

SOFTSTARTER TYPE PSE

Fieldbus Communication

Fieldbus Plug Modbus TCP



PREPARED 2022-01-05	STATUS Approved	SECURITY LEVEL Public		
RELEASED 2022-01-13	DOCUMENT KIND Manual			
OWNING ORGANIZATION Motor Starting & Safety Softstarters	DOCUMENT ID. 1SFC132374M0201	REV. D	LANG. en	PAGE 1/23
© Copyright 2021 ABB. All rights reserved.				

Contents

- 1. Overview 4**
- 2. Technical Description5**
 - 2.1. Modbus TCP5
 - 2.2. MTQ22-FBP 6
 - 2.3. Connection Setup7
- 3. Software Configuration 8**
 - 3.1. PSE Softstarter 8
 - 3.2. MTQ22-FBP 11
- 4. Modbus TCP Register Map15**
 - 4.1. Digital Input Telegram15
 - 4.2. Digital Output Telegram 17
 - 4.3. Analog Input Telegram18
 - 4.4. Parameters18
 - 4.5. Diagnostics18
 - 4.5.1. MTQ22-FBP19
 - 4.5.2. PSE Softstarter19
- 5. MTQ22-FBP LED Diagnostics in Case of Error22**
- 6. Basic TCP Modbus Diagnostic Information23**
- 7. Contact us23**

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	1SFC132374M0201	D	en	2/23

Cyber Security Legal Disclaimer

This product is designed to be connected to 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). You shall establish and maintain any appropriate measures (such as 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 the interface 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, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Risk Mitigation and Secure Deployment

The idea is to create defence-in-depth protection for each network by allocating firewall solutions to the front of internal trusted networks of each network by manage firewalls, their configurations and access rules. The softstarter must be positioned in a trusted network, strictly limited and in a hosted portion of a network or control system. Configure firewalls according to the principle of denying everything that is not needed nor used. For secure remote access, use a VPN connection with an encryption layer to create a secure channel over an insecure network. For more information regarding cyber security and risk mitigation, download the document [Cyber security for ABB drives](#) from the ABB library.



Information

The device uses the default Modbus TCP port 502 (0x01F6). This port must be open in the firewall for both incoming and outgoing traffic to allow Modbus-TCP compatible devices to communicate.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	1SFC132374M0201	D	en	3/23

1. Overview

This document aims to describe the installation and configuration process of the MTQ22-FBP Modbus TCP adapter module. Modbus is a master-slave protocol and only one device can transmit on the line at any time. The master (which in most cases is a PLC) manages the exchanges and only it can take the initiative. It interrogates each of the slaves in succession and no slave can send a message unless it is invited to do so. The master repeats the question when there is an incorrect exchange, and declares the interrogated slave absent if no response is received within a given time period. If a slave does not understand a message, it sends an exception response to the master who may or may not repeat the request.

The adapter will be used to enable Modbus TCP communication between an ABB PSE softstarter and a Modbus master over an IP network. The TCP Modbus communication protocol differs from the other Modbus versions through the use of TCP/IP communication as a wrapper for the Modbus data. Modbus RTU messages are sent over an IP network. The use of IP datagrams removes the need for slave addresses since all slaves use a unique IP address to enable IP communication. However, The MTQ22-FBP still uses Modbus RTU to communicate with the PSE which require the slave ID to match between the MTQ22-FBP and the PSE, as explained in section 3.2.

The document starts with technical information regarding the required devices and a description of how to connect them to enable Modbus TCP communication. The third chapter explains how to configure the PSE and MTQ22-FBP software, Fieldbus Control, Slave address, IP address and other important parameters are configured with detailed instructions. The fourth chapter presents the MTQ22-FBP data registers, used to read or write data to the connected PSE devices. In case of any TCP Modbus connection problems, chapter 5 explains the meaning of the MTQ22-FBP diagnostic LED indicators. This manual is written specifically for Modbus TCP and will not cover other fieldbus protocols or other devices than ABB Softstarters type PSE18...PSE370. For more detailed information regarding warranty, service, type designation and other product specific information for the associated devices, see respective manual.

Requirements

To connect the PSE Softstarter to a fieldbus system, the following accessories are required:

- ABB FieldBusPlug Accessory (FBPA)
- ABB MTQ22-FBP (Modbus TCP)
- Cable for bus connection (CDP19-FBP .100)
- Micro USB cable
- ABB PSE softstarter
- Software for MTQ22-FBP set-up (ABB Config Tool)
- PLC or another Modbus TCP master

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	1SFC132374M0201	D	en	4/23

2. Technical Description

The following list highlights the core features and functionalities provided by the MTQ22-FBP and Modbus TCP protocol.

Highlighted Features

- The MTQ22-FBP Ethernet adapter module provides Ethernet connectivity for the ABB PSE softstarter Fieldbus plug (FBP) device.
- Up to four FBP devices can be connected to one MTQ22-FBP. This allows a very cost-efficient connection of FBP devices to Ethernet.
- Through the MTQ22-FBP Ethernet Adapter module it is possible to:
 - Give control commands to the device (Start, Stop, Set Auto Mode, etc.)
 - Read status information and actual values from the device
 - 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.
- 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 cable redundancy in case of a single failure.

2.1. 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 connections on an IP network.

