

X20(c)IF10D1-1

Data sheet
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Version history

B&R makes every effort to keep documents as current as possible. The most current versions are available for download on the B&R website (www.br-automation.com).

1 General information

1.1 Other applicable documents

For additional and supplementary information, see the following documents.

Other applicable documents

Document name	Title
MAX20	X20 System user's manual

1.2 Coated modules

Coated modules are X20 modules with a protective coating for the electronics component. This coating protects X20c modules from condensation and corrosive gases.

The modules' electronics are fully compatible with the corresponding X20 modules.



For simplification purposes, only images and module IDs of uncoated modules are used in this data sheet.

The coating has been certified according to the following standards:

- Condensation: BMW GS 95011-4, 2x 1 cycle
- Corrosive gas: EN 60068-2-60, method 4, exposure 21 days



1.2.1 Starting temperature

The starting temperature describes the minimum permissible ambient temperature in a voltage-free state at the time the coated module is switched on. This is permitted to be as low as -40°C. During operation, the conditions as specified in the technical data continue to apply.



Information:

It is important to absolutely ensure that there is no forced cooling by air currents in the closed control cabinet, e.g. due to the use of a fan or ventilation slots.

1.3 Order data


Order number	Short description	Figure
	X20 interface module communication	
X20IF10D1-1	X20 interface module, for DTM configuration, 1 EtherNet/IP scanner (master) interface, electrically isolated	
X20cIF10D1-1	X20 coated interface module, for DTM configuration, 1 EtherNet/IP scanner (master) interface, electrically isolated	

Table 1: X20IF10D1-1, X20cIF10D1-1 - Order data

Optional accessories

Model number	Short description
X20CA0E61.xxxxx	POWERLINK/Ethernet connection cable, RJ45 to RJ45, 0.2 to 20 m
X20CA0E61.xxxx	POWERLINK/Ethernet connection cable, RJ45 to RJ45, 20 m and longer

1.4 Module description

The interface module is equipped with an EtherNet/IP scanner interface. This allows third-party components to be integrated in the B&R system and makes it possible to quickly and easily transfer data in both directions.

The interface is equipped with 2 RJ45 connections. Both connections result in an integrated switch. This makes it easy to implement daisy chain cabling.

Functions:

- [EtherNet/IP scanner \(master\)](#)
- [Error monitoring](#)

EtherNet/IP

EtherNet/IP is an Ethernet-based fieldbus. The fieldbus is mainly used in automation technology.

Error monitoring

The status of the module and fieldbus is monitored. An error code is returned if an error occurs.

2 Technical description

2.1 Technical data

Order number	X20IF10D1-1	X20cIF10D1-1
Short description		
Communication module	EtherNet/IP scanner (master)	
General information		
B&R ID code	0xA71B	0xE753
Status indicators	Module status, network status, data transfer	
Diagnostics		
Module status	Yes, using LED status indicator and software	
Network status	Yes, using LED status indicator and software	
Data transfer	Yes, using LED status indicator	
Power consumption	2 W	
Additional power dissipation caused by actuators (resistive) [W]	-	
Certifications		
CE	Yes	
UKCA	Yes	
ATEX	Zone 2, II 3G Ex nA nC IIA T5 Gc IP20, Ta (see X20 user's manual) FTZÚ 09 ATEX 0083X	
UL	cULus E115267 Industrial control equipment	
HazLoc	cCSAus 244665 Process control equipment for hazardous locations Class I, Division 2, Groups ABCD, T5	
DNV	Temperature: B (0 to 55°C) Humidity: B (up to 100%) Vibration: B (4 g) EMC: B (bridge and open deck)	
CCS	Yes	-
LR	ENV1	-
KR	Yes	
ABS	Yes	
BV	EC33B Temperature: 5 - 55°C Vibration: 4 g EMC: Bridge and open deck	
KC	Yes	-
Interfaces		
Fieldbus	EtherNet/IP scanner (master)	
Variant	2x shielded RJ45 (switch)	
Line length	Max. 100 m between 2 stations (segment length)	
Transfer rate	10/100 Mbit/s	
Transfer		
Physical layer	10BASE-T/100BASE-TX	
Half-duplex	Yes	
Full-duplex	Yes	
Autonegotiation	Yes	
Auto-MDI/MDIX	Yes	
Controller	netX100	
Memory	8 MB SDRAM	
Electrical properties		
Electrical isolation	PLC isolated from EtherNet/IP (IF1 and IF2)	
Operating conditions		
Mounting orientation		
Horizontal	Yes	
Vertical	Yes	
Installation elevation above sea level		
0 to 2000 m	No limitation	
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m	
Degree of protection per EN 60529	IP20	

