

# X20(c)IF10D1-1

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## 1 General information

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 module can be operated in X20 CPUs or in the expandable POWERLINK bus controller X20BC1083.

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

- EtherNet/IP scanner (master)
- Integrated switch for efficient wiring

### 1.1 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



#### 1.1.1 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  $-40^{\circ}\text{C}$ . 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.**

## 2 Order data

Order number	Short description	Figure
	<b>X20 interface module communication</b>	
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

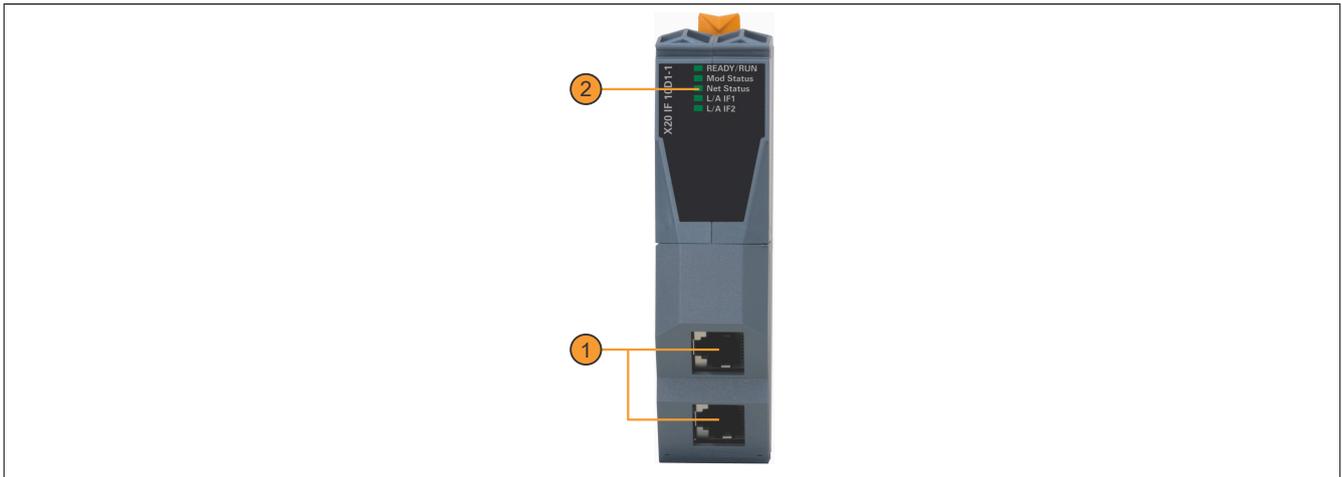
Model number	Short description
X20CA0E61.xxxxx	POWERLINK/Ethernet connection cable, RJ45 to RJ45, 0.2 to 20 m
X20CA0E61.xxxx	POWERLINK/Ethernet connection cable, RJ45 to RJ45, 20 m and longer

### 3 Technical data

Order number	X20IF10D1-1	X20cIF10D1-1
<b>Short description</b>		
Communication module	EtherNet/IP scanner (master)	
<b>General information</b>		
B&R ID code	0xA71B	0xE753
Status indicators	Module status, network status, data transfer	
<b>Diagnostics</b>		
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]	-	
<b>Certifications</b>		
CE	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 GL	Temperature: <b>B</b> (0 - 55°C) Humidity: <b>B</b> (up to 100%) Vibration: <b>B</b> (4 g) EMC: <b>B</b> (bridge and open deck)	
LR	ENV1	-
KR	Yes	
ABS	Yes	
EAC	Yes	
KC	Yes	-
<b>Interfaces</b>		
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	
<b>Transfer</b>		
Physical layer	10BASE-T/100BASE-TX	
Half-duplex	Yes	
Full-duplex	Yes	
Autonegotiation	Yes	
Auto-MDI/MDIX	Yes	
Controller	netX100	
Memory	8 MB SDRAM	
<b>Electrical properties</b>		
Electrical isolation	PLC isolated from EtherNet/IP (IF1 and IF2)	
<b>Operating conditions</b>		
<b>Mounting orientation</b>		
Horizontal	Yes	
Vertical	Yes	
<b>Installation elevation above sea level</b>		
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	
<b>Ambient conditions</b>		
<b>Temperature</b>		
<b>Operation</b>		
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	
<b>Relative humidity</b>		
Operation	5 to 95%, non-condensing	Up to 100%, condensing
Storage	5 to 95%, non-condensing	
Transport	5 to 95%, non-condensing	
<b>Mechanical properties</b>		
Slot	In the X20 CPU and expandable bus controller X20BC1083	In the X20 CPU and expandable bus controller X20cBC1083