The implementation of the Modbus TCP server in the MTQ22-FBP module is done according to:

- Modbus Application Protocol Specification v1.1b
- Modbus Messaging on TCP/IP Implementation Guide v1.0b

The supported Modbus commands can be found in chapter 4. Further information on the Modbus TCP protocol is available at www.modbus.org.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	1SFC132374M0201	D	en	5/23

2.2. MTQ22-FBP

A device layout of the MTQ22-FBP can be seen in Figure 1. Connectors X1 ... X4 are used to connect up to four FBP devices to the MTQ22-FBP. On the left side of the port connectors LEDs show the current communication status. See chapter 5 for detailed information regarding status LEDs.

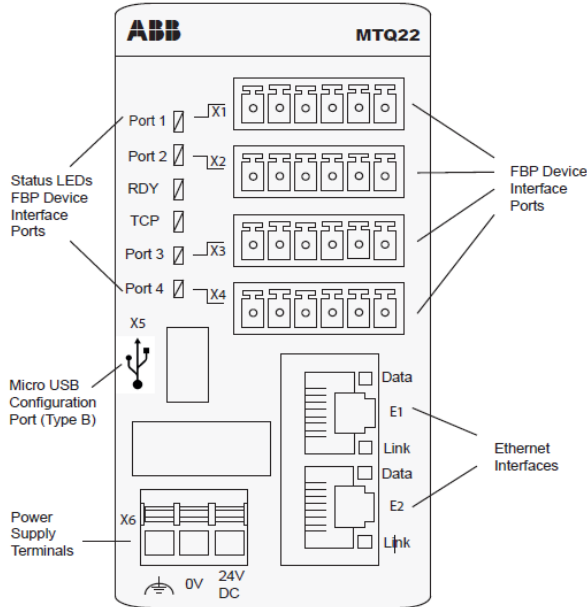
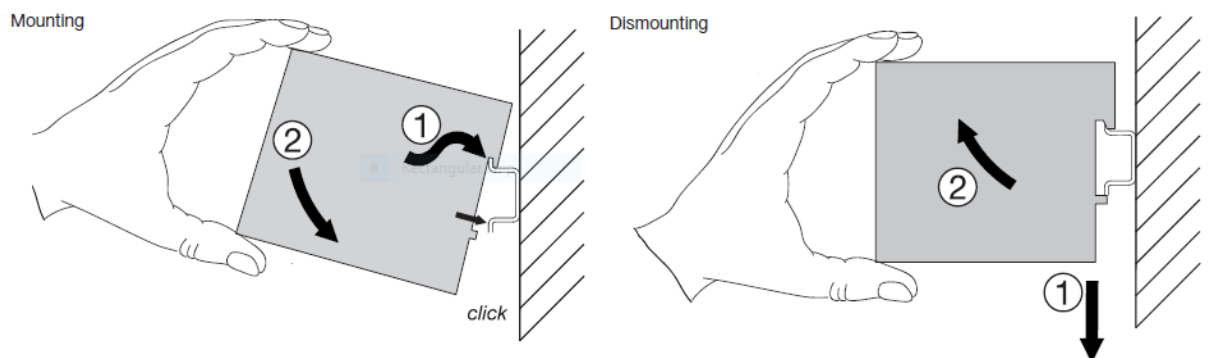


Figure 1: Top view of the MTQ22-FBP. Four PSE devices can be connected to the MTQ22 via the ports X1 to X4. The standard Micro USB connector X5 allows to configure the device.

The Micro USB connector X5 allows device configuration using a PC, see chapter MTQ22-FBP. Two RJ45 sockets E1 and E2 offer Ethernet connectivity. The communication status of each interface is shown by two LEDs. The MTQ22-FBP must be supplied with 24VDC via X6.

Mounting and Dismounting

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



Arrange the communication cables as far away from the motor cables as possible. Avoid parallel runs. Use bushings at cable entries. The network cable is connected to the RJ45 connectors on the MTQ22-FBP 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.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	1SFC132374M0201	D	en	6/23

2.3. Connection Setup

In order for Modbus to function properly the PSE must be connected point-to-point with a Fieldbus Plug Accessory (PS-FBPA) as seen in Figure 2. Further the PS-FBPA must be connected to one of the ports named X1 to X4 on the MTQ22-FBP. The Modbus master is in turn connected to one of the Ethernet connections E1 or E2.