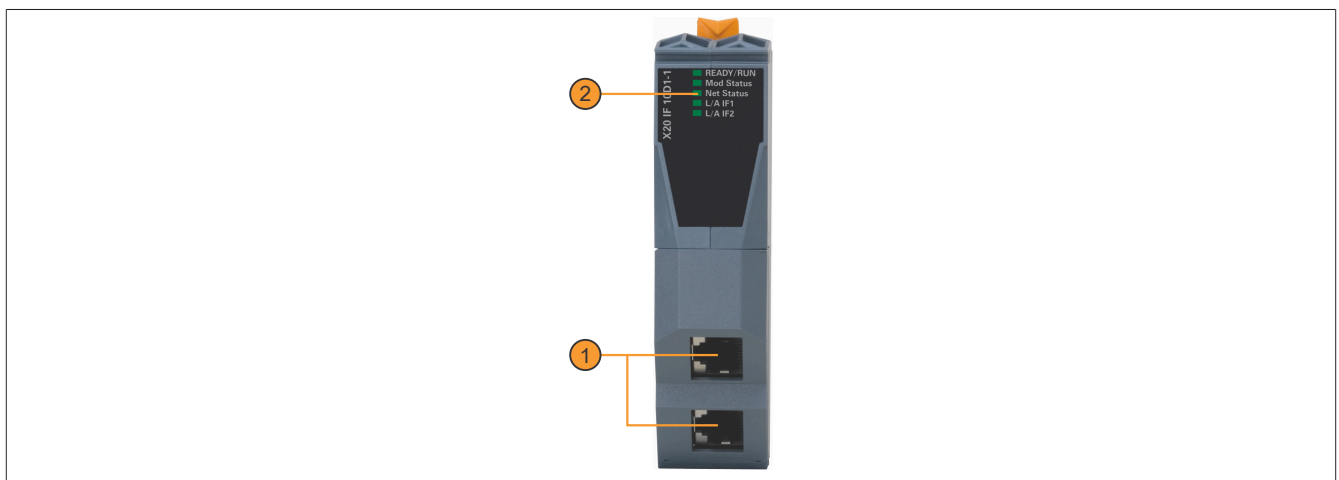
Table 2: X20IF10D1-1, X20cIF10D1-1 - Technical data

Technical description

Order number	X20IF10D1-1		X20cIF10D1-1
Ambient conditions			
Temperature			
Operation			
Horizontal mounting orientation	-25 to 60°C		
Vertical mounting orientation	-25 to 50°C		
Derating	-		
Starting temperature	-		Yes, -40°C
Storage	-40 to 85°C		
Transport	-40 to 85°C		
Relative humidity			
Operation	5 to 95%, non-condensing	Up to 100%, condensing	
Storage	5 to 95%, non-condensing		
Transport	5 to 95%, non-condensing		
Mechanical properties			
Slot	In the X20 PLC and expandable bus controller X20BC1083		In the X20 PLC and expandable bus controller X20cBC1083

Table 2: X20IF10D1-1, X20cIF10D1-1 - Technical data

2.2 Operating and connection elements



1	EtherNet/IP connection with 2x RJ45 for simple wiring	2	LED status indicators
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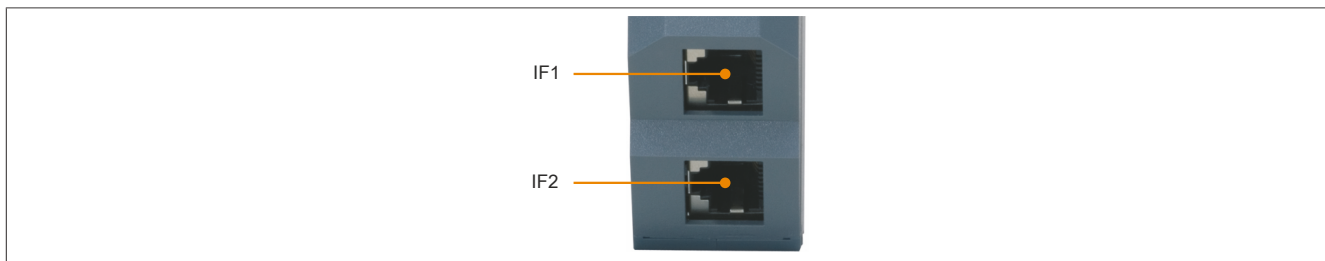
2.2.1 LED status indicators

