MANUAL

MTQ22-FBP.0 Modbus TCP communication module

Universal Motor Controller UMC100.3

Important notice

Target group
This manual is intended for the use of specialists in electrical installation and control and automation engineering, who are familiar with the applicable national standards.

Safety requirements
The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

Using this manual

Symbols
This manual contains symbols to point the reader to important information, potential risks and precautionary information. The following symbols are used:

	Sign to indicate a potentially dangerous situation that can cause damage to the connected devices or the environment.
	Sign to indicate important information and conditions.
	Sign to indicate a potentially dangerous situation that can cause human injuries.

Terms and abbreviations

MRP	Media redundancy protocol
MRC	Media redundancy client
MRM	Media redundancy manager
TCP/IP	Transmission Control Protocol / Internet Protocol
UDP	User Datagram Protocol
Client / Server	The Modbus TCP messaging service provides a Client/Server communication between devices connected on an Ethernet TCP/IP network. The device initiating the communication (e.g. a PLC) is called the client. The device answering the request is called the server (the MTQ22-FBP.0 in this case).
Master / Slave	Master/slave is a model of communication where one device e.g. a PLC has control over one or more other devices (here MTQ22-FBP.0 and UMC). In the Modbus TCP context, the master is the client and the slave is the server.
MAC	Medium Access Control
MAC Address	Unique address of every Ethernet device. The MAC address of the MTQ22-FBP.0 is printed on the nameplate.
PLC	Programmable Logic Controller

Related documents

Technical documentation	Document no.
UMC100.3 manual English language	2CDC135032D0204
UMC100.3 ATEX manual English language	2CDC135033D0204
MTQ22-FBP.0 configuration tool	1SAJ260900R0001
Mapping tables for acyclic access to the UMC100.3	2CDC135068M0201

Table of contents

Cyber security

Disclaimer
This product is designed to be connected and to communicate information and data via a network interface.

It is your sole responsibility to provide and continuously ensure a secure connection between the product and your network or any other network (as the case may be) and to establish and maintain appropriate measures (including, but not limited to, the installation of firewalls, application of authentication measures, encryption of data, installation of anti virus programs, etc) to protect the product, the network, its system and interfaces against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Although ABB provides functionality testing on the products and updates that we release, you should institute your own testing program for any product updates or other major system updates (to include but not limited to code changes, configuration file changes, third party software updates or patches, hardware change out, etc) to ensure that the security measures that you have implemented have not been compromised and system functionality in your environment is as expected.

For more information or contact details regarding ABB cyber security, go to http://www.abb.com/cybersecurity

Deployment guideline
This device must be connected only to **a private/restricted network and not to any public networks**.
When connecting MTQ22-FBP.0 to public networks, security measures must be taken to reduce the cyber security risks. Such measures are not provided by the MTQ22-FBP.0 device: "external equipment“ is needed.
This private/restricted network can be connected for access via Internet or other network when using **“external equipment”** which can be separated devices or devices that combine **firewall, router and secure VPN functionality**. The cyber security standard of these external equipment depends on the customer and the targeted security level.

This “Cyber Security Deployment” guideline cannot suggest concrete products for **“external equipment”** to make a secure system setup. This must be decided in the context of the specific project, requirements and existing infrastructure.

Recommendations

When commissioning a network system, it is important to address any cyber security issues by making a cyber security assessment of the system. Example of methods to reduce security vulnerabilities are:

- Network connection
  Limit the connections with routers/firewall and similar products
- Network access control
  Add some control/limitations on the network by routers/firewall and similar products
- Network monitor
  If required add products which can monitor the network access and traffic
- Network separation
  From a cyber security point and the protection of the industry factory system, it is advisable to separate the remote connection gateway from the factory control connected gateways
- It is highly recommended to contact any cyber security personnel/consultant to make an effective cyber security assessment of the system.

Overview

The MTQ22-FBP.0 Ethernet communication module supports the Modbus TCP network protocol. This chapter contains a short description of Modbus TCP and the MTQ22-FBP.0 Ethernet module.

Highlighted features

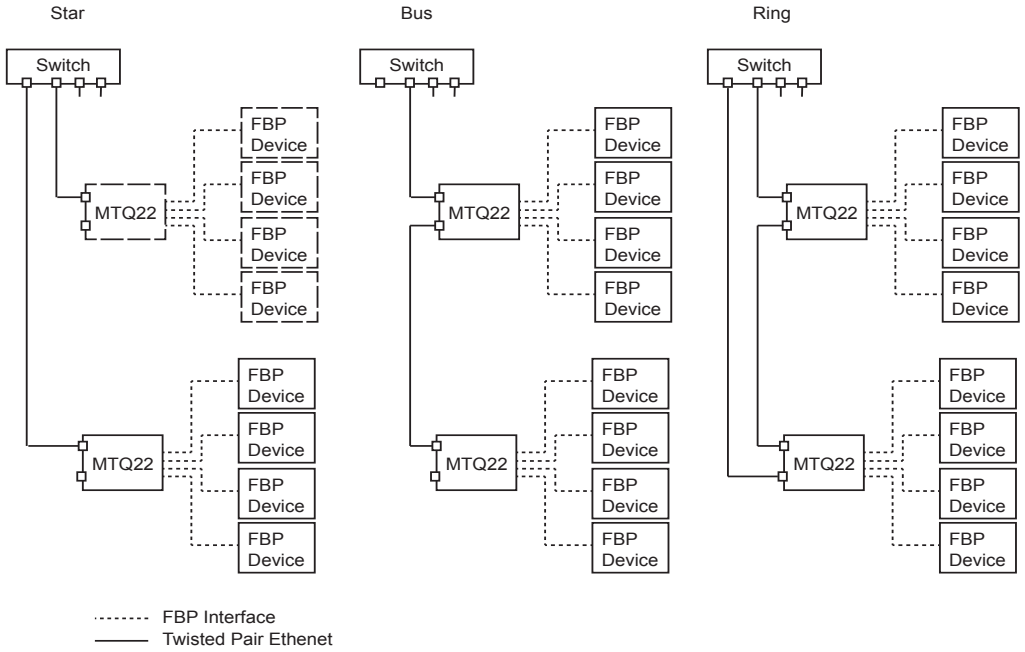
- The MTQ22-FBP.0 Modbus TCP module provides Ethernet connectivity for following devices
  - UMC100.3
  - UMC100-FBP.0
  - UMC22-FBP.0
  - PSE, PST
- Up to four devices can be connected to one MTQ22-FBP.0. This allows a very cost efficient connection of these devices to Ethernet.
- Through the MTQ22-FBP.0 Ethernet communication module it is possible to:
  - Give control commands to the device (Start, Stop, Auto, etc.). The meaning of the commands depends on the connected device
  - Read status information and actual values from the device
  - Change parameter values
  - Read maintenance counters
  - Reset a trip
- A built in two-port switch allows the flexible usage in bus, star or ring network topologies.
- Up to four masters can concurrently access the connected devices. The master connections can be supervised.
- Access via Modbus TCP can be restricted to a limited set of IP addresses
- The Media Redundancy Protocol (MRP) is implemented (client). MRP is standardized in IEC/EN 62439-2 and offers redundancy in case of a single failure.
- The Modbus address map offers flexible data access to best suit the needs of Modbus TCP client (e.g. PLC).
- Location supervision for detecting of interchanged drawers in withdraw-able systems.

Please note that the data mapping is the same for UMC100-FBP.0 and UMC100.3 even if the name UMC100 is often used in this document.

Document history		
D0202	page 29, 33	Supplementation of table values and supported bit rate
D0202 Rev B	various	Update of images, LLDP information added
D0202 Rev C	various	New template, corrections

Ethernet

Ethernet standards support a variety of physical media (coaxial cable, twisted pair, fiber optics) and topologies (bus, ring and star). The MTQ22-FBP.0 Ethernet communication module supports twisted pair as the physical media in a bus, ring and star topology.
Possible topologies are shown in Figure 1.
The MTQ22-FBP.0 is compatible with Ethernet standards IEEE 802.3 and IEEE 802.3u.



—
01 Different topologies that can be realized with the MTQ22-FBP.0 Ethernet Adapter. For the ring structure a special switch must be used. See chapter Communication for more information.

Modbus TCP

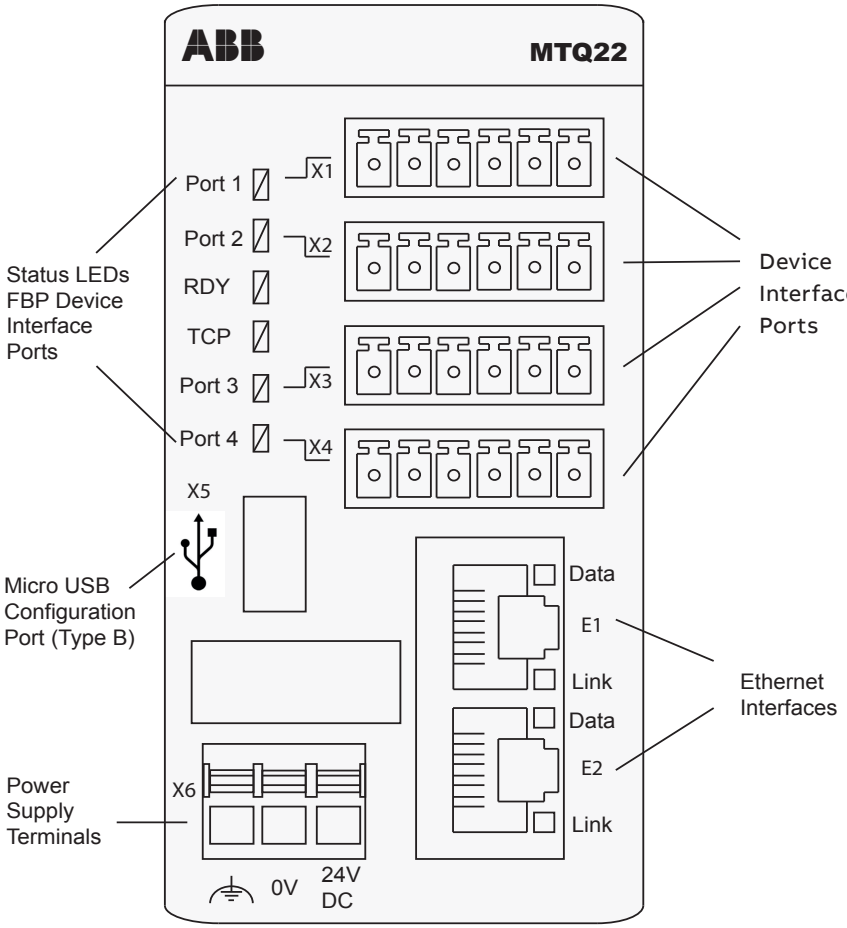
Modbus TCP is a variant of the Modbus family of simple, vendor neutral communication protocols intended for supervision and control of automation equipment. Specifically, it covers the use of Modbus messaging over TCP connection on an IP network.
The implementation of the Modbus TCP server in the MTQ22-FBP.0 module is done according to:
- Modbus Application Protocol Specification v1.1b
- Modbus Messaging on TCP/IP Implementation Guide v1.0b

The supported Modbus commands are listed in chapter Communication. Four simultaneous Modbus TCP connections are supported.