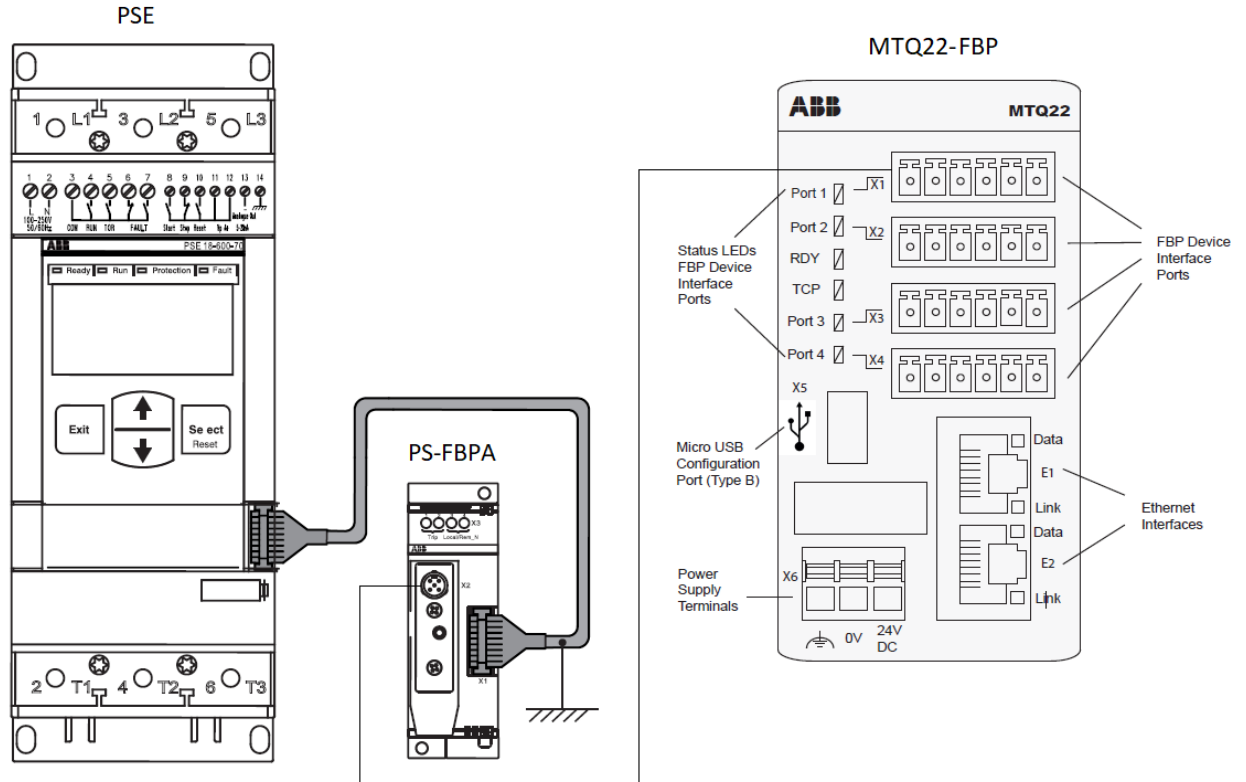


Figure 2: Device connections required to enable a Modbus TCP connection between the PSE and a Modbus master.

The cable connecting the PS-FBPA and the MTQ22-FBP, a CDP19-FBP .100 cable must be purchased separately. A spring terminal block connector must also be installed on the separate cable and connected according to Figure 3.

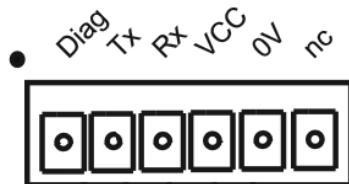


Figure 3: MTQ22-FBP port connection specification.

3. Software Configuration

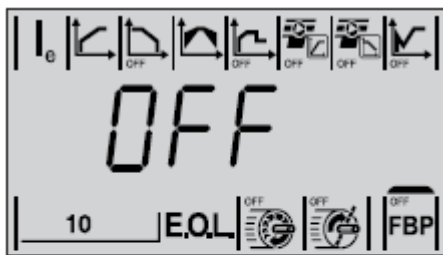
This chapter describes how to configure the MTQ22-FBP and the PSE to enable Modbus communication.

3.1. PSE Softstarter

The following list of instructions explains how to configure the fieldbus parameters on the PSE softstarter.

1. Fieldbus Control

This parameter is used for configuration of the fieldbus communication. Connecting the PSE Softstarter to the Fieldbus plug automatically enables fieldbus communication. To enable control of the softstarter using fieldbus, this parameter must be set to On. If Fieldbus Control is set to OFF, fieldbus can only be used for monitoring softstarter data.



If this parameter is set to On, the softstarter might trip on fieldbus fault if no fieldbus communication is available. If the intention is to run without fieldbus control, this parameter should be set to OFF.

2. Fieldbus Address

The parameter Fieldbus Address allows setting of address for the fieldbus communication. The setting range for the fieldbus address is 0...255. If the address is set to 255, the address stored in internal memory of the fieldbus plug will be used.

It is possible to read and set this parameter via the keypad when Fieldbus Control is set to On or OFF.

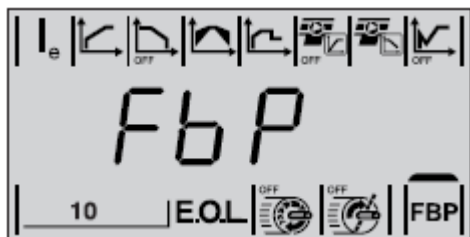


Changing this parameter will automatically reset the fieldbus interface and the new address will be active. If MTQ22-FBP was communicating with the old address, the MTQ22-FBP needs to be re-configured and the PSE restarted.

Default value	Setting range	Description
255	0...255	Fieldbus Address

3. Fieldbus Type

The fieldbus type parameter must be set to FbP (fieldbus plug) when using the MTQ22-FBP. FbP is the default value of the parameter. The PSE has a built-in version of Modbus which is activated by setting the parameter to Int (Internal).