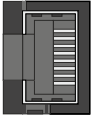
Figure	LED	Color	Status	Description
	READY/RUN	Green/Red	Off	No power to module
		Green	On	PCI bus communication in progress
		Red	Blinking	Boot error
	Mod status ¹⁾	On		Communication on the PCI bus has not yet been started.
		Green	Blinking	The interface module has not yet been configured.
		On		Scanner (master) is ready for operation.
		Red	Blinking	Correctable hardware errors
	Net status ¹⁾	On		Uncorrectable hardware errors
		Green/Red	Blinking	Initialization/Self-test
		Off		No power to module
		Green	Blinking	No active connections available
	L/A IF1/IF2	On		A least one established active connection available
		Red	Blinking	A timeout occurred on at least one connection.
		On		An IP address has been used more than once.
		Green/Red	Off	No IP address assigned or module not supplied
		Blinking		Initialization/Self-test
		Off		No link to remote station
		Flickering		The link to the remote station is established. The LED blinks if Ethernet activity is taking place on the bus.
		On		The link to the remote station is established.

1) This LED is a green/red dual LED.

2.2.2 Ethernet interface

For information about wiring X20 modules with an Ethernet interface, see section "Mechanical and electrical configuration - Wiring guidelines for X20 modules with Ethernet cables" in the X20 user's manual.



Interface	Pinout		
	Pin	Ethernet	
 Shielded RJ45	1	RXD	Receive data
	2	RXD\	Receive data\
	3	TXD	Transmit data
	4	Termination	
	5	Termination	
	6	TXD\	Transmit data\
	7	Termination	
	8	Termination	

3 Function description

3.1 EtherNet/IP

EtherNet/IP (Ethernet industrial protocol) is an open Common Industrial Protocol (CIP) based fieldbus standard developed by Rockwell Automation and the Open DeviceNet Vendor Association (ODVA).

EtherNet/IP supports the provider-consumer principle for data exchange between individual network nodes.

For additional information, see [The EtherNet/IP interface](#).

3.2 Error codes

The module returns an error code if an error occurs. A complete list of all error codes in PDF format is available in under item "Communication_Error" in section "Communication / Fieldbus systems / Support with FDT/DTM / Diagnostic functions / Diagnostics on the runtime system / Master diagnostics" in Automation Help.

4 Commissioning

4.1 Firmware

The module comes with preinstalled firmware. The firmware is part of the Automation Studio project. The module is automatically brought up to this level.

A hardware upgrade must be performed to upgrade the firmware included in Automation Studio (see Help "Project management - Workspace - Upgrades" in Automation Help).

4.2 Operating the module

The interface module can be operated in the slot of a controller or in the slot of an expandable POWERLINK bus controller.

4.2.1 Use in the expandable X20BC1083 POWERLINK bus controller

4.2.1.1 Cyclic data

If this module is connected to the expandable POWERLINK bus controller, the amount of cyclic data is limited by the POWERLINK frame. This is 1488 bytes each in the input and output directions.

When using multiple X20IF10xx-1 interfaces or other X2X modules with a POWERLINK bus controller, the 1488 bytes are divided between all connected modules.

4.2.1.2 Operation

It is important to note the following in order to operate the module with the bus controller without problems:

- A minimum revision $\geq E0$ is required for the bus controller.
- The module can only be operated with the POWERLINK V2 setting. V1 is not permitted.
- With SDO access to POWERLINK object 0x1011/1 on the bus controller, the firmware and configuration stored on the bus controller are not reset. They can only be overwritten by accessing them again. This affects objects 0x20C0 and 0x20C8, subindexes 92 to 95.

4.2.1.3 Timing characteristics

The internal data transfer results in an additional runtime shift of one cycle per direction.



Information:

For additional information about runtime behavior, see section "Runtime shift" in X20BC1083.