Further information on the Modbus TCP protocol is available from www.modbus.org.

MTQ22-FBP.0

Connectors X1 ... X4 are used to connect up to four devices to the MTQ22-FBP.0. Ready made cables are available for the connection in withdrawable systems or non-withdrawable systems. The order codes are available in chapter Ordering Data. On the left side of the port connectors LEDs show the current communication status. See the section on "Diagnosis / behavior in case of an error" for details. The Micro USB connector X5 allows device configuration using a PC. A standard USB cable can be used. Two RJ45 sockets E1 and E2 offer Ethernet connectivity. The communication status of each interface is shown by two LEDs. The MTQ22-FBP.0 must be supplied with 24VDC via X6.



—

02 Top view of the MTQ22-FBP.0. Four FBP devices can be connected to the MTQ22 via the ports X1 to X4. The standard Micro USB connector X5 makes it possible to configure the device. The two Ethernet interfaces E1, E2 allows the flexible integration into different network structures.

Supported devices

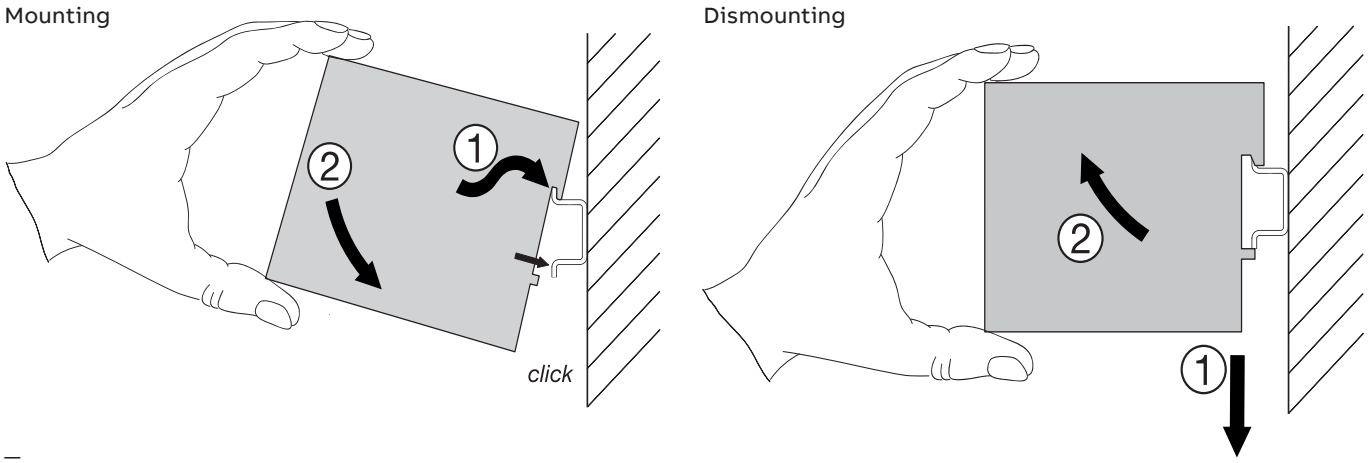
The following devices can be connected to the MTQ22-FBP.0.

- UMC22-FBP.0 (all revisions)
- UMC100.3, UMC100-FBP.0 (all revisions)
- Other devices as listed in the configuration tool

Installation

Mounting and dismounting

You can mount and unmount the MTQ22-FBP.0 onto a 35 mm standard mounting rail without tools.



—
03 Mounting and dismounting the MTQ22-FBP.0 on a 35 mm standard mounting rail.

Electrical Installation

General
Arrange the communication cables as far away from the motor cables as possible. Avoid parallel runs. Use bushings at cable entries.

Ethernet connection
The network cable is connected to the RJ45 connectors on the MTQ22-FBP.0 module. Standard CAT5 UTP, FTP or STP cables can be used. The shield of the RJ45 cable is connected to the shield of connector X6.

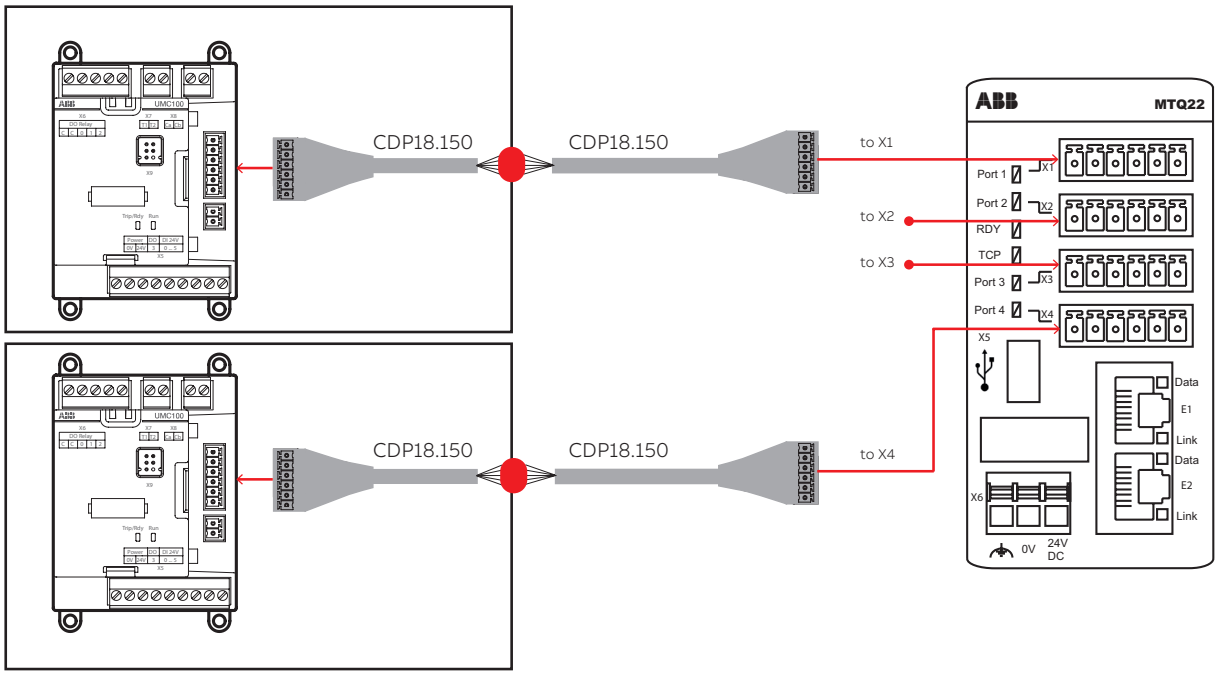
Power Supply connection
The MTQ22-FBP.0 has to be supplied with 24 V DC on the terminals X6. Using the shield connection is optional.

FBP Device connection
FBP devices (e.g. UMC100) can be connected point to point using the ready made cable CDP17.
This option is recommended in non withdraw-able installations (e.g. using a mounting plate for the installation).

In case the FBP device is mounted within a withdraw-able unit (drawer) all the needed cables and auxiliaries are available as well as shown in detail in the figure below.

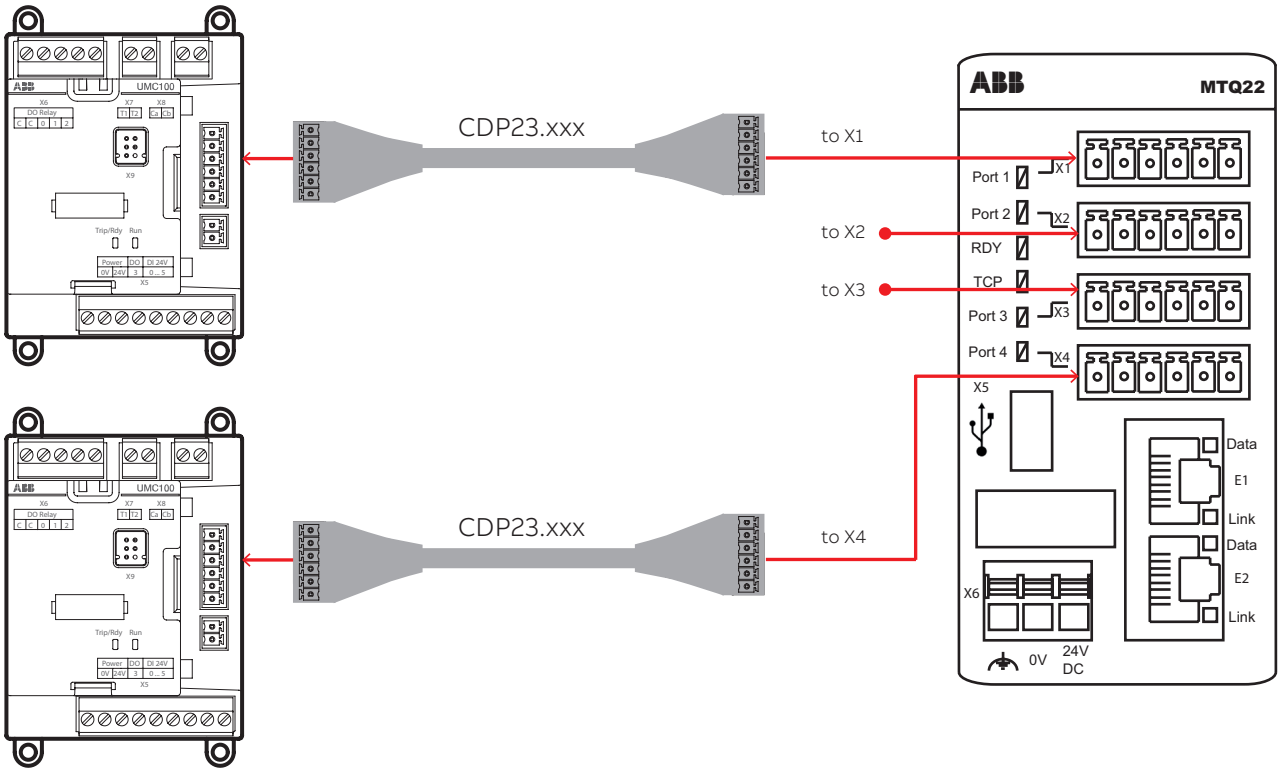
The distance between the MTQ22-FBP.0 and the FBP device must not exceed 3 meters.

The communication cables between MTQ22-FBP.0 and UMC100 must not run in parallel to the motor cables.



—

04 Solution for motor control centers in draw-out technology.
Connecting the MTQ22-FBP.0 ports 1 to 4 - connectors X1 to X4 - to the UMC mounted inside a drawer standard mounting rail.