- When FbP is selected – configured to use external fieldbus plug, such as the MTQ22-FBP.
- When Init is selected – PSE will use the internal Modbus implementation to communicate with external devices.

Default value	Setting range	Description
FbP	FbP/Int	FbP enables the use of external fieldbus plugs. The Int parameter should be set when using the internal Modbus interface

4. Download Parameter

This parameter allows for blocking parameter download from the fieldbus. Note that download of parameters works differently for different fieldbus protocols. See documentation for the protocol used.



It is possible to read and set this parameter via the keypad when Fieldbus Control is set to On or OFF.

Default value	Setting range	Description
dPon	dPo/dPof	Enable/disable parameter download

5. Fieldbus Operation When Fault

This parameter is accessible only if Fieldbus Control is previously set to On.

In case of fieldbus malfunction, for instance due to power loss or a broken cable, this parameter allows for different (operations in case of a fault) reactions to the fault.

Setting Fieldbus fault reaction to trIP will make the softstarter trip on a fieldbus fault. Selecting trIP makes reset of the fault necessary, in case of a tripping event.



When LocC is selected, the control of the softstarter will automatically switch from fieldbus control to local control. The switch to local control will make hard-wire control possible. When the Fieldbus starts working again the control is automatically switched back to the Fieldbus. There is a 10 second delay before it is possible to controlling the motor.

Default value	Setting range	Description
LooC	Looc/trIP	Trip on fieldbus fault or automatically move to local control on fieldbus fault

6. Type of Operation for Reset of Fieldbus Fault

Select what operation shall be asserted if a fieldbus communication fault occurs. Manual or automatic options are available. HAnd is the default value for reset of Fieldbus Fault:



- If HAnd is selected - The motor will stop and manual reset is required.
- If Auto is selected - The motor will stop and automatic reset is performed.

This parameter is accessible only if trIP is previously selected for the parameter fieldbus Operation When Fault.

Default value	Setting range	Description
HAnd	HAnd/Auto	Hand require manual reset of fieldbus fault while Auto will perform the reset automatically.

3.2. MTQ22-FBP

An easy to use PC configuration tool is provided to adjust the parameters of the MTQ22-FBP. The PC can be connected to the MTQ22-FBP with a standard Micro USB-cable. The ABB Configuration Tool can be downloaded by clicking the following [link](http://www.abb.com) or searching for 1SAJ260900R0001 at the ABB Download Center.

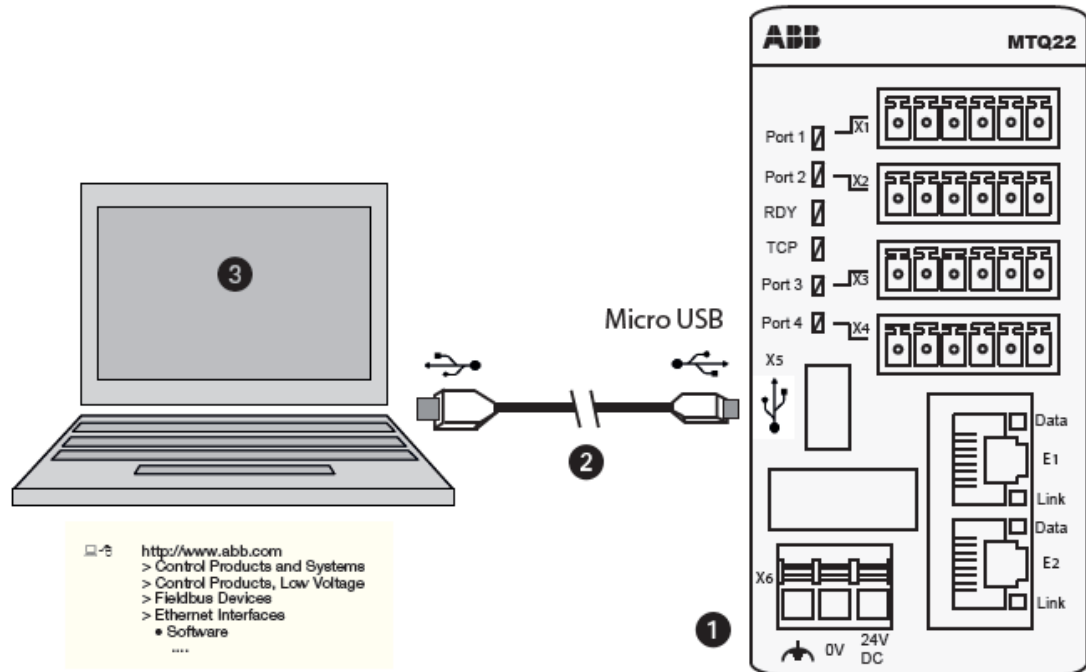


Figure 4: Connecting the MTQ22-FBP to a service Laptop. The MTQ22-FBP must be supplied with 24V DC before the configuration can take place (1). For the connection a Micro USB cable (2) is used. On the PC the MTQ22-FBP configuration software must be installed (3).

If the MTQ22-FBP 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 because of license reasons. It is pre-installed on Windows 7 and 10, for XP it must be downloaded separately from Microsoft. Follow the setup instructions of Windows to install the new software. 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 are displayed. You can change them offline or online. The right area shows a short help text.