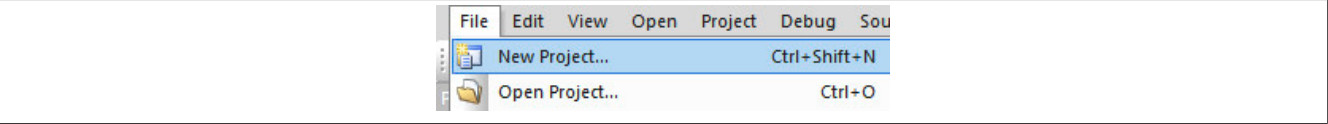
5 The EtherNet/IP interface

5.1 Settings in Automation Studio

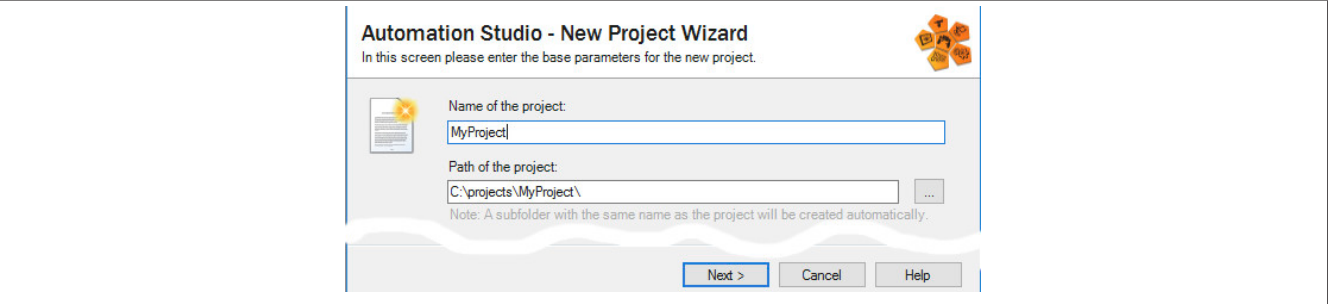
To configure the interface, a new Automation Studio project is created and the suitable settings are made on the module.

5.1.1 Creating an Automation Studio project

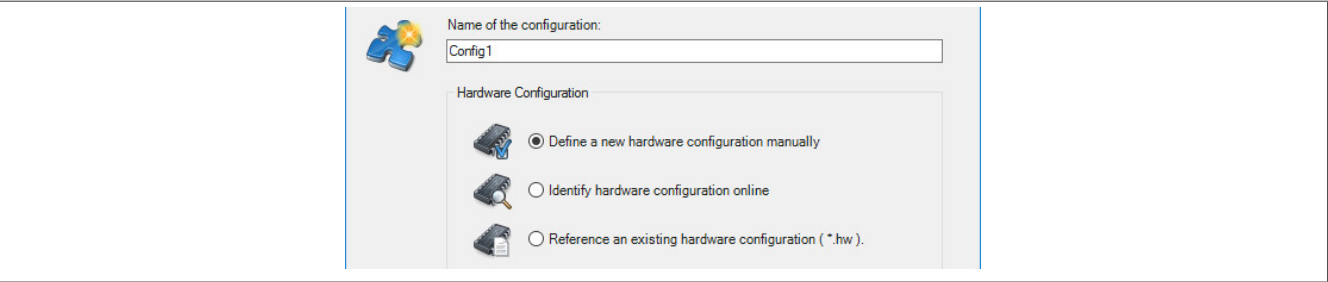
- Create a new Automation Studio project by selecting "New project".



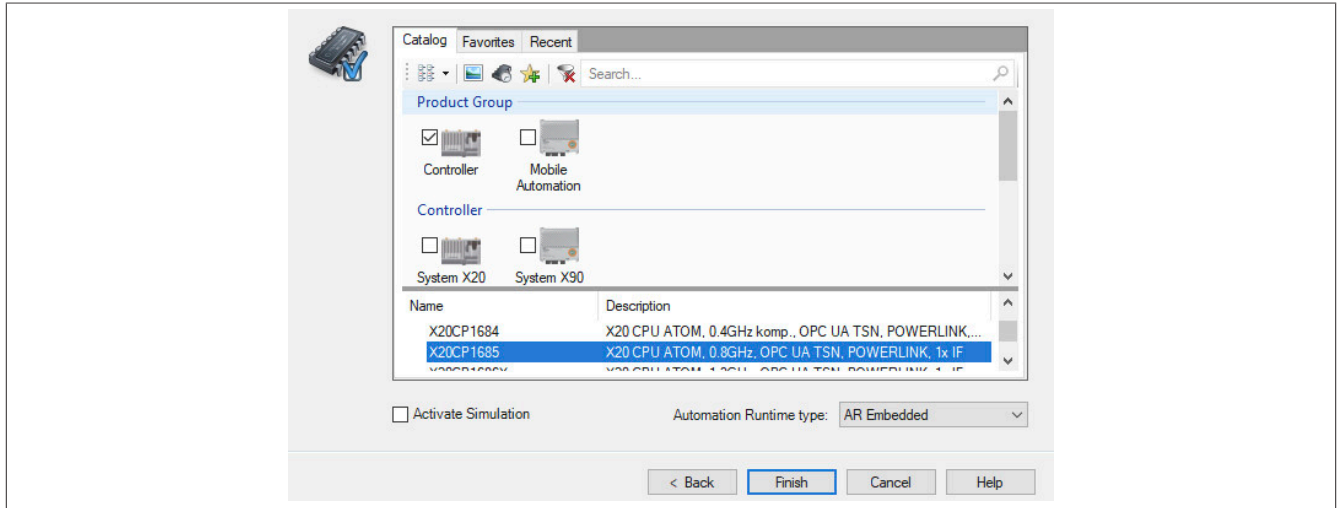
- Assign a project name and set up the project path.