—

05 Connecting the MTQ22-FBP.0 ports 1 to 4 - connectors X1 to X4 - to the UMC

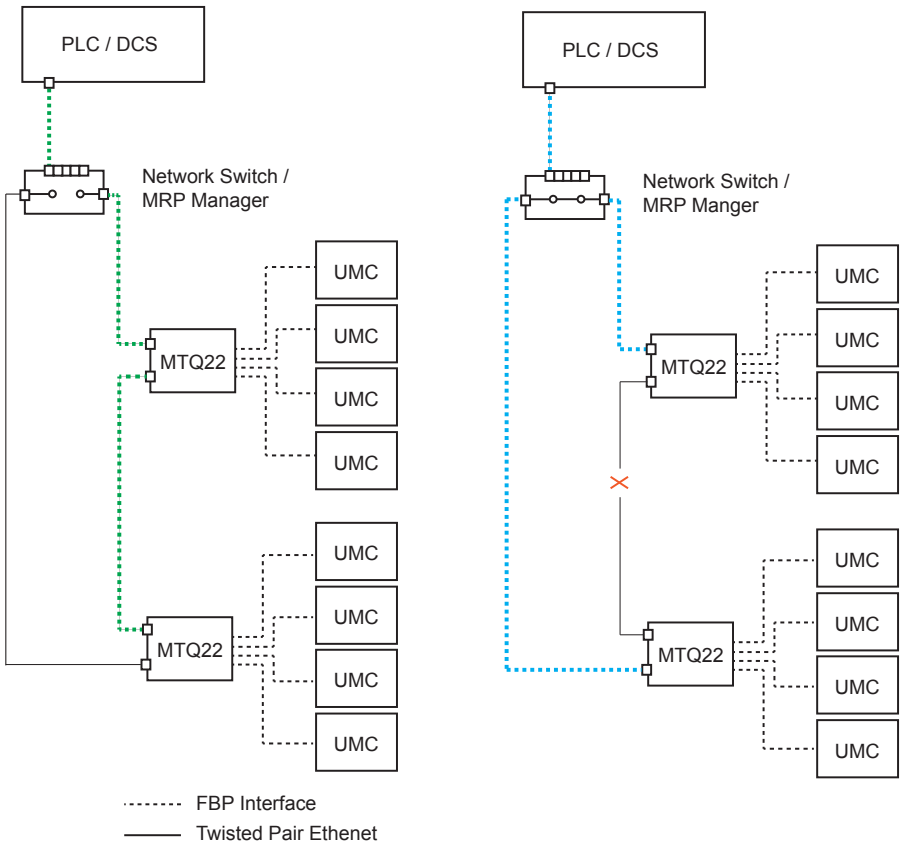
Ethernet communication

Star topology
In star topology, only one RJ45 cable must be connected between the MTQ22-FBP.0 and a switch. An unmanaged standard switch can be used in this operation mode.

Bus topology
In bus topology, the internal two-port-switch of the MTQ22-FBP.0 is used to connect MTQ22-FBP.0 to MTQ22-FBP.0. Only the first MTQ22-FBP.0 in the chain needs to be connected to a switch. The second Ethernet port of the last MTQ22-FBP.0 can be left unconnected. An unmanaged standard switch can be used in this operation mode.

Ring topology with network redundancy
The ring topology offers cable redundancy on the Ethernet side. The topology is similar to the bus topology, but the last MTQ22-FBP.0 in the chain must be connected to the switch again to close the ring. A managed switch supporting MRP and acting as MRP manager must be used in this case. The redundancy protocol implemented in the MTQ22-FBP.0 is according to EN/IEC 62439-2.

The MRP standard defines two principal device roles in a MRP network. The MRP manager which is typically a managed network switch, and MRP clients which are typically automation devices like the MTQ22-FBP.0.
The MRP master sends out test telegrams cyclically to check the health status of the network. If everything is in order, it blocks telegrams on one side of its internal switch to avoid loops (left side of the next figure). If a fault is detected somewhere in the network, the MRP master reorganizes the network and closes its internal switch. In this way, all network nodes are still accessible (right side of next figure).



06 This figure shows how a single network failure is corrected in a MRP network. The left side shows the intact network. The MRP manager has opened its internal switch, so all nodes can be reached using the green dotted route. On the right side the MRP master has detected a network problem and has closed its internal switch to ensure connectivity to all network nodes. The blue dotted path shows how all network nodes are currently reached.

Ring topology with network redundancy in draw-out systems

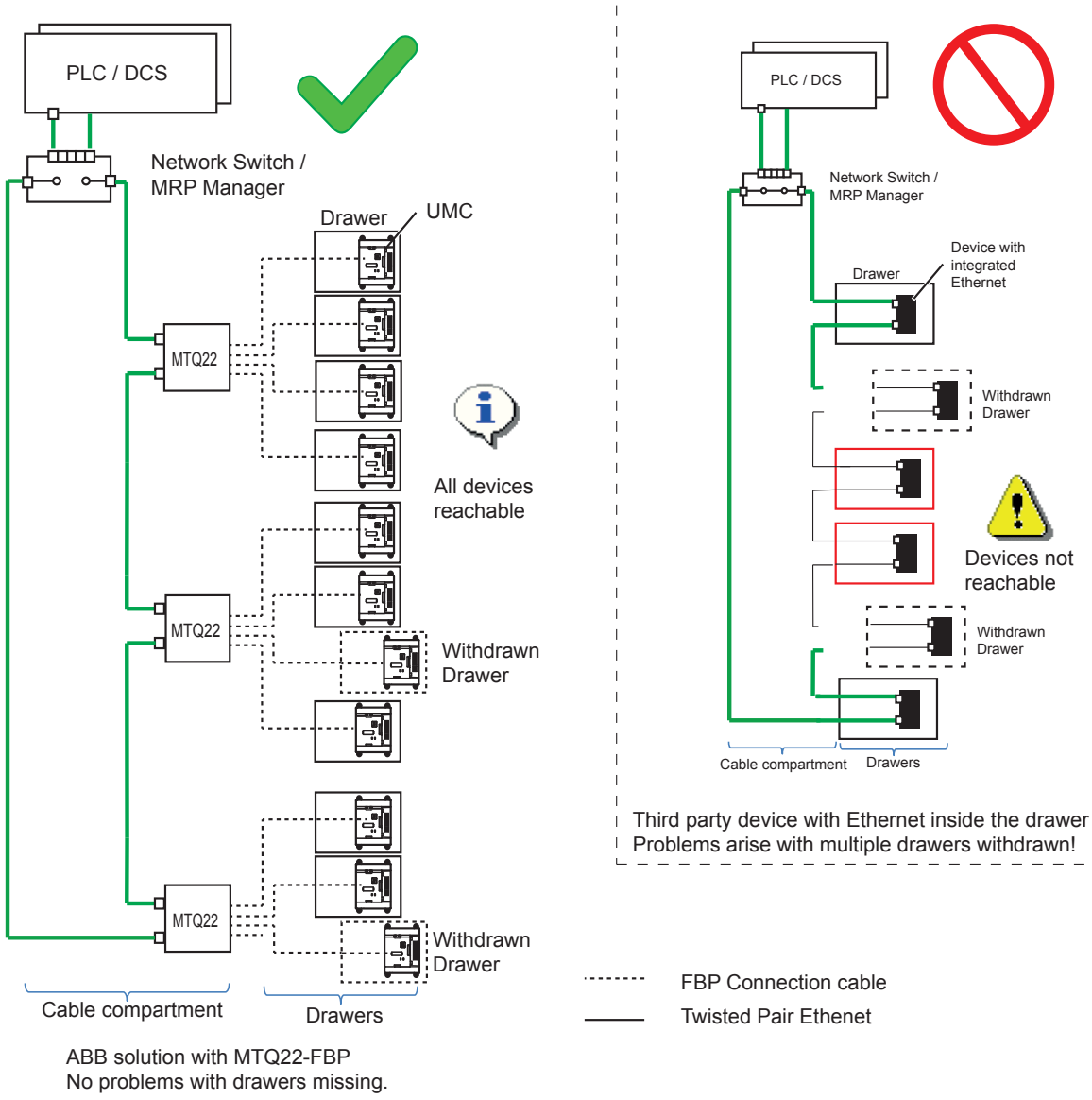
Draw-out systems are used where highest availability and shortest downtimes should be achieved. In such systems, all the devices required for a single motor feeder are installed into a drawer to ensure fast and easy exchange in the event of a failure. Here the MTQ22-FBP.0 offers the following benefits:

- No need to bring high speed Ethernet into the withdraw-able unit
- Stable communication even if two or more drawers are withdrawn.

The right figure below shows the situation where devices have integrated Ethernet and two drawers are withdrawn. Devices between these two drawers cannot be reached anymore. Moreover, the MRP redundancy function will not work in this situation.

On the left side the solution with MTQ22-FBP.0 is shown. The MTQ22-FBP.0 is not mounted inside the drawer but is installed in the cable compartment where the switch and other central equipment are installed. The Ethernet cable is not connected to the UMC mounted inside the drawer. But the robust and well known FBP interface goes to the UMC in the drawer. Therefore, no special measures are required in the event that one or more drawers are withdrawn.

A removed drawer cannot disturb the Ethernet communication in any way.



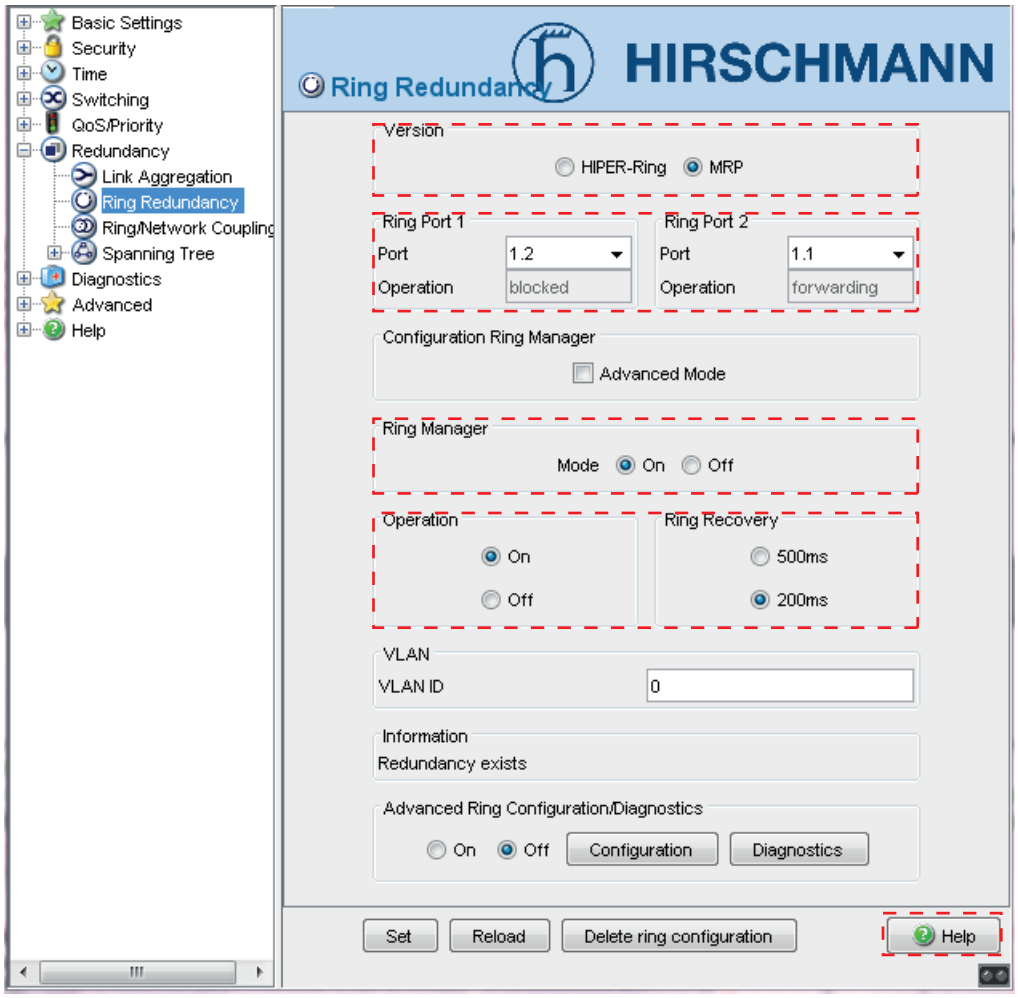
—

07 The left side shows the benefits not having Ethernet connected inside a drawer

Switch configuration for ring topology

Managed switches of various vendors offer the possibility to configure ring topologies with MRP redundancy.
In the following example a network switch from Belden/Hirschmann is used as an example.
The screenshots are taken from the RS20 configuration tool.

