakage sensors

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



### 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 mm<sup>2</sup>



### 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  
 USB port for PC connection  
 Multilingual: German, English, French, Italian, Polish, Portuguese, Spanish, Russian

# Contact us

## **ABB STOTZ-KONTAKT GmbH**

Eppelheimer Straße 82  
69123 Heidelberg, Germany  
Phone: +49 62 21 / 701-0  
Fax: +49 62 21 / 701-1325  
Email: [info.desto@de.abb.com](mailto:info.desto@de.abb.com)

[www.abb.com](http://www.abb.com)

<http://new.abb.com/low-voltage/products/motor-controllers>

### **Note:**

We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB AG does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents – in whole or in parts – is forbidden without prior written consent of ABB AG.

Copyright© 2014 ABB  
All rights reserved