- The type of hardware configuration is selected, and the name of the configuration is assigned.

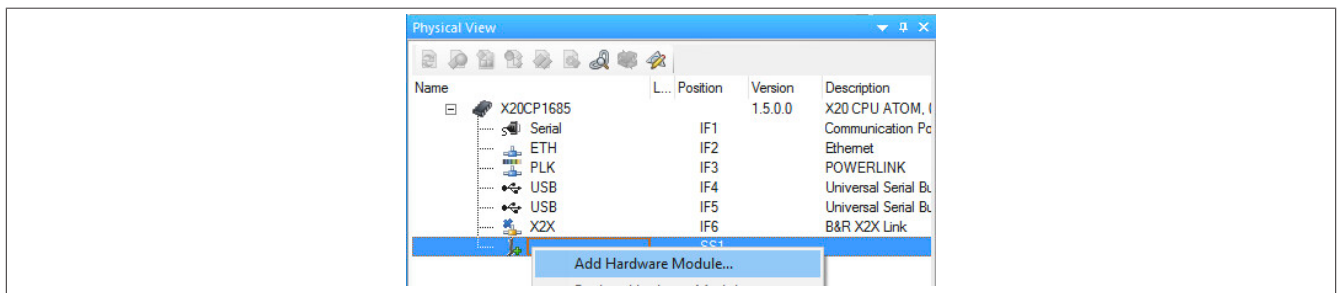


- If "Define a new hardware configuration manually" was selected, the hardware is selected in the next step. In order to simplify the search, different filters can be set for this in the Hardware Catalog. Finally, the Automation Studio project is created by selecting the required hardware and clicking "Finish".

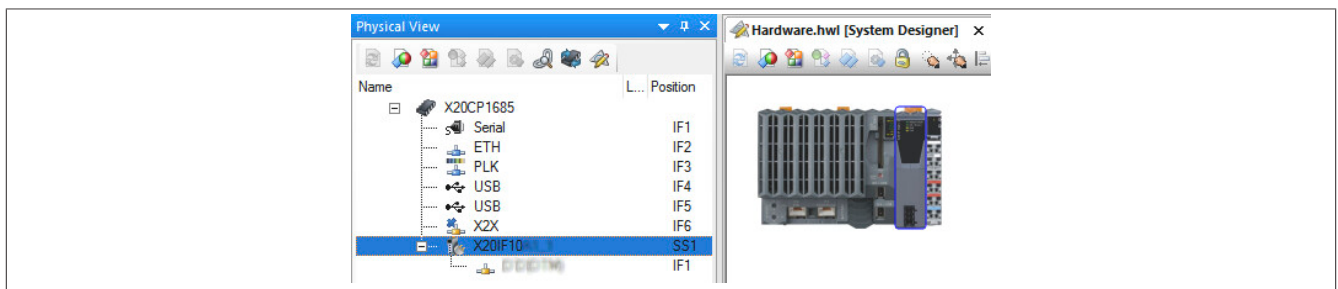


5.1.2 Adding and configuring the interface module

- In this example, the interface card is connected in the slot of a controller. Right-clicking on the slot and selecting "Add hardware module" opens the Hardware Catalog.

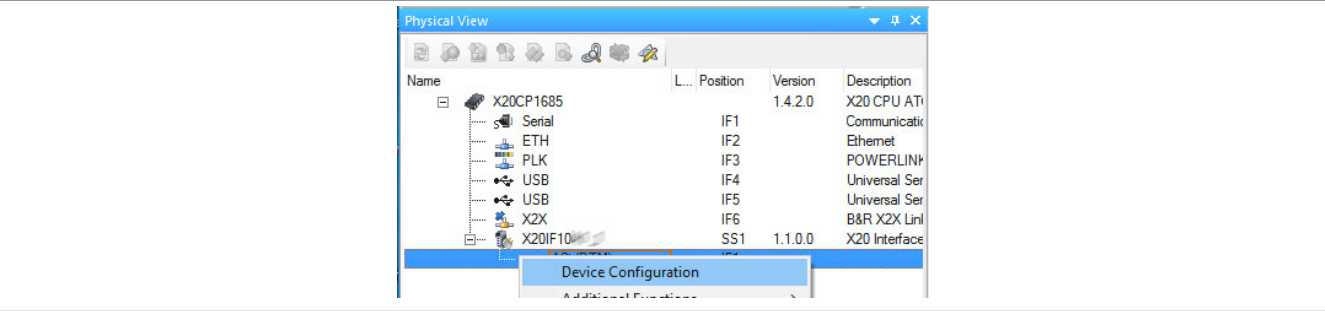


- The module is added to the project via drag-and-drop or by double-clicking on the interface card.