- Follow the setup instructions of the switch manual
- Open the "Redundancy" page and select the marked options shown in the figure below.
  To get help press the Help button.



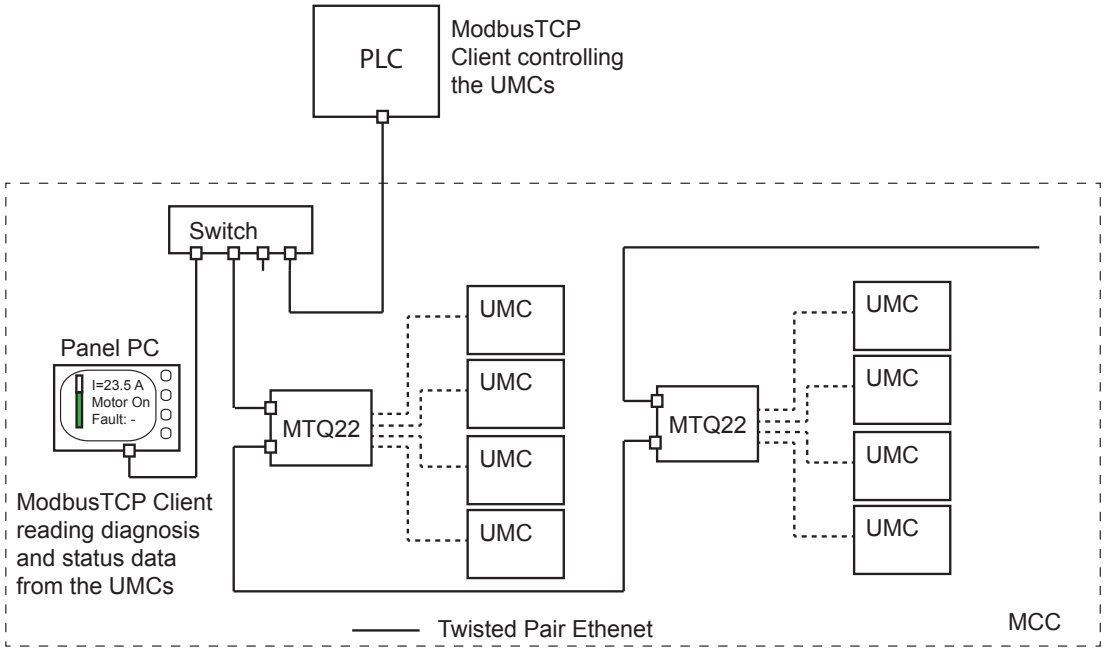
—

08 The page 'Ring Redundancy' makes it possible to enable the MRP redundancy protocol and to define the ports that are the start and end of the ring.

Usage with multiple Modbus TCP Clients

The MTQ22-FBP.0 allows the concurrent communication with up to four Modbus TCP clients (e.g. PLCs). The MTQ22-FBP.0 optionally can supervise the clients and signal a bus fault to the connected devices in case of a fault. Note the following points:

- Specify the number of clients that should be supervised and the minimum number of clients that have to be present See section Configuration for more info.
- Only one of the concurrent PCLs should send command data to a device (e.g. UMC100). Otherwise there might arise conflicts (e.g. if two different command words are sent at the same time).
- Different Modbus TCP clients can control FBP devices connected to the same MTQ22-FBP.0. E.g. Modbus TCP client 'A' controls the UMC100 connected to port 1 and client 'B' controls the FBP devices connected to port 2 - 4
- Monitoring of all devices from the clients is always possible



—

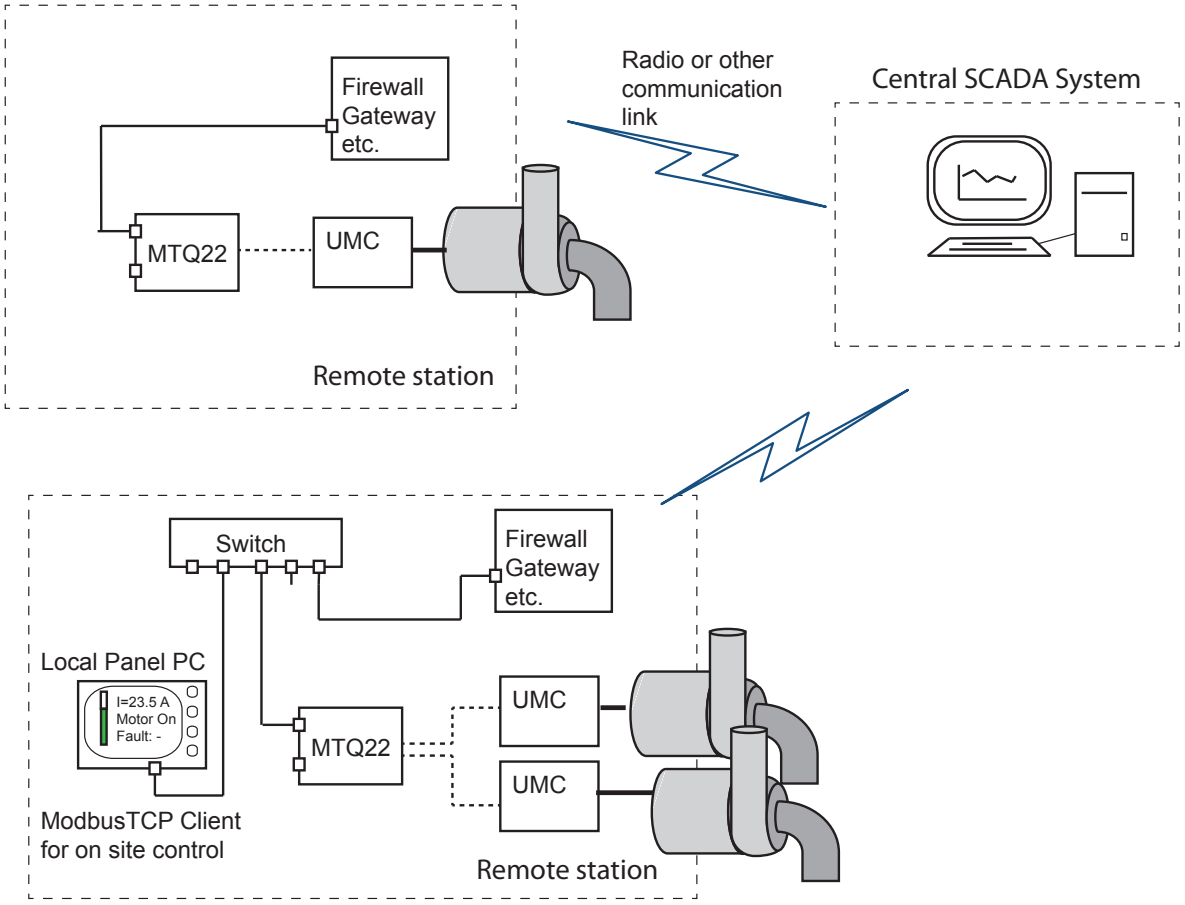
09 The MTQ22-FBP.0 allows up to four concurrent Modbus TCP clients.
This can be used to monitor the FBP devices (e.g. UMCs as shown here) in the MCC with the help of a panel PC for example. At the same time the PLC controls the UMCs.

Usage in Remote Access Applications

In some applications it is essential to do monitoring or even control remotely, e.g. at regional distributed pump stations. In such cases the use of standard Ethernet is of great benefit because standard routers, gateways etc. can be used.

Take measures where only authorized users have access to the remote installation and can read or write data.

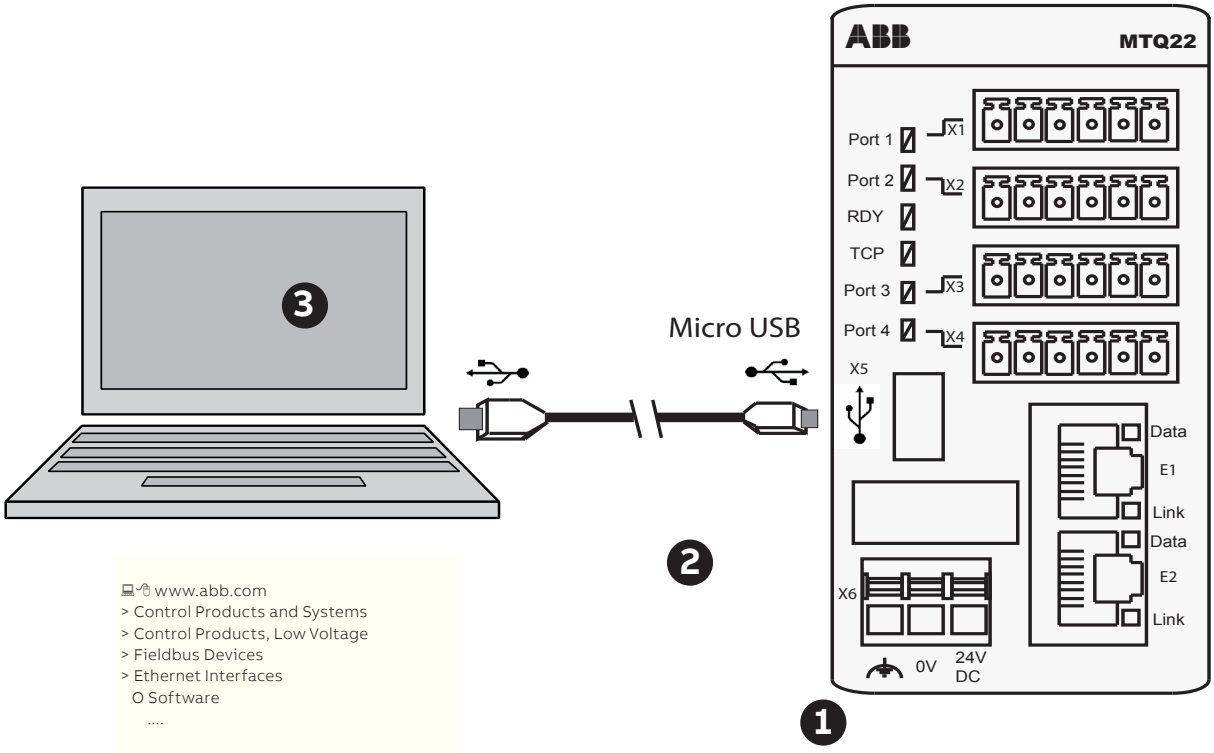
The following figure shows a system with a central SCADA (supervision control and data acquisition) station and several remote locations.
The SCADA system is connected to the remote locations via a model or other wireless or wired network.