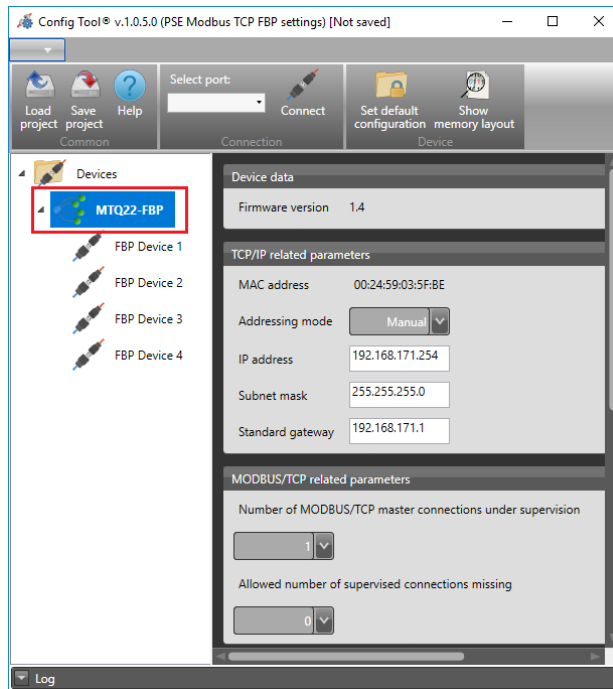
Make sure to start the Configuration Tool as administrator and to connect the USB cable between the PC and MTQ22-FBP before the program is started.

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	1SFC132374M0201	D	en	11/23

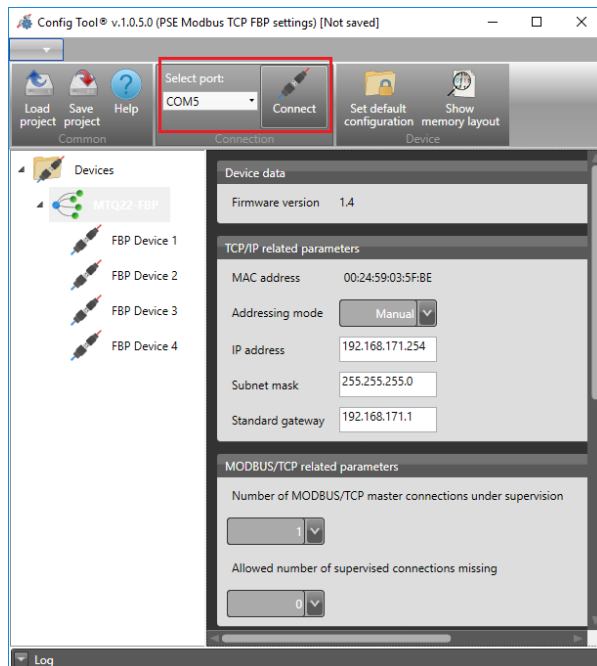
Set required MTQ22-FBP parameters

The following steps describes how to set the required parameters on the MTQ22-FBP.

1. After the application is started (as administrator) select the MTQ22-FBP that you want to configure in the Config Tool.



2. From the Select port drop down menu select the COM port associated to the MTQ22-FBP and click connect. The number of the COM port varies, make sure to select the one connected to the MTQ22-FBP.

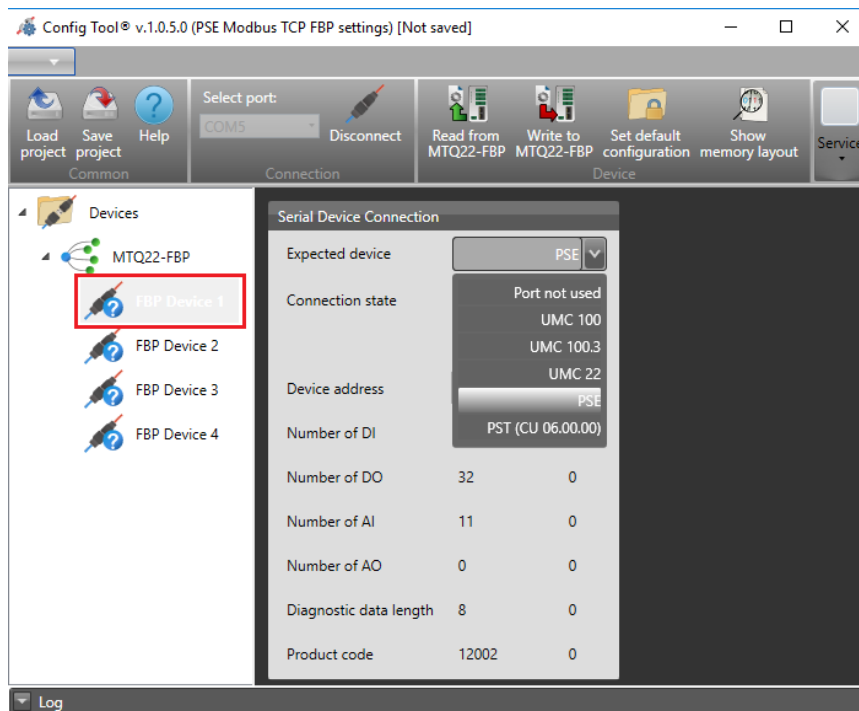


STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	1SFC132374M0201	D	en	12/23