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

## 4 Operating and connection elements



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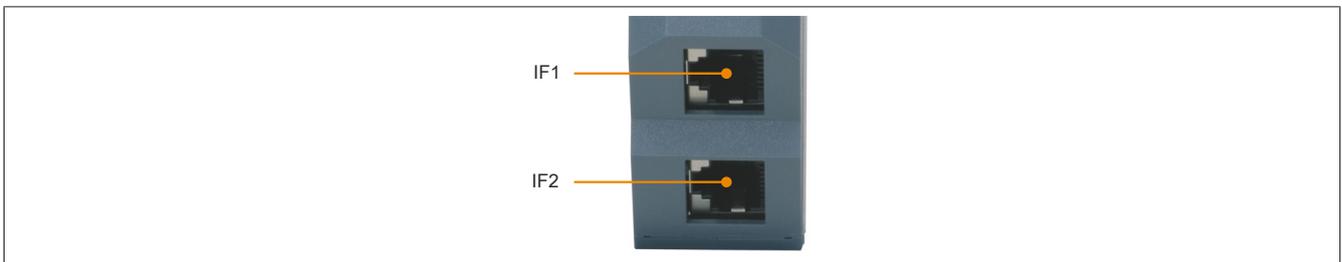
### 4.1 LED status indicators

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 <sup>1)</sup>	Green	Blinking	The interface module has not yet been configured.
			On	Scanner (master) is ready for operation.
		Red	Blinking	Correctable hardware errors
		On	Uncorrectable hardware errors	
	Net status <sup>1)</sup>	Green/Red	Blinking	Initialization/Self-test
			Off	No power to module
		Green	Blinking	No active connections available
		On	A least one established active connection available	
		Red	Blinking	A timeout occurred on at least one connection.
	L/A IF1/IF2	Red	On	An IP address has been used more than once.
			Green/Red	Off
		Green	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.

### 4.2 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	

## 5 Use in the expandable X20BC1083 POWERLINK bus controller

### 5.1 Cyclic data

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

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

### 5.2 Operating netX modules

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

- A minimum revision  $\geq E0$  is required for the bus controller.
- netX modules 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 netX firmware and the 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.

### 5.3 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.

## 6 netX error codes

netX modules return an error code when an error occurs. These error codes are fieldbus-specific. A complete list of all error codes in PDF format is available in Automation Help in section "Communication / Fieldbus systems / Support with FDT/DTM / Diagnostic functions / Diagnostics on the runtime system / Master diagnostics" under item "Communication\_Error".

## 7 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.

To update the firmware contained in Automation Studio, a hardware upgrade must be performed (see "Project management / Workspace / Upgrades" in Automation Help).