10 TCP-IP based communication makes the integration of distributed stations much simpler.

Configuration

An easy to use PC configuration tool is provided to adjust the parameters of the MTQ22-FBP.0. The PC can be connected to the MTQ22-FBP.0 with a standard Micro USB cable. The software is accompanied by a "readme.txt" text file, which contains the latest installation and setup instructions.



11 Connecting the MTQ22-FBP.0 to a service Laptop. The MTQ22-FBP.0 must be supplied with 24V DC before the configuration can take place (1) For the connection a Micro USB cable (2) is used. On the PC the MTQ22 configuration software must be installed (3).

First Steps

If the MTQ22-FBP.0 is connected for the first time, the required USB driver has to be installed. The Microsoft USB driver is not part of the software package for licensing-related reasons in case it is not yet part of the Windows installation. Follow the setup instructions of Windows to install the new hardware. The required driver inf-file is part of the software package. After startup of the application, the screen is split into three areas – left, middle and right. In the left area, you can add as many MTQs as you have in your project. In the middle area, the configuration parameters per MTQ22-FBP.0 are displayed. You can change them offline or online. The right area shows a short help text.
See figure 12.

Online Mode

In online mode, it is possible to read the configuration data stored in a MTQ22-FBP.0 back into the configuration tool or to write the data from the configuration tool down into the MTQ22. The online connection is made by USB, with a serial profile being used on the USB side. Therefore Windows detects the MTQ22-FBP.0 interface as a serial link and creates a COM port for it. Before going online, lookup the COM port assigned by Windows and set it in the configuration tool. Now press the connect button on the toolbar. A closed connector indicates online mode.

If a failure message in the tool comes up, re-assign the COM port, because it may be blocked by another application. To do this, search for "Device manager" -> Right-Click on the USB connection under "Ports (COM&LPT)" -> "Port Settings" -> "Advanced" -> Choose a different COM port under "COM Port Number". Then restart the laptop and try again in the MTQ22 configuration tool.

To upload or download parameters to the MTQ22-FBP.0, the device must be supplied with 24 V DC. The USB port is galvanically isolated to protect the PC in case potential differences exist between the MTQ22 ground and the PC ground.

12 The configuration tool makes it possible to set the parameters in an easy way. Several MTQ22-FBP.0 devices can be created in the device tree (left). The final configuration can be saved to the disk and downloaded into the devices using a standard USB cable.

Parameters

Master Configuration and Supervision

The MTQ22-FBP.0 supports up to four parallel connections to Modbus TCP clients (i.e. PLCs). It is possible to monitor these clients for activity and signal a communication fault to the connected FBP devices after an adjustable timeout time.
For security reasons, the access to the MTQ22-FBP.0 can be limited to clients having IP addresses within a user defined range. Single addresses or address ranges can be defined.

Network Settings

Before any Ethernet communication takes place, the MTQ22-FBP.0 must have an IP address. It is possible to provide a static address or obtain the address via DHCP or the BootP protocol.
In the case of a static IP address, the netmask and the gateway address must also be set manually.

Device Settings

Up to four FBP devices can be connected to the MTQ22-FBP.0. For each port, the connected device type (or NONE) must be specified. The MTQ22-FBP.0 then monitors the presence of the configured FBP device.

Position Supervision

The MTQ22-FBP.0 detects accidental permutation of devices connected to it. Therefore, a specific address (1...254) has to be set per port which must match the address (1...254) set in the connected device. The MTQ22-FBP.0 offers status registers to read the actual FBP device supervision status via Modbus TCP.
See the Address Map section for details.

Parameter Overview
Before using the MTQ22-FBP.0 device, the following parameters must be set:

Parameter name	Default settings
DHCP / BOOTP	Manual
IP Address	192.168.171.254
Subnet Mask	255.255.255.0
Standard Gateway	192.168.171.1
Number of Modbus TCP masters under supervision	1
Allowed number of supervised connections missing	0
Allowed Modbus TCP IP Address for master 1 ... 4	0.0.0.0 ... 255.255.255.255 for master 1 0.0.0.0 ... 0.0.0.0 for master 2-4
Timeout for master 1 ... 4	10s
Device port 1 ... 4 used	UMC100
Device address for device 1 ... 4	1,2,3,4

Modbus TCP register map

Please note that the data mapping is the same for UMC100-FBP.0 and UMC100.3 even if the name UMC100 is often used in this document.

Supported function codes

The following Modbus function codes are supported:

Function Code	Explanation
FC1	Read coils
FC2	Read input discretes
FC3	Read multiple registers
FC4	Read input registers
FC5	Write single coil
FC6	Write single register
FC7	Read exception status
FC15	Force multiple coils
FC16	Write multiple registers
FC23	Read/Write multiple registers

Modbus Address Table

The I/O-data as well as parameter, diagnosis and configuration data of the connected FBP devices can be accessed applying the supported function codes on the addresses described in the following table 2.

Modbus TCP counts registers beginning with the digit 1, but on the bus, registers start counting from zero.
The addresses in this manual describe the addresses that are transmitted on the network.
Depending on the customer's application, it might be necessary to increment all addresses by one.

Device I/O data and diagnosis can be accessed by three different ways:
- Separate access to each data type (boolean values or analog values) of each module.
  This requires sending several Modbus telegrams to the dedicated addresses
- Access to the data of all connected devices with one MODBUS telegram ordered by module connected to port 1..4
- Access to the data of all connected devices with one MODBUS telegram ordered by data type DI, AI, Diagnosis or DO, AO.

MTQ22 Status Data

Address	Data	Size	Access
0x0000...0x0007 (HEX), 0 – 7 (DEC)	Product Name, Default "MTQ22-FBP" (ASCII-representation is 0x4D54, 0x5132, 0x322D, 0x4642, 0x5020, 0x2020, 0x2020, 0x2020)	8 words	Read / Write
0x0010 (HEX), 16 (DEC)	Port 1 number of connection losses between MTQ22-FBP.0 and UMC100	Word	Read / Write
0x0011 (HEX), 17 (DEC)	Port 2 number of connection losses between MTQ22-FBP.0 and UMC100	Word	Read / Write
0x0012 (HEX),18 (DEZ)	Port 3 number of connection losses between MTQ22-FBP.0 and UMC100	Word	Read / Write
0x0013 (HEX), 19 (DEZ)	Port 4 number of connection losses between MTQ22-FBP.0 and UMC100	Word	Read / Write
0x0080 (HEX), 128 (DEZ)	Port 1 diagnostics	Word	Read
0x0081 (HEX), 129 (DEZ)	Port 2 diagnostics	Word	Read
0x0082 (HEX), 130 (DEZ)	Port 3 diagnostics	Word	Read
0x0083 (HEX), 131 (DEZ)	Port 4 diagnostics	Word	Read

See section **Diagnosis / behavior in case of an error** for an explanation of the communication status codes.

Reading and Writing Device Data

The following tables show how to generally access data of the devices connected to port one to port four of the MTQ22-FBP.0. The manuals of the connected devices are also needed to understand what data is provided and to derive the length of the input and output data telegrams from it.
The tables in this document show the mapping of the most common input, output and diagnosis data, that can be accessed very fast with one single read or write command.
Generally it is possible to read all data from the UMC100.3. All registers are listed in the separate document 2CDC135068M0201, that can be downloaded from the ABB product web page.

In the following tables the same data types are shown in the same color for an easier identification.

Individual data access by device
This method makes it possible to individually access data from a connected device via single registers or groups of registers organized in words.

Address for data access to device connected to port				Data	Length	Access
1	2	3	4			
0x0C00 dec 3072	0x0C20 dec 3104	0x0C40 dec 3136	0x0C60 dec 3168	Diagnosis data of connected device	0 ... 16 registers*	Read
0x1000 dec 4096	0x1010 dec 4112	0x1020 dec 4128	0x1030 4144	Digital Inputs (DI)	0 ... 16 registers* (0 - 32 bytes)	Read
0x1800 dec 6144	0x1810 dec 6160	0x1820 dec 6176	0x1830 dec 6192	Digital Outputs (DO)	0 ... 16 registers* (0 - 32 bytes)	Write, Read
0x2000 dec 8192	0x2100 dec 8448	0x2200 dec 8704	0x2300 dec 8960	Analog Inputs (AI)	0 ... 256 registers	Read
0x2800 dec 10240	0x2900 dec 10496	0x2A00 dec 10752	0x2B00 dec 11008	Analog Outputs (AO)	0..256 registers	Write, Read

*) Actual number of registers (length) depends on the connected device.

The following table shows the data which can be accessed using bit access requests.

Address for data access to device connected to port				Data	Length	Access
1	2	3	4			
0x1000 dec 4096	0x1100 dec 4352	0x1200 dec 4608	0x1300 dec 4864	Digital Inputs (DI) bitwise access	0 ... 256 Bit*	Read Coils, Read Multiple Coils
0x1800 dec 6144	0x1900 dec 6400	0x1A00 dec 6656	0x1B00 dec 6912	Digital Outputs (DO) bitwise access	0 ... 256 Bit*	Write Coils, Write Multiple Coils Read Coils, Read Multiple Coils

*) Actual number of bits depends on the connected device.

Access to all data ordered by device

For performance reasons, some applications might require access to the entire I/O data with one Modbus TCP telegram. This access method makes it possible to read or write data from all the connected devices with one request.

Address	Data	Length	Access
0x3000 dec 12288	Input Data Block DI1 | AI1 | Diag1 | DI2 | AI2 | Diag2 | ... | DI4 | AI4 | Diag4	0...1216 registers	Read
0x4000 dec 16384	Output Data Block DO1 | AO1 | DO2 | AO2 | DO3 | AO3 | DO4 | AO4	0...1216 registers	Write, Read

The total input data block length depends of the length of the AI, DI, diagnostics data of each configured device. The total output data length depends of the length of the AO, DO data of each configured device. If only three ports are used (e.g. port four used as spare) the data length for device four must be set to zero in the input and output data block. If a device does not provide a certain data type (e.g. AO), the length of this field has to be set to zero. Only word access is supported in this address range.

Access to all data ordered by data type

For performance reasons some applications might require access to the entire I/O data with one Modbus TCP telegram. This access method makes it possible to read or write data from all devices ordered by data type.

Address	Data	Length	Access
0x5000 dec 20480	Input Data Block DI1 | DI2 | DI3 | DI4 | AI1 | ... | AI4 | Diag1 | ... | Diag4	0...1216 registers	Read
0x6000 dec 24576	Output Data Block DO1 | ... | DO4 | AO1 | ... | AO4	0...1216 registers	Write, Read

The total input data block length depends of the length of the AI, DI, Diagnosis data of each configured device. The total output data length depends of the length of the AO, DO data of each configured device. If only three ports are used (e.g. port four used as spare) the data length for device four must be set to zero in the input and output data block. If a device does not provide a certain data type (e.g. AO), the length of this field has to be set to zero. Only word access is supported in this address range.