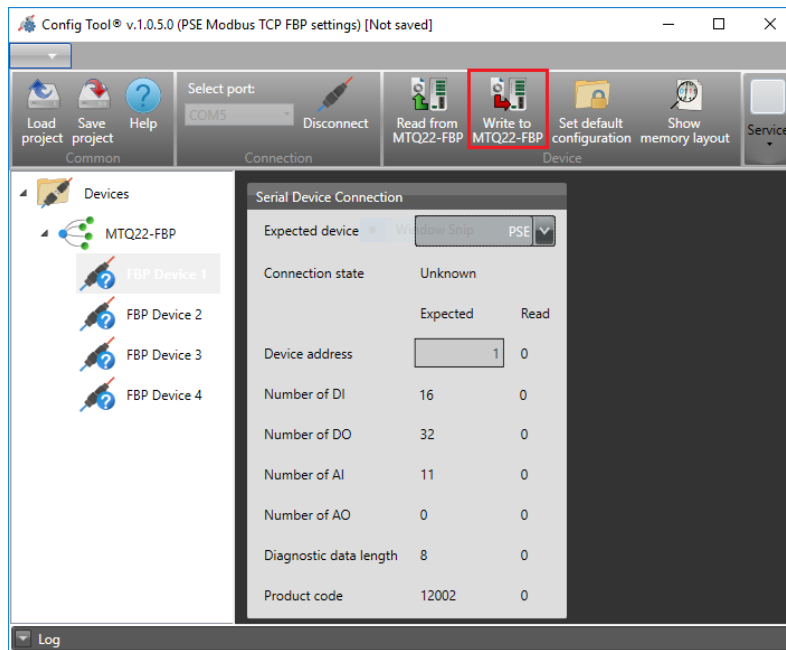
3. Use the following table to set the required parameters. Remember to adjust the parameters to suite your specific network settings.

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	PSE
Device address for device 1 ... 4	1,2,3,4

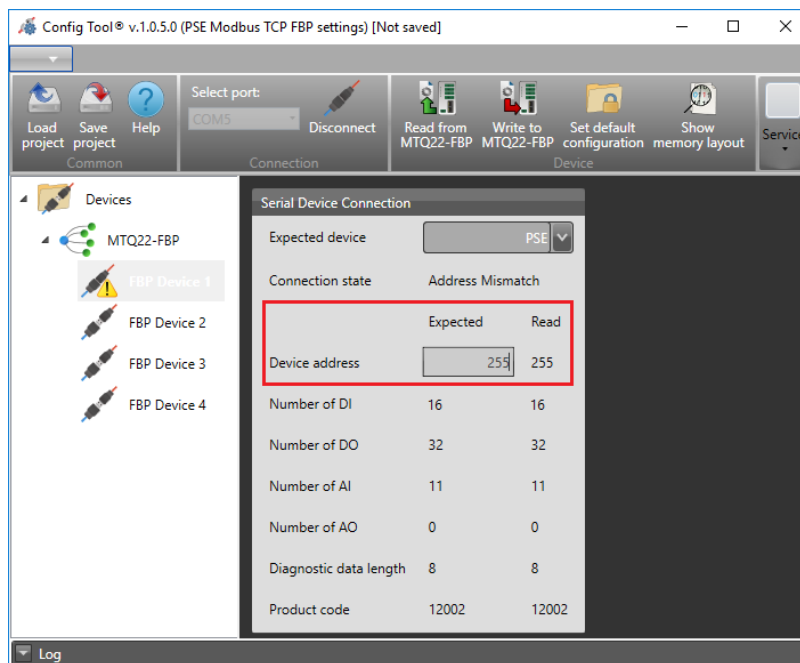
4. Select the connected FBP device and chose PSE in the drop-down menu called Expected device. For the ports without a connected device chose Port not used.



- When all Expected device parameters for FBP Device 1 to 4 are adjusted click the Write to MTQ22-FBP button to upload the configuration to the device.



- Select the FBP Devices in the Config Tool and set the expected Device address to match the Device address read by the MTQ22-FBP. When the two Device addresses match for all connected PSEs click the Write to MTQ22-FBP button again. Note that, when the slave ID is updated in the PSE a reboot will be required on the PSE for the Config Tool to detect the new value.



- The MTQ22-FBP is now configured and should be able to communicate with the PSE.

4. Modbus TCP Register Map

The following chapter shows how to generally access data of the FBP-devices connected to port one to port four of the MTQ22-FBP.



Information

Modbus TCP counts registers beginning with one. 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 your client application it might be necessary to increment all addresses by one.

The I/O-data as well as diagnostic and configuration data of the connected PSE devices can be accessed applying the supported Modbus function codes. The supported functions can be found in respective sub section.

4.1. Digital Input Telegram

To read the digital input telegram, use Modbus function code 1 Read Coil Status or 2 Read Discrete Inputs.