## 8 The EtherNet/IP interface

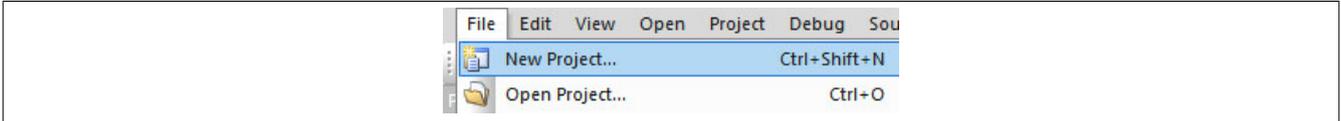
### 8.1 Settings in Automation Studio

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

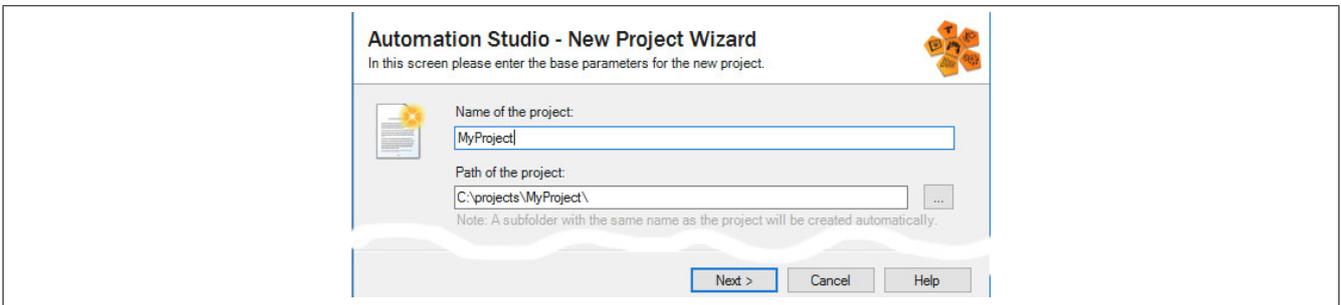
To do this, a new Automation Studio project is created and the suitable settings are made on the module.

#### 8.1.1 Creating an Automation Studio project

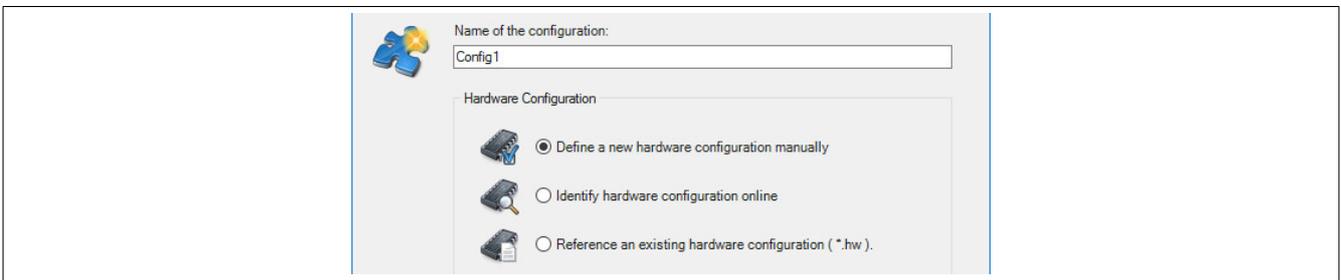
- Create a new Automation Studio project by selecting "New project".



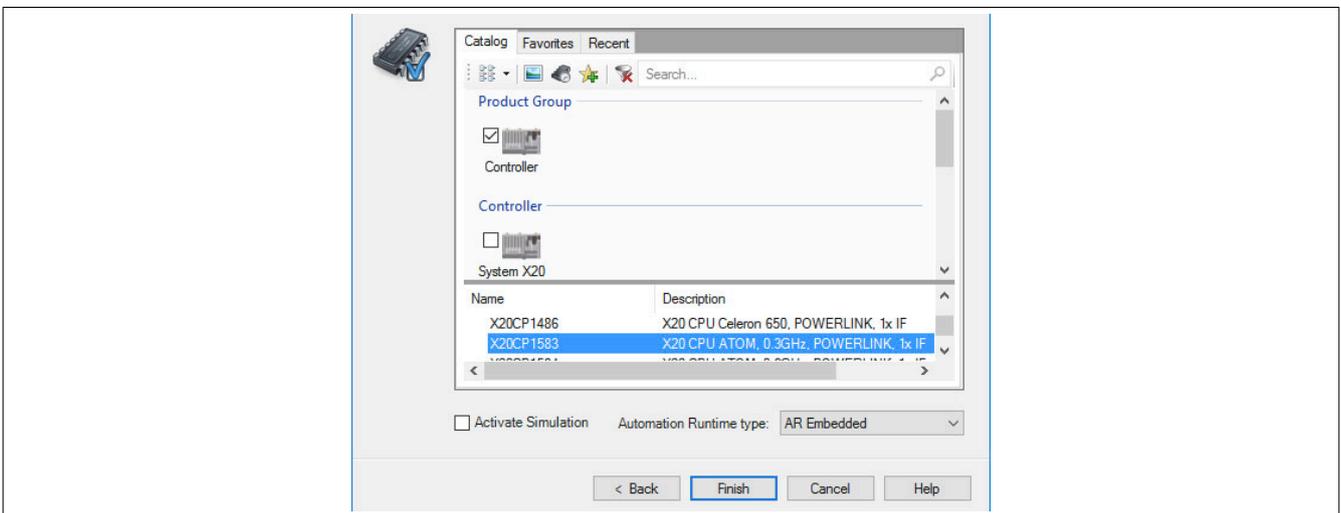
- Assign a project name and set up the project path.