Example address map with UMC100

The previous section described the Modbus address map in a device independent manner.
In this section the address map is presented for the case that four UMC100 devices are connected.

Note that the UMC100 allows remapping of the content of the IO data bytes.
If the IO data content in a function block application have been changed, the content of the data bytes might differ from the data shown in the following tables.

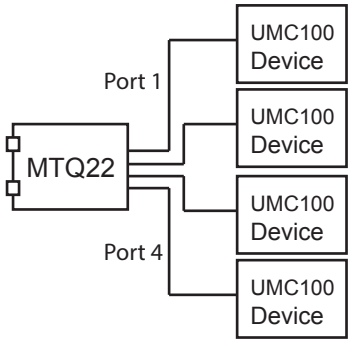
UMC100-I/O data referred to in section **A1 Parameters and Data Structures on a Fieldbus:** in the UMC100 manual

Diag: 8 Bytes (4 Words)
DI: 2 Bytes (1 Word)
DO: 4 Bytes (2 Words)
AI: 14 Bytes (7 Words)
AO: 8 Bytes (4 Words)

→

Monitoring Data:
DI + AI + Diag = 24 Bytes = 12 Words

Command Data:
DO + AO = 12 Bytes = 6 Words



Individual data access by device
This method makes it possible to individually access data from a connected device via single registers or groups of registers.

Address for data access to device connected to port				Data	Length	Access
1	2	3	4			
0x0C00	0x0C20	0x0C40	0x0C60	Diagnosis	4 Words (= 8 Bytes)each UMC	Read
0x1000	0x1010	0x1020	0x1030	Digital Inputs (DI)	1 Word (= 2 Bytes) each UMC	Read
0x1000	0x1100	0x1200	0x1300	DI bitwise	0 ... 16 Bit each UMC	Read Coils, Read Multiple Coils
0x1800	0x1900	0x1A00	0x1B00	Digital Outputs (DO)	2 Word (= 4 Byte) each UMC	Write, Read
0x1800	0x1810	0x1820	0x1830	DO bitwise	0..32 Bit each UMC	Write Coils, Write Multiple Coils Read Coils, Read Multiple Coils
0x2000	0x2100	0x2200	0x2300	Analog Inputs (AI)	7 Words each UMC	Read
0x2800	0x2900	0x2A00	0x2B00	Analog Outputs (AO)	4 Words each UMC	Write, Read

Word-oriented access to the monitoring data of UMC100 acc. to the UMC100 manual section

A1 Parameters and Data Structures on a Fieldbus

UMC at port 1	**UMC at port 2**	**UMC at port 3**	**UMC at port 4**	**Bit 7 Bit 15**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit1**	**Bit 0 Bit 8**	
Address												
0x1000 dec 4096	0x1010 dec 4112	0x1020 dec 4128	0x1030 dec 4144	Summary Warning	Summary Fault	Local Control	Reverse Lockout Time[3]	Overload warning	Run Forward / Opening	Off	Run Reverse / Closing	Low-Byte
				UMC100 DI5	UMC100 DI4	UMC100 DI3	UMC100 DI2	UMC100 DI1	UMC100 DI0	Run Fast Forward	-	High-Byte

Bit-oriented access to the monitoring data of UMC100 according to the UMC100 manual section

A1 Parameters and Data Structures on a Fieldbus

UMC at port 1	**UMC at port 2**	**UMC at port 3**	**UMC at port 4**	**Bit Information**	
Address					
0x1000 dec 4096	0x1100 dec 4352	0x1200 dec 4608	0x1300 dec 4864	Run Reverse / Closing	Bit 0
0x1001 dec 4097	0x1101 dec 4353	0x1201 dec 4609	0x1301 dec 4865	Off	
...	...	...	...	...	
0x100F dec 4111	0x130F dec 4867	0x130F dec 4823	0x130F dec 4879	UMC100 DI5	Bit 15

Word-oriented access to the command data of UMC100 according to the UMC100 manual section

A1 Parameters and Data Structures on a Fieldbus

UMC at port 1	**UMC at port 2**	**UMC at port 3**	**UMC at port 4**	**Bit 7 Bit 15 Bit 23 Bit 31**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit1**	**Bit 0 Bit 8 Bit 16 Bit 24**	
Address												
0x1800 dec 6144	0x1810 dec 6160	0x1820 dec 6176	0x1830 dec 6192	-	Fault Reset	Auto Mode	Prepare Emergency Start	-	Run Forward / Opening	Off	Run Reverse / Closing	Low Byte
												High Byte
				UMC100 DO2	UMC100 DO1	UMC100 DO0	UMC100 24VDC Out	-	-	Run Fast Forward	-	Low Byte
												High Byte
0x1801 dec 6145	0x1811 dec 6161	0x1821 dec 6177	0x1831 dec 6193	VI15x DO0	-	-	-	DX1xx DO3	DX1xx DO2	DX1xx DO1	DX1xx DO0	Low Byte
				-	-	-	-	-	-	-	-	High Byte

Bit-oriented access to the command data of UMC100 according to the UMC100 manual section

A1 Parameters and Data Structures on a Fieldbus

UMC at port 1	**UMC at port 2**	**UMC at port 3**	**UMC at port 4**	**Bit Information**	
Address					
0x1800 dec 6144	0x1900 dec 6400	0x1A00 dec 6656	0x1B00 dec 6912	Run Reverse / Closing	Bit 0
0x1801 dec 6145	0x1901 dec 6401	0x1A01 dec 6657	0x1B01 dec 6913	Off	
...	...	...	...	...	Bit 31
0x1820 dec 6175	0x 191F dec 6431	0x1A1F dec 6687	0x1B1F dec 6943	-	

Analog Inputs of UMC100 according to the UMC100 manual section

A1 Parameters and Data Structures on a Fieldbus

UMC at port 1	UMC at port 2	UMC at port 3	UMC at port 4	Data								
Address												
0x2000 dec 8192	0x2100 dec 8 448	0x2200 dec 8704	0x2300 dec 8960	Motor current in % of I_e (0 % - 800 %)								
0x2001 dec 8193	0x2101 dec 8448	0x2201 dec 8704	0x2301 dec 8961	Analog word (Thermal Load: 0 % - 100 %)								
0x2002 dec 8194	0x2102 dec 8450	0x2202 dec 8704	0x2302 dec 8962	Analog word (Time to trip in seconds)								
0x2003 dec 8195	0x2103 dec 8451	0x2203 dec 8704	0x2303 dec 8963	Analog word (Time to restart in seconds)								
0x2004 dec 8196	0x2104 dec 8452	0x2204 dec 8704	0x2304 dec 8964	Analog word (Active power in selected scale)								
0x2005 dec 8197	0x2105 dec 8453	0x2205 dec 8704	0x2305 dec 8965	DX1xx DI7	DX1xx DI6	DX1xx DI5	DX1xx DI4	DX1xx DI3	DX1xx DI2	DX1xx DI1	DX1xx DI0	Low Byte
				-	-	Run Time Excee-ded1	Out of posi-tion1	Torque Open1	Torque Closed1	End Pos Open1	End Pos Closed1	High Byte
0x2006 dec 8198	0x2106 dec 8454	0x2206 dec 8704	0x2306 dec 8966	U Imbal. warn	U Imbal. trip	Under-voltage warn	Under-voltage trip	Under-power warn	Under-power trip	Over-power warn	Over-power trip	Low Byte
				Earth fault warning	Earth fault trip	Cooling time running	-	THD warning	No start possible[5]	1 start left [5]	More than 1 start left[5]	High Byte

Analog Outputs of UMC100 according to the UMC100 manual section

A1 Parameters and Data Structures on a Fieldbus

UMC at port 1	UMC at port 2	UMC at port 3	UMC at port 4	Data
Address				
0x2800	0x2900	0x2A00	0x2B00	Analog word
0x2801	0x2901	0x2A01	0x2B01	Analog word
0x2802	0x2902	0x2A02	0x2B02	Analog word
0x2803	0x2903	0x2A03	0x2B03	Analog word

[1] Not for Actuator 1 ... 4
[2] Only for Actuator 1 ... 4
[3] Not for Overload Relay and Transparent
[4] Only for Pole-Changing Starter
[5] If start limit function is used

Diagnosis Data of UMC100 according to the UMC100 manual section
A1 Parameters and Data Structures on a Fieldbus

UMC at port 1	**UMC at port 2**	**UMC at port 3**	**UMC at port 4**	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit1**	**Bit 0**
Address											
0x0C00 dec 3072	0x0C20 dec 3104	0x0C40 dec 3136	0x0C60 dec 3168	Checkback missing	PTC wiring failure	PTC hot	Pre-waring thermal model	Locked rotor during start-up (stall)	Phase imbalance[1]	Phase loss[1]	Thermal overload trip
				Actuator problem[1]	UMC self-test error	Earth fault pre-warning	Earth fault trip (internal or externally triggered)	I above high current warning threshold	I above high current trip threshold	I below low current warning threshold	I below low current trip threshold
0x0C01 dec 3073	0xC021 dec 3105	0x0C41 dec 3137	0x0C61 dec 3167	Trip/ Warning from AuxFault function block input 5[2)]	Trip/Warning from AuxFault function block input 4[2)]	Trip/ Warning from AuxFault function block input 3[2)]	Trip/ Warning from AuxFault function block input 2[2)]	Trip/ Warning from AuxFault function block input 1[2)]	HW fault on IO module	Custom application error	IO module missing
				-	-	-	-	Trip triggered from Multi-function input DI2	Trip triggered from Multi-function input DI1	Trip triggered from Multi-function input DI0	Trip / Warning from AuxFault function block input 6[2)]
0x0C02 dec 3074	0x0C22 dec 3106	0x0C42 dec 3138	0x0C62 dec 3168	-	-	THD Warning	Voltage out of spec[1]	Overload power	Underload power[1]	-	-
				-	-	Cooling Time Running	Just one start left	Num Starts Overrun	-	-	-
0x0C03 dec 3075	0x0C23 dec 3107	0x0C43 dec 3139	0x0C63 dec 3169	Extended diagnosis is available[1)].	Parameter out of range	-	-	-	-	-	-
				Fault code. See the section "Error Handling, Maintenance and Service-> Fault Messages" for a description of the code.							

[1)] There is more than one root cause that triggers this diagnosis. For details see diagnosis byte seven.
[2)] By default these diagnosis bits are triggered from the digital inputs of the DX111/DX122 IO module. If you have created an own custom application these diagnosis bits might be triggered for other reasons (see manual "Custom Application Editor" for more details).

Data Access in one block ordered by device

This section explains how to access the data of the connected devices in one block. Only one Modbus TCP read request is required to read all monitoring data, and only one request is necessary to write all command data.

Monitoring Data
This address map shows how the complete monitoring data from up to four UMCs can be read in one block. The data is ordered without any gaps after each other in the following way.