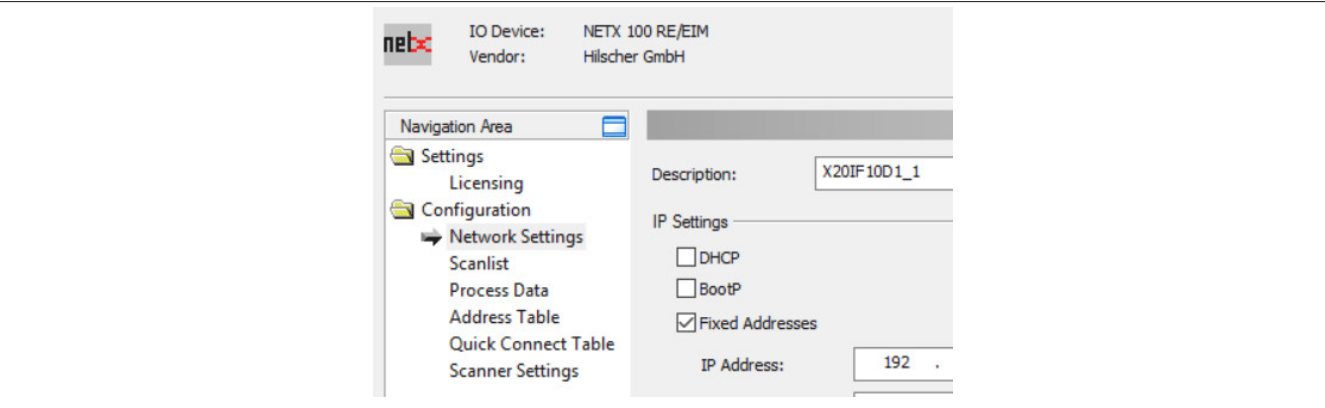


The EtherNet/IP interface

- Additional module settings can be made under "Device configuration". This configuration environment is opened by right-clicking on the IF interface and selecting "Device configuration".



- General settings are made in the device configuration.



5.1.2.1 Network settings

Contains the symbolic name of the module

Parameter	Explanation
Description	Module name of the scanner

- IP settings

The IP addresses and operation modes of the Ethernet interface are set here.

Parameter	Explanation
DHCP	IP address determined via DHCP protocol.
BootP	IP address determined via BootP protocol.
Fixed addresses	The IP address is static. The IP address is defined by the following 3 parameters.
IP address	IP address of the EtherNet/IP scanner station
Network mask	Network mask of the EtherNet/IP scanner station
Gateway address	Gateway address of the EtherNet/IP scanner station

- Port 1

Parameter	Explanation
Operating mode	Operating mode of the EtherNet/IP scanner (master)
MDI mode	Configure cable type <ul style="list-style-type: none">• Auto MDI-X: Detect cable type automatically• MDI-X: Use crossover cable.• MDI: Use straight-through cable.

- Port 2

Identical to port 1

5.1.2.2 Scan list

This table lists all attached EtherNet/IP adapters (slaves).

Parameter	Explanation	Values																				
Activate	This is used to enable or disable the adapters. <ul style="list-style-type: none">Enabled: Process memory is reserved and data is exchanged.Disabled: The master reserves memory in the process data image for the adapter, but no data is exchanged.																					
Index	Continuous numbering of the EtherNet/IP devices in the scan list.																					
IP address	Configurable IP address of the EtherNet/IP adapter station.																					
Name	Editable station name.																					
Description	Symbolic, non-editable station name																					
RPI (ms)	Requested packet interval in milliseconds for a connection. For values in the microsecond range, the fixed point format can be used, e.g. 0.2 for 200 microseconds.	0.001 to 4294967 (default: 100)																				
Timeout multiplier	Multiplication factor applied to the expected packet rate to obtain the connection timeout value. Whenever a timeout occurs during connection, modules should stop transmission over a connection, even if the pending closing signal has been transmitted.	<table><tr><th>Value</th><th>Multiplier</th></tr><tr><td>0</td><td>x 4</td></tr><tr><td>1</td><td>x 8</td></tr><tr><td>2</td><td>x 16</td></tr><tr><td>3</td><td>x 32 (default)</td></tr><tr><td>4</td><td>x 64</td></tr><tr><td>5</td><td>x 128</td></tr><tr><td>6</td><td>x 256</td></tr><tr><td>7</td><td>x 512</td></tr><tr><td>8 to 255</td><td>Reserved</td></tr></table>	Value	Multiplier	0	x 4	1	x 8	2	x 16	3	x 32 (default)	4	x 64	5	x 128	6	x 256	7	x 512	8 to 255	Reserved
Value	Multiplier																					
0	x 4																					
1	x 8																					
2	x 16																					
3	x 32 (default)																					
4	x 64																					
5	x 128																					
6	x 256																					
7	x 512																					
8 to 255	Reserved																					

5.1.2.3 Process data

This table lists the process data of the individual Ethernet/IP adapters (slaves).