- Assign the hardware configuration type and configuration name.

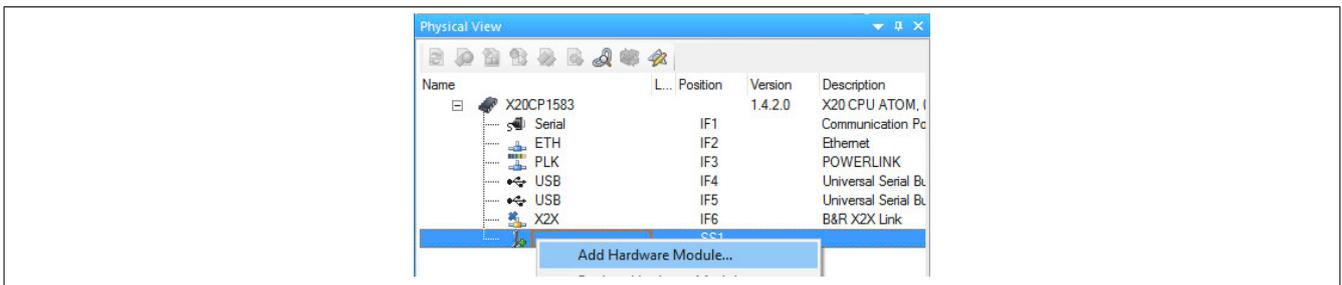


- Select the hardware in the next step if "Define a new hardware configuration manually" was selected. In order to simplify the search, different filters can be set in the Hardware Catalog. Lastly, highlight the required hardware and create the Automation Studio project by clicking on "Finish".