Address for data access to device connected to port				Data	Description
1	2	3	4		
1000h	1010h	1020h	1030h	Reserved	
1001h	1011h	1021h	1031h	Stop	0 = Motor running 1 = Motor stopped
1002h	1012h	1022h	1032h	Run	0 = Motor stopped 1 = Motor running
1003h	1013h	1023h	1033h	Reserved	
1004h	1014h	1024h	1034h	Reserved	
1005h	1015h	1025h	1035h	Auto mode status ¹	0 = Local control 1 = Modbus master control
1006h	1016h	1026h	1036h	Fault	0 = No active fault 1 = One or more active faults
1007h	1017h	1027h	1037h	Reserved	
1008h	1018h	1028h	1038h	Reserved	
1009h	1019h	1029h	1039h	DI_FBP_Trip	0 = No trip on DI_FBP adaptor 1 = Trip on DI_FBP adaptor
100Ah	101Ah	102Ah	103Ah	DI_FBP_Local	0 = Remote control 1 = Local control

Address for data access to device connected to port				Data	Description
1	2	3	4		
100Bh	101Bh	102Bh	103Bh	DI_Start	Hardwire DI Start input signal state 0 = DI Start signal inactive 1 = DI Start signal active
100Ch	101Ch	102Ch	103Ch	DI_Stop	Hardwire DI Stop input signal state 0 = DI Stop signal inactive 1 = DI stop signal active
100Dh	101Dh	102Dh	103Dh	DI_Reset	Hardwire DI Reset input signal state 0 = DI Reset signal inactive 1 = DI Reset signal active
100Eh	101Eh	102Eh	103Eh	TOR	0 = Softstarter is not in top of ramp 1 = Softstarter is in top of ramp (bypass closed)
100Fh	101Fh	102Fh	103Fh	Ready to start	0 = No faults are active, control supply voltage is stable and motor will start when start command is given 1 = Fault is active or control supply voltage is not stable and motor will not start when start command is given

¹⁾ Auto mode status reflects the control state of the Softstarter. This is affected by a combination of:

- The Auto mode signal from the Modbus master (Digital output telegram).
- The state of the Local/Remote switch on the Fieldbus Plug Accessory.
- The Fieldbus control parameter.

4.2. Digital Output Telegram

To write the digital output telegram, use Modbus function code 5

Write Single Coil or 15 (0Fh) Force Multiple Coils.

To read the digital output telegram, use Modbus function code 1

Read Coil Status or 2 Read Input Status.

Address for data access to device connected to port				Data	Description
1	2	3	4		
1800h	1810h	1820h	1830h	Reserved	
1801h	1811h	1821h	1831h	Stop	Commence a stop when this coil is set (this coil has higher priority than the start coil). The stop coil is only acknowledged if the Auto mode coil is set.
1802h	1812h	1822h	1832h	Start	Commence a start when this coil is set. The start coil is only acknowledged if the Auto mode coil is set.
1803h	1813h	1823h	1833h	Reserved	
1804h	1814h	1824h	1834h	Reserved	
1805h	1815h	1825h	1835h	Auto mode	This coil must be set for controlling the motor.
1806h	1816h	1826h	1836h	Fault reset	Reset an active fault or protection when this coil is set.
1807h	1817h	1827h	1837h	Reserved	
1808h	1818h	1828h	1838h	Reserved	
1809h	1819h	1829h	1839h	Reserved	
180Ah	181Ah	182Ah	183Ah	Reserved	
180Bh	181Bh	182Bh	183Bh	Reserved	
180Ch	181Ch	182Ch	183Ch	Clear active diagnostics	Clear active diagnostics when this coil is set
180Dh	181Dh	182Dh	183Dh	Reserved	

4.3. Analog Input Telegram

All analog input telegram data values are represented as 16-bit values.

To read the analog input telegram, use Modbus function code 3

Read Holding Registers or 4 Read Input Registers.

Address for data access to device connected to port				Data	Representa- tion
1	2	3	4		
2000h	2100h	2200h	2300h	Motor current in % of I _e (0%-800%)	Value = 1 ⇒ 1%
2001h	2101h	2201h	2301h	Thermal load in % of trip temperature (0%-100%)	Value = 1 ⇒ 1%
2002h	2102h	2202h	2302h	Phase current L1	Value = 1 ⇒ 1A
2003h	2103h	2203h	2303h	Phase current L2	Value = 1 ⇒ 1A
2004h	2104h	2204h	2304h	Phase current L3	Value = 1 ⇒ 1A
2005h	2105h	2205h	2305h	Max phase current	Value = 1 ⇒ 1A
2006h	2106h	2206h	2306h	Measured frequency	Value = 1 ⇒ 1Hz
2007h	2107h	2207h	2307h	Measured power factor	Value = 100 ⇒ 1
2008h	2108h	2208h	2308h	Output voltage in % of line voltage	Value = 1 ⇒ 1%
2009h	2109h	2209h	2309h	Counted number of starts	Value = 1 ⇒ 100
200Ah	210Ah	220Ah	230Ah	Run time in hours	Value = 1 ⇒ 10h

4.4. Parameters

The MTQ22-FBP does not support reading or writing PSE softstarter parameters such as start ramp time, initial voltage and torque control.

4.5. Diagnostics

To read the diagnostics data, use Modbus function code 3

Read Holding Registers or 4 Read Input Registers. The following chapter presents register values associated to diagnostic data for both PSE and MTQ-FBP devices.

4.5.1. MTQ22-FBP

The status of the connected FBP devices can be read via Modbus TCP on the addresses 0x80 to 0x83 for the devices connected to port 1 ... port 4.