Parameter	Explanation
Type	Device designation specified by the hardware. Further description of modules configured on the device or the input or output signals.
Day	The name of the input and output data can be changed in column "Day".
SCADA	This parameter is not supported.

Type	Day
X20IF10D3-1 V1.19 <192.168.10 X20IF10D3_1	Module 0
Exclusive Owner<Slot 0>	hallo
Input Assembly (Instance ID 101)	Output
Output Assembly (Instance ID 100)	

Channel Name
ModuleOk
Module_0_hallo001
Module_0_hallo002
Module_0_hallo003
Module_0_hallo004

5.1.2.4 Address table

This table provides information about the addresses of the input and output data (in decimal or hexadecimal notation).

"Display mode" allows toggling between decimal and hexadecimal display.

Parameter	Explanation
Device	Device name of the adapter
Slot	Slot number for modular adapters
Connection name	Text-based name of the connection
Instance ID	Assembly instance ID
Length	Byte length of the instance
Address	Data offset address of the instance

The address table can also be exported as a CSV file.

5.1.2.5 Quick connect table

This parameter is not supported.

5.1.2.6 Scanner settings

- Start of bus communication

It is possible here to select how data exchange is started on the module.

Parameter	Explanation
Automatically by device	Data exchange is started automatically after the module is initialized.
Controlled by application	Data exchange is started by Automation Runtime.

- Module alignment

The addressing mode is defined by the process image here. The addresses (offsets) of the process data are always interpreted as byte addresses.

Addressing mode	Explanation
Byte boundaries	The module address can start on any offset.
2 byte boundaries	The module address can only start on even byte offsets.



Information:

This configuration is automatically managed by Automation Runtime and is not permitted to be changed (default setting).

- Application monitoring

The module-internal watchdog time can be set here. If the watchdog has been enabled (watchdog time not equal to 0), the hardware watchdog must be reset after the set time at the latest.

Parameter	Explanation	Values
Watchdog time	Software watchdog disabled	0 ms
	Permissible range of values.	20 to 65535 ms
	Default value: 1000 ms	



Information:

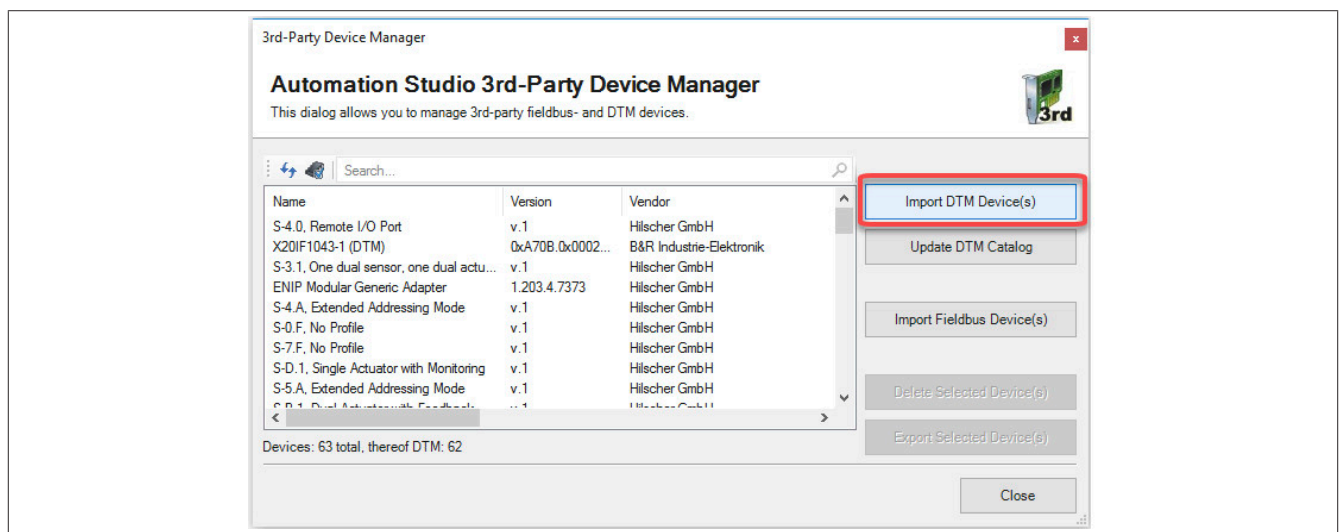
The watchdog time is reset automatically by Automation Runtime.