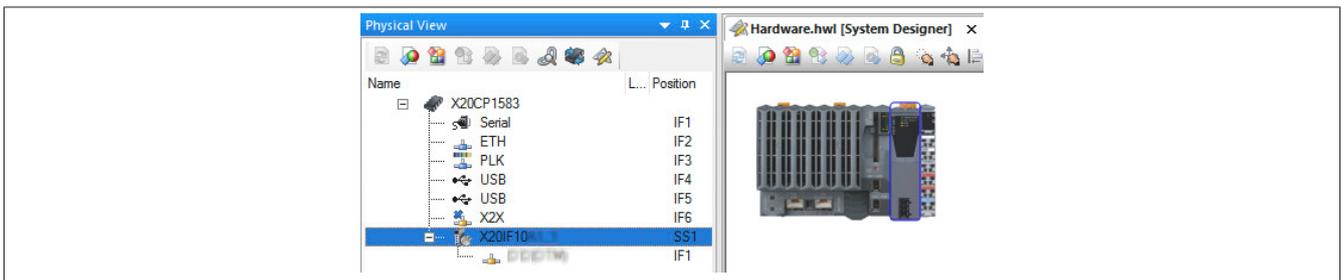


## 8.1.2 Adding and configuring the interface module

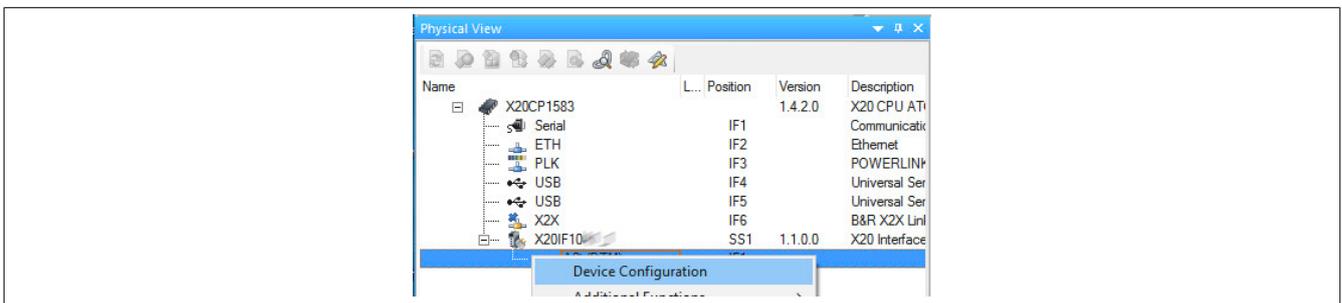
- In this example, the interface card is connected in the slot of a CPU. Right-clicking on the slot and selecting "Add hardware module" opens the Hardware Catalog.



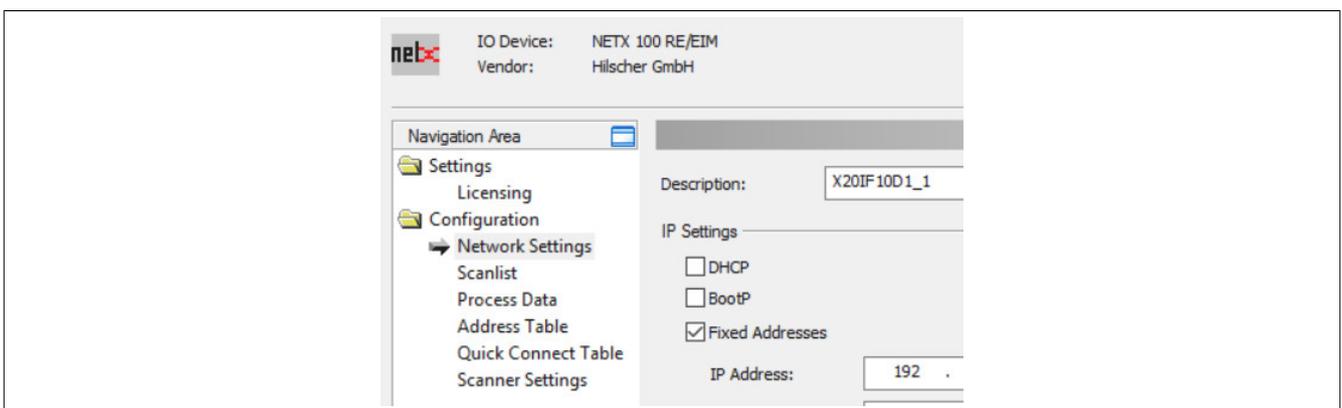
- The module is added to the project via drag-and-drop or by double-clicking on the interface card.



- 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.



### 8.1.2.1 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"> <li>• <b>Auto MDI-X:</b> Detect cable type automatically</li> <li>• <b>MDI-X:</b> Use crossover cable.</li> <li>• <b>MDI:</b> Use straight-through cable.</li> </ul>