Address	FBP communication status
80h	Port 1
81h	Port 2
82h	Port 3
83h	Port 4

The communication status is zero (0) in case of no error. 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.
2	Unsupported FBP Device. An unsupported device was connected to the MTQ22-FBP.	Check that a PSE is connected and not another device.
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 PSE device address do not match.	Fix parameterization Check that the connected PSE was not interchanged (e.g. wrong drawer inserted).
5 - 10	General configuration error	Double-check the configuration Check that no unsupported device was connected. Check configuration data sent to the MTQ22-FBP (if own config was sent)
Other values	Reserved	-

4.5.2. PSE Softstarter

PSE softstarter diagnostics are represented by bits in a 16-unsigned integer register. Use a calculator to translate the decimal number to one or more bits. If a bit is set that fault is active and could potentially be resetted.

Address for data access to device connected to port				Bit	Data	Description
1	2	3	4			
C00h	C20h	C40h	C60h	0	Reset possible on active event	Current fault or protection can be reset
				1	Software fault	Internal fault
				2	Shunt fault	Current is flowing when it should not
				3	By-pass open	By-pass does not close
				4	Softstarter overload	Too high thyristor- or heat sink temperature
				5	Phase loss	No voltage in one or more phases on the line side
				6	Bad network quality	Bad network quality on the line side
				7	Current loss	Current is not flowing when it should
				8	Fieldbus fault	Fieldbus communication failure
				9	Low supply voltage	Too low control supply voltage
				10	High current	Too high current
				11	Motor overload	Too high motor temperature
				12	Locked rotor protection	Current is higher than settable value during top of ramp
				13	Underload protection	Current is lower than settable value during top of ramp
			15	Reserved		
C01h	C21h	C41h	C61h	0..15	Reserved	
C02h	C22h	C42h	C62h	0..15	Reserved	
C03h	C23h	C43h	C63h	0	Reserved	
				1	Reserved	
				2	Reserved	
				3	Reserved	
				4	Parameter is read-only	This bit is set if a parameter write operation failed due to the parameter being read-only.

Address for data access to device connected to port				Bit	Data	Description
1	2	3	4			
				5	Parameter is not settable	This bit is set if a parameter write operation failed due to the parameter not being settable (such as during a soft start or soft stop).
				6	Parameter value is out of range	This bit is set if a parameter write parameter operation failed due to the set value being out of range.
				7	Extended diagnostic available	If set, fault code provides extended diagnostics.
				8..15	Fault code	This can be additional info for a fault such as in which phase the fault occurred or the parameter number of the latest read/write parameter operation failure.

The diagnostic data is composed of a bit map of all potential faults and protections, as well as a flag, which indicates if the active fault or protection can be reset. If “Parameter is read-only”, “Parameter not settable in current state” or “Parameter out of range” bits are set, “Fault code” contains the parameter number. “Parameter not settable in current state” can occur if the motor is running.

If “Extended diagnosis is available” is set, “Fault code” contains the Event information for the current event. For events that can occur on a specific line, e.g., Phase loss, the value of the fault code will indicate the line number the event occurred on. A “4” indicates the line cannot be determined or the problem exists on all three phases.

5. MTQ22-FBP LED Diagnostics in Case of Error

Diagnostic information is locally displayed using two Light Emitting Diodes (LEDs) per PSE device interface. The meaning of the LEDs is as follows.

LED	Explanation
Port 1, 2, 3, 4	
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.

LED RDY	Explanation
General Status	
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 replace the device.

LED TCP	Explanation
Communication Status	
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

6. Basic TCP Modbus Diagnostic Information

PSE trips on fieldbus fault (EF40)

- The purpose of the fieldbus fault function is to detect any communication problems between the Modbus master and the Softstarter. Fieldbus fault will be enabled if the Fieldbus control parameter is set to On and Operation when fault parameter is set to triP.
- When fieldbus fault reaction is set to trip, the Softstarter will trip on Fieldbus Fault (EF40) after a set time of no communication. The timeout parameter value is set to 10 s and cannot be changed.
- If there has been a trip on fieldbus fault for some reason, the communication has to afterwards be continuously stable for 10 s before the Softstarter accepts commands from the Modbus master and when it is possible to reset the fault.
- If the Reset of Fieldbus Fault PSE parameter is set to Auto and the fieldbus fault (EF40) has tripped due to no communication, 30 s of stable communication is required before an automatic reset is performed.

Motor does not start

- If fieldbus fault reaction is set to “switch to local” control and fieldbus communication is lost and/or timeout is reached, the Softstarter can only be controlled with hard-wire signals. When communication is re-established, there is a 10 second delay before fieldbus control is possible.
- Check if the fieldbus control parameter is set to ON.
- Make sure the auto mode is enabled in order to control the motor with Modbus. The data value in respective protocol address for the connected PSE devices shall be set.
- Check if the stop coil is set since it has higher priority than the start coil.
- Motor will not start if there is an active fault (check the ready to start coil).

7. Contact us

For more information, please contact your local ABB representative or visit <https://new.abb.com/low-voltage/products/softstarters-new>

STATUS	SECURITY LEVEL	DOCUMENT ID.	REV.	LANG.	PAGE
Approved	Public	1SFC132374M0201	D	en	23/23