DI UMC1	AI UMC1	Diag UMC1	DI UMC2	AI UMC2	Diag UMC2	...	DI UMC4	AI UMC4	Diag UMC4

The following table shows in detail how the data is organized

UMC at port 1	UMC at port 2	UMC at port 3	UMC at port 4	Data							
0x3000 dec 12288	0x300C dec 12300	0x3018 dec 12312	0x3024 dec 12324	Summary Warning	Summary Fault	Local Control	Rev Lockout Time	Overload warning	Run Fwd / Opening	Off	Run Rev/ Closing
				UMC100 DI5	UMC100 DI4	UMC100 DI3	UMC100 DI2	UMC100 DI1	UMC100 DI0	Run Fast Fwd	-
0x3001 dec 12289	0x300D dec 12301	0x3019 dec 12313	0x3025 dec 12325	Motor Current in % of I_e (0% - 800%							
0x3002 dec 12290	0x300E dec 12302	0x300A dec 12314	0x3026 dec 12326	Analog Word (Thermal Load: 0% - 100%)							
0x3003 dec 12291	0x300F dec 12303	0x301B dec 12315	0x3027 dec 12327	Analog Word (Time to trip in seconds)							
0x3004 dec 12292	0x3010 dec 12304	0x301C dec 12316	0x3028 dec 12328	Analog Word (Time to restart in seconds)							
0x3005 dec 12293	0x3011 dec 12305	0x301D dec 12317	0x3029 dec 12329	Analog Word (Active power in selected scale)							
0x3006 dec 12294	0x3012 dec 12306	0x301E dec 12318	0x302A dec 12330	DX1xx DI7	DX1xx DI6	DX1xx DI5	DX1xx DI4	DX1xx DI3	DX1xx DI2	DX1xx DI1	DX1xx DI0
				-	-	Run Time Excee-ded[1]	Out of Position	Out of Position	Torque Closed	End Pos Open	End Pos Closed
0x3007 dec 12295	0x3013 dec 12307	0x301F dec 12319	0x302B dec 12331	U Imbal. warn	U Imbal. trip	Under-voltage warn	Under-voltage trip	Under-power warn	Under-power trip	Over-power warn	Over-power trip
				Earth fault warning	Earth fault trip	Cooling time running	-	THD warning	No start possible	No start possible	More than one start left
0x3008 dec 12296	0x3014 dec 12308	0x3020 dec 12320	0x302C dec 12332	CB missing	PTC wiring failure	PTC hot	Pre-warn therm. model	Locked rotor	Phase imbal-ance	Phase loss	Thermal OL trip
				Actuator problem	UMC self-test error	Earth fault pre-warning	Eart fault trip	I > warning threshold	I > trip threshold	I < warning threshold	I < trip threshold
0x3009 dec 12297	0x3015 dec 12308	0x3021 dec 12321	0x302D dec 12333	Trip/ Warning from AuxFault fb input 5	Trip/ Warning from AuxFault fb input 4	Trip/ Warning from AuxFault fb input 3	Trip/ Warning from AuxFault fb input 2	Trip/ Warning from AuxFault fb input 1	HW fault on IO module	Custom applica-tion error	IO module missing
				-	-	-	-	Trip triggered from Multifunc. input DI2	Trip triggered from Multifunc. input DI1	Trip triggered from Multifunc. input DI0	Trip / Warning from AuxFault fb input 6
0x300A dec 12298	0x3016 dec 12310	0x3022 dec 12322	0x302E dec 12334	-	-	THD Warning	Voltage out of spec1	Overload power	Under-load power1	-	-
				-	-	Cooling Time Running	Just one start left	Num Starts Overrun	-	-	-
0x300B dec 12299	0x3017 dec 12311	0x3023 dec 12323	0x302F dec 12335	Ext. diagnosis is available	Para-meter out of range	-	-	-	-	-	-
				Fault code							

Command Data

This address map shows how the complete command data from up to four UMCs can be written in one block.
The data is ordered without any gaps after each other in the following way.

DO UMC1	AO UMC1	DO UMC2	AO UMC2	DO UMC3	AO UMC3	DO UMC4	AO UMC4

The next table shows in detail how the data is organized

UMC at port 1	UMC at port 2	UMC at port 3	UMC at port 4	Data							
0x4000 dec 16384	0x4006 dec 16390	0x400C dec 16396	0x4012 dec 16402	-	Fault Reset	Auto Mode	Prepare Emergency Start	-	Run Forward / Opening	Off	Run Reverse / Closing
				UMC100 DO2	UMC100 DO1	Auto Mode	UMC100 24VDC Out	-		Run Fast Forward	-
0x4001 dec 16385	0x4007 dec 16391	0x400D dec 16397	0x4013 dec 16403	VI15x DO0	-	-	-	DX1xx DO3	DX1xx DO2	DX1xx DO1	DX1xx DO0
				-	-	-	-	-	-	-	-
0x4002 dec 16386	0x4008 dec 16392	0x400E dec 16398	0x4014 dec 16404	Analog word							
0x4003 dec 16387	0x4009 dec 16393	0x400F dec 16399	0x4015 dec 16405	Analog word							
0x4004 dec 16388	0x400A dec 16394	0x4010 dec 16400	0x4016 dec 16406	Analog word							
0x4005 dec 16389	0x400B dec 16395	0x4011 dec 16401	0x4017 dec 16407	Analog word							

Data Access in one block ordered by data type

This section explains how to access the data of the connected devices in one block. Only one Modbus TCP read request is required to read all monitoring data, and only one request is necessary to write all command data.

Monitoring Data

This address map shows how the complete monitoring data from up to four UMCs can be read in one block. The data is ordered without any gaps after each other in the following way.

DI UMC1	DI UMC2	DI3 UMC3	DI4 UMC4	AI1 UMC1	...	AI UMC4	Diag UMC1	...	Diag UMC4

The following table shows in detail how the data is organized:

UMC at port 1	UMC at port 2	UMC at port 3	UMC at port 4	Data							
0x5000 dec 20480	0x5001 dec 20481	0x5002 dec 20482	0x5003 dec 20483	Summary Warning	Summary Fault	Local Control	Rev Lockout Time	Overload warning	Run Fwd / Opening	Off	Run Rev/ Closing
				UMC100 DI5	UMC100 DI4	UMC100 DI3	UMC100 DI2	UMC100 DI0	UMC100 DI0	Run Fast Fwd	-
0x5004 dec 20484	0x500B dec 20491	0x5012 dec 20498	0x5019 dec 20505	Motor current in % of I_e (0 % - 800 %							
0x5005 dec 20485	0x500C dec 20492	0x5013 dec 20499	0x501A dec 20506	Analog word (Thermal Load: 0 % - 100 %)							
0x5006 dec 20486	0x500D dec 20493	0x5014 dec 20500	0x501B dec 20507	Analog word (Time to trip in seconds)							
0x5007 dec 20487	0x500E dec 20494	0x5015 dec 20501	0x501C dec 20508	Analog word (Time to restart in seconds)							
0x5008 dec 20488	0x500F dec 20495	0x5016 dec 20502	0x501D dec 20509	Analog word (Active power in selected scale)							
0x5009 dec 20489	0x5010 dec 20496	0x5017 dec 20503	0x501E dec 20510	DX1xx DI7	DX1xx DI6	DX1xx DI5	DX1xx DI4	DX1xx DI3	DX1xx DI2	DX1xx DI1	DX1xx DI0
				-	-	Run Time Exceeded1	Out of Position	Torque Open	Torque Closed	End Pos Open	End Pos Closed
0x500A dec 20490	0x5011 dec 20497	0x5018 dec 20504	0x501F dec 20511	U Imbal. warn	U Imbal. trip	Under-voltage warn	Under-voltage trip	Under-power warn	Under-power trip	Over-power warn	Over-power trip
				Earth fault warning	Earth fault trip	Cooling time running	-	THD warning	No start possible	One start left	More than one start left
0x5020 dec 20512	0x5024 dec 20516	0x5028 dec 20520	0x502C dec 20524	CB missing	PTC wiring failure	PTC hot	Pre-warn therm. mode	Locked rotor	Phase imbalance	Phase loss	Thermal OL trip
				Actuator problem	UMC self-test erro	Earth fault pre-warning	Eart fault trip	I > warning threshold	I > trip threshold	I < warning threshold	I < trip threshold
0x5021 dec 20513	0x5025 dec 20517	0x5029 dec 20521	0x502D dec 20525	Trip/ Warning from AuxFault fb input 5	Trip/ Warning from AuxFault fb input 4	Trip/ Warning from AuxFault fb input 3	Trip/ Warning from AuxFault fb input 2	Trip/ Warning from AuxFault fb input 1	HW fault on IO module	Custom applica-tion error	IO module missing
				-	-	-	-	Trip triggered from Multif. input DI2	Trip triggered from Multif. input DI1	Trip triggered from Multif. input DI0	Trip / Warning from AuxFault fb input 6
0x5022 dec 20514	0x5026 dec 20518	0x502A dec 20522	0x502E dec 20526	-	-	THD Warning	Voltage out of spec[1]	Overload power	Underload power[1]	-	-
				-	-	Cooling Time Running	Just one start left	Num Starts Overrun	-	-	-
0x5023 dec 20515	0x5027 dec 20519	0x502B dec 20523	0x502F dec 20527	Ext. diagnosis is available.	Parameter out of range	-	-	-	-	-	-
				Fault code							

Command Data

This address map shows how the complete command data from up to four UMCs can be written in one block. The data is ordered without any gaps after each other.

DO UMC1	...	DO UMC4	AO UMC1	...	AO UMC4

The following table shows in detail how the data is organized:

UMC at port 1	UMC at port 2	UMC at port 3	UMC at port 4	Data							
0x6000 dec 24576	0x6002 dec 24578	0x6004 dec 24580	0x6006 dec 24582	-	Fault Reset	Auto Mode	Prepare emergency start	-	Run Forward / Opening	Off	Run Reverse / Closing
				UMC100 DO2	UMC100 DO1	UMC100 DO0	UMC100 24VDC Out	-	-	Run Fast Forward	-
0x6001 dec 24577	0x6003 dec 24579	0x6005 dec 24581	0x6007 dec 24583	VI15x DO0	-	-	-	DX1xx DO3	DX1xx DO2	DX1xx DO1	DX1xx DO0
				-	-	-	-	-	-	-	-
0x6008 dec 24584	0x600C dec 24588	0x6010 dec 24592	0x6014 dec 24596	Analog word							
0x6009 dec 24585	0x600D dec 24589	0x6011 dec 24593	0x6015 dec 24597	Analog word							
0x600A dec 24586	0x600E dec 24590	0x6012 dec 24594	0x6016 dec 24598	Analog word							
0x600B dec 24587	0x600F dec 24591	0x6013 dec 24595	0x6017 dec 24599	Analog word							

Diagnosis / behavior in case of an error

The MTQ22-FBP.0 provides detailed diagnosis information about the status of the connected devices, its own status and the status of the Modbus TCP connection.
Diagnosis information is accessible
- with the locally available lamps and
- via the Modbus TCP services.