#### - Port 2

Identical to port 1

### 8.1.2.2 Scan list

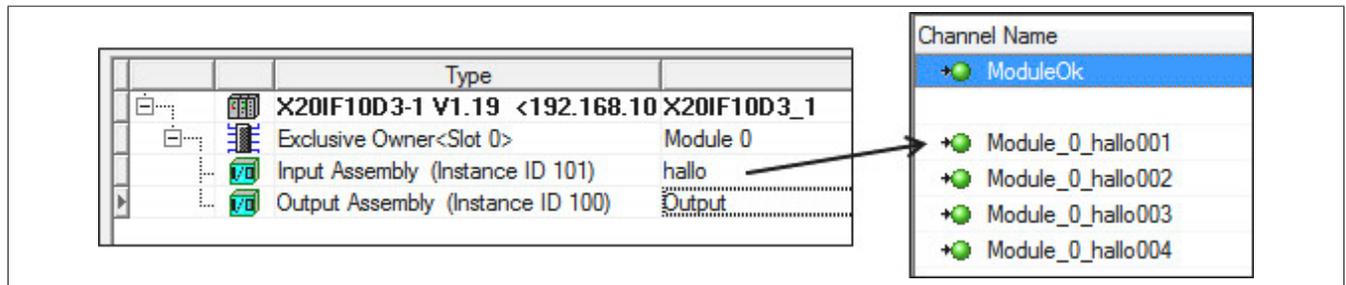
This table lists all attached EtherNet/IP adapters (slaves).

Parameter	Explanation	Values																				
Activate	This is used to enable or disable the adapters. <ul style="list-style-type: none"> <li>• <b>Enabled:</b> Process memory is reserved and data is exchanged.</li> <li>• <b>Disabled:</b> The master reserves memory in the process data image for the adapter, but no data is exchanged.</li> </ul>																					
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 border="1"> <thead> <tr> <th>Value</th> <th>Multiplier</th> </tr> </thead> <tbody> <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> </tbody> </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																					

### 8.1.2.3 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.



### 8.1.2.4 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.

### 8.1.2.5 Quick connect table

This parameter is not supported.

### 8.1.2.6 Scanner settings

#### - Start of bus communication

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

Parameter	Explanation
Automatically by device	Data exchange is started automatically after initializing this module.
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	Watchdog software disabled	0 ms
	Permissible range of values	20 to 65535 ms
	Default value: 1000 ms	

## Information:

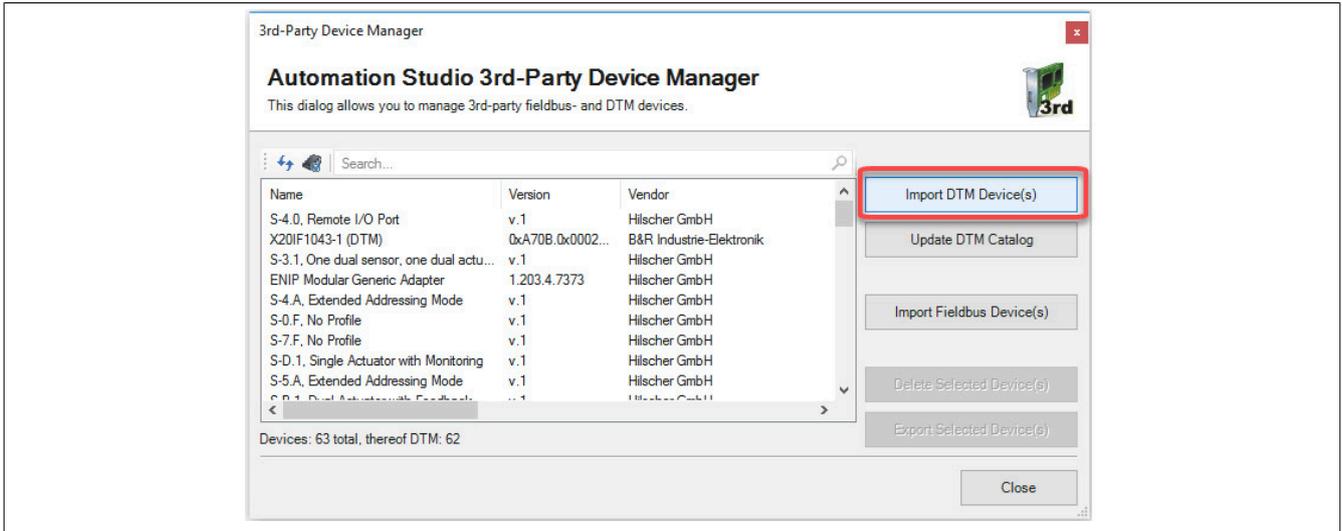
The watchdog time is reset automatically by Automation Runtime.