5.1.3 Adding the EDS file in Automation Studio

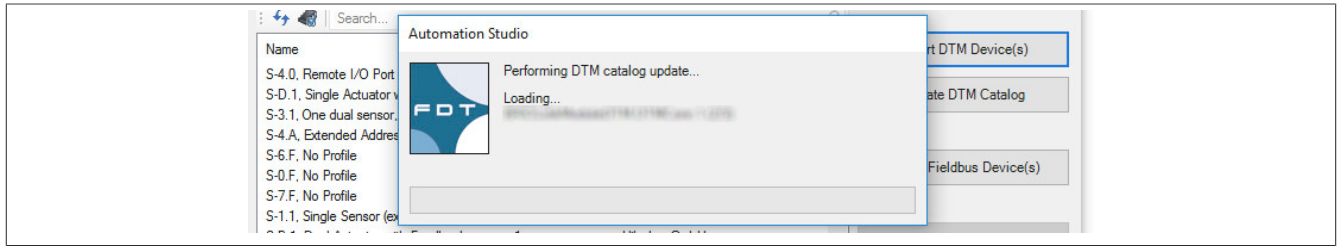
To tell the EtherNet/IP scanner (master) which adapters (slaves) were connected and how they were configured, a description file (EDS file) is required.

To add and use a device description file in Automation Studio, perform the following steps:

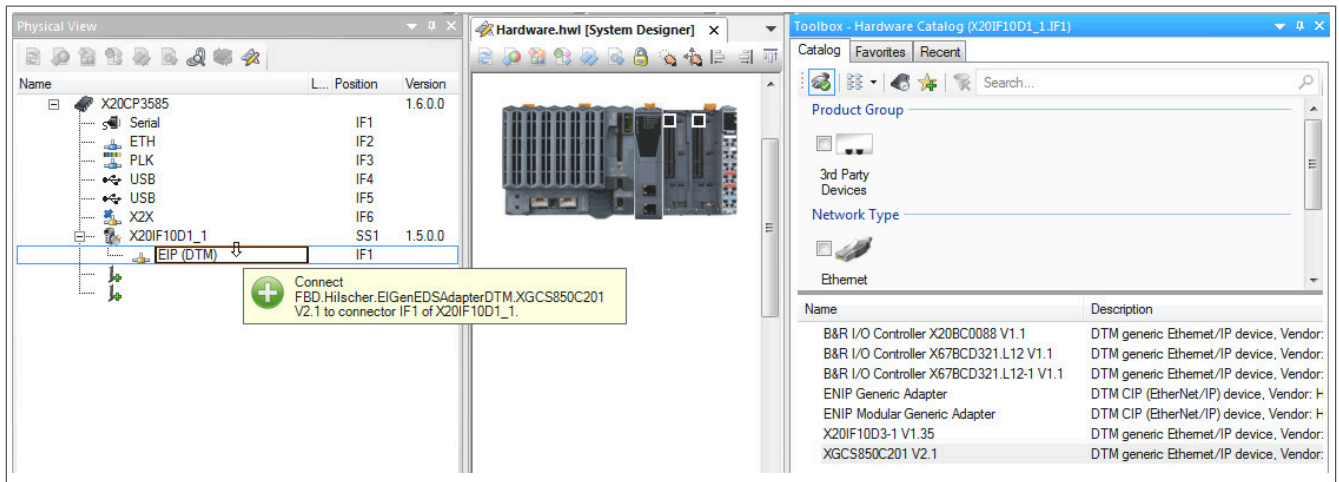
- If the EtherNet/IP adapter (slave) from B&R is used, download the EDS file from the B&R website (www.br-automation.com) and unzip the ZIP file.
- Open the dialog box in Automation Studio under "Tools - Manage 3rd-party devices" and select "Import DTM device(s)".



- Select the EDS file to be imported and confirm with OK. The EDS file is imported into Automation Studio.



- Click on "EIP(DTM)" on EtherNet/IP scanner (master) X20IF10D1-1, drag the EDS file from the Hardware Catalog and attach it to the EtherNet/IP scanner (master).



- Right-click on the IF interface and select "Device configuration" to open the configuration environment for the EDS file.