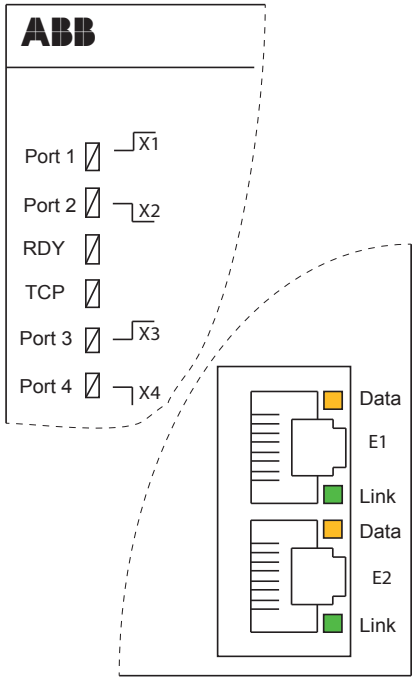
The possibilities of locally available diagnostics are described in the next section.

LED status indications

Diagnosis information is locally displayed using two light emitting diodes (LEDs) per interface to an FBP device. The meaning of the LEDs is as follows:

LED Port 1,2,3,4	**Explanation**
Off	Disabled (no device configured)
Green blinking	Startup (waiting for device)
Green on	Configured device identified and data exchange running
Red blinking	Communication fault
Green / Red alternating	Address mismatch between expected device address and connected device address. E.g. caused by swapping two devices. Wrong device type connected.

*) Only for intelligent devices like UMC or PST. Not for passive sensors.



MTQ22-FBP.0 Status

LED RDY General Status	**Explanation**
Green on	Normal
Red blinking	Minor error, e.g. wrong configuration or IP address already available in the network.
Red on	Major internal fault. If the error is permanent after reboot, the device must be replaced.

LED TCP Communication Status	**Explanation**
Green blinking	Waiting for Modbus TCP connection
Green on	At least one Modbus TCP connection established
Red blinking	One or more (as parameterized) connections timed out
Red on	Fatal error
Green / Red alternating	Error in the TCP/IP configuration

Ethernet Status

The Ethernet status is shown at the two LEDs integrated in the RJ45 connectors.

	Off	**On**	**Flashing**
Data LED Yellow	No network traffic	-	Communication with network active (traffic).
Link LED Green	No connection to network, e.g. because a cable is not plugged in or a wire is broken.	Connection to network established (e.g. connection with network switch)	-

Reading the device communication status

The status of the connected devices can be read via Modbus TCP on the addresses 0x80 ... 0x83 for the devices connected to port 1 ... port 4. See the section "Modbus TCP Address Map" for a detailed Modbus TCP address map.
The communication status is zero (0) if there is no. A value different from zero indicates an error. The value itself describes the error reason.

Error Code	Description	Possible Reasons, Corrective Measures
0	OK	-
1	Wait For FBP Device. Communication not yet established.	• Check that the FBP device is powered • Check the wiring between the FBP device and the MTQ22-FBP.0. • Check that the drawer is inserted (in font size needs to be corrected here)
2	Unsupported FBP Device. An unsupported device was connected to the MTQ22-FBP.0	• See the section **"Overview -> Supported FBP Devices"** for a list
3	Communication Fault on Module Port. Communication to a FBP device was established but was lost again.	• Check the FBP device • Check that the FBP device is powered • Check that the drawer is inserted (in a withdrawable system)
4	Address mismatch. The configured device address and the real FBP device address do not match.	• Fix parameterization • Check that the connected FBP device was not interchanged (e.g. wrong drawer inserted). See the section Configuration -> Position supervision
5 - 10	General configuration error	• Double-check the configuration • Check that no unsupported device was connected. See the section **"Overview -> Supported FBP Devices"** for a list • Check configuration data sent to the MTQ22-FBP.0 (if own configuration was sent)
Other values	reserved	-

Technical data

General

Supply voltage	**24 V DC (+30 % ... -20 %) (19.2 ... 31.2 V DC) including ripple**
Current consumption	Max. 180 mA (at 19.2 ... 31.2 V DC)
Short-circuit protection at port 1 ... 4	PTC resistor
Reverse polarity protection of supply inputs	Yes
Pollution degree terminals	3
Mounting	Snap-on mounting onto 35 mm standard mounting rails
Mounting Position	Any
Degree of protection	IP20
Temperature range: Storage / Operation	-25 ... +70 °C / 0 ... +60 °C
Dimensions (W x H x D)	45 mm x 90 mm x 96 mm
Total power dissipation	max. 3.5 W
Net weight	0.172 kg
Configuration	Via PC tool
Diagnosis with LEDs	See section "Diagnosis"
Cable length between MTQ22-FBP.0 and devices	It is strongly recommended to limit the cable length to 3 m
Marks, Approvals	CE, cUL Further in preparation. Ask your local sales unit representative for other marks/approvals.
Operation altitude above sea level	max. 2000 m For higher altitudes please contact your local sales unit.

EMC

Measurement of radiated and conducted interference according to EN61131-2 CISPR16-2-3	**Class A**
Electrostatic discharge according to IEC 61000-6-2	8 kV air discharge 6 kV contact discharge
Radio frequency electromagnetic field according to IEC 61000-4-3	10 V/m
Fast transient bursts according to EN61000-4-4	2 kV power supply 0.5 kV communication lines
High energy surges according to EN61000-4-5	1/0.5 kV CM/DM power supply
Conducted radio frequency interference according to EN61000-4-6	10 V
Immunity low frequency harmonics according to EN61000-4-11	Power supply: 50 ... 12 kHz, 3 V

—

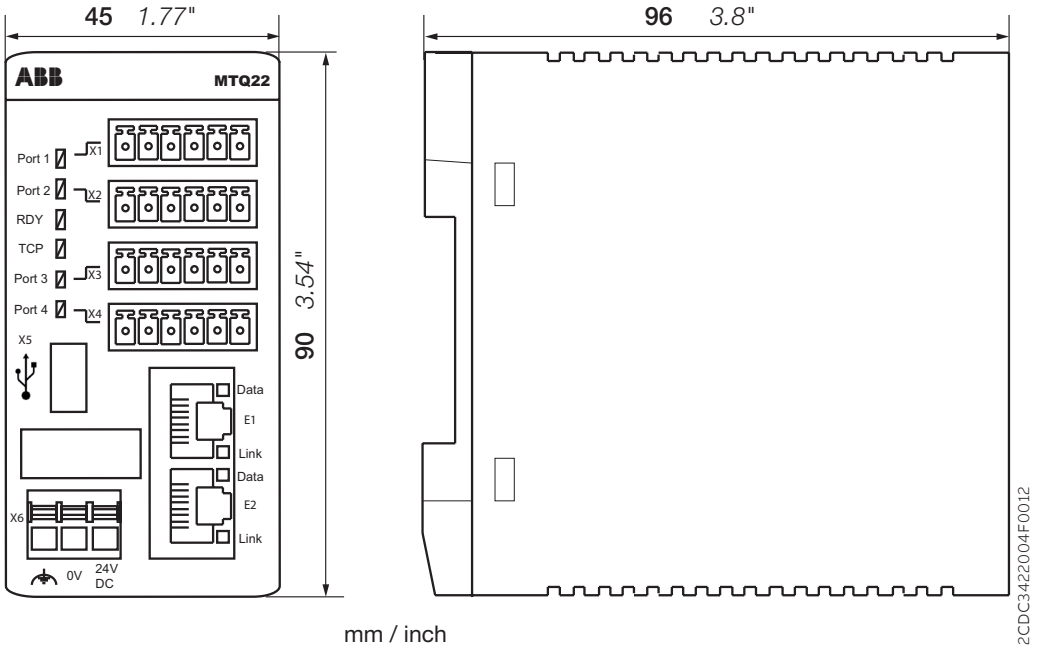
Ethernet and Modbus TCP performance data

Network Redundancy Protocol	MRP client acc. to EN/IEC 62439-2
Recovery time in a network with 15 MTQ22-FBP.0 nodes in ring topology and interruption of the communication at one place (single fault)	< 200 ms typically (depends on the settings in the MRP master)
Response time of a ModbusTCP request to IO data	< 1 ms (typically)
Response time of a ModbusTCP request to parameter data and maintenance counters	< 3 ms (typically)
Max. concurrent Modbus TCP connections	4
Ethernet interfaces	2 (internal two-port switch)
Supported Ethernet topologies	Star, ring, bus (daisy chain)
Supported Bitrate	10 MBit/s, 100 MBit/s
LLDP Naming of Ethernet ports	E1: Port_002 E2: Port_001

Ordering data

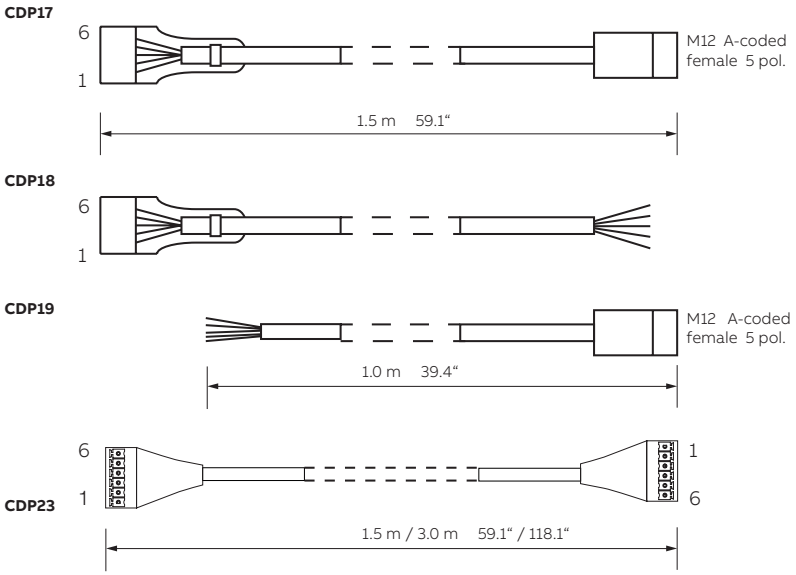
Order code	Type	Description
1SAJ260000R0100	MTQ22-FBP.0	Modbus TCP Interface for 4 FBP-Devices
1SAJ929180R0015	CDP18-FBP.150	Cable ETH-X1/X4-open wire, for drawers inside and outside
1SAJ929200R0001	ETHTB-FBP.4	Terminal set X1…X4 for Ethernet FBP 4 pcs package
1SAJ929200R0002	ETHTB-FBP.50	Terminal set X1…X4 for Ethernet FBP 50 pcs package
1SAJ929230R0015	CPD23.150	Cable Ethernet interface - UMC100.3, length 1.5 m
1SAJ929230R0030	CPD23.300	Cable Ethernet interface - UMC100.3, length 3 m

Dimensions



—
13 Dimensions MTQ22-FBP.0

Connection cables



Pin		
6	nc	
5	0V	blue
4	VCC	brown
3	Rx	black
2	Tx	gray
1	Diag	white

—
14 Dimensions auxiliary cables

—
ABB STOTZ-KONTAKT GmbH
Eppelheimer Straße 82
69123 Heidelberg
Germany

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

abb.com/lowvoltage

Additional information
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 will take precedence. ABB AG does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

Document number 2CDC194003D0202 Rev. C (09/2023)