### 8.1.3 Adding the EDS file in Automation Studio

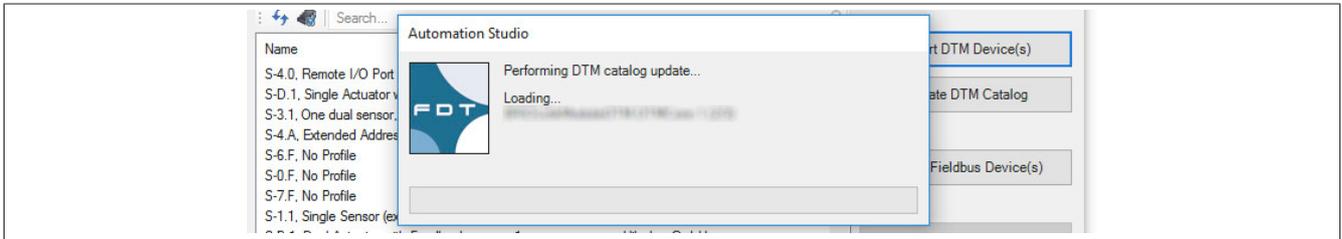
To tell the EtherNet/IP scanner (master) which adapters (slaves) were connected and how they were configured, a description file (EDS file) is required.

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

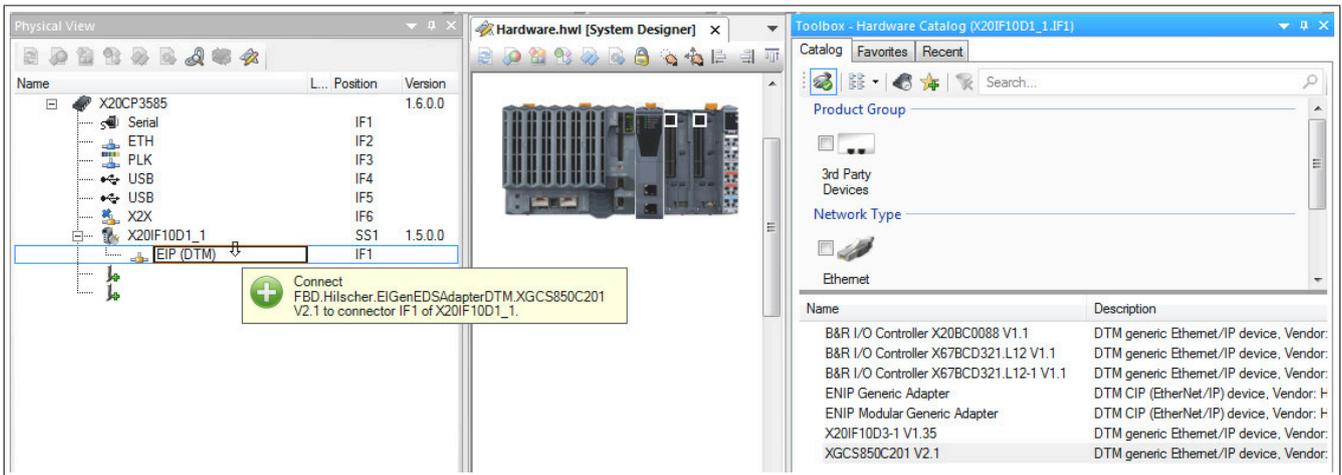
- If the EtherNet/IP adapter (slave) from B&R is used, download the EDS file from the B&R website ([www.br-automation.com](http://www.br-automation.com)) and unzip the ZIP file.
- Open the dialog box in Automation Studio under "Tools - Manage 3rd-party devices" and select "Import DTM device(s)".



- 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.

