X20(c)IF10E3-1

1 General information

The interface module is equipped with a PROFINET IO device interface. This allows the B&R system (I/O modules, POWERLINK, etc.) to be connected to systems from other manufacturers 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.

- PROFINET IO device
- · Integrated switch for efficient cabling

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



3 Order data

Order number	Short description	Figure
	X20 interface module communication	~
X20IF10E3-1	X20 interface module, for DTM configuration, 1 PROFINET IO device (slave) interface module, electrically isolated	
X20clF10E3-1	X20 interface module, coated, for DTM configuration, 1 PROFINET IO device (slave) interface module, electrically iso- lated	

Table 1: X20IF10E3-1, X20cIF10E3-1 - 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

4 Technical data

Order number	X20IF10E3-1 X20cIF10E3-1
Short description	
Communication module	PROFINET IO device (slave)
General information	
B&R ID code	0xA71E 0xE238
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
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 (0 - 55°C) Humidity: B (up to 100%) Vibration: B (4 g) EMC: B (bridge and open deck)
LR	ENV1
KR	Yes
ABS	Yes
EAC	Yes
KC	Yes -
Interfaces	
Fieldbus	PROFINET IO device (slave)
PROFINET attributes	
Conformance class	C
Performance class	RT (switch supports IRT)
Netload class	
Variant	2x shielded RJ45 (switch)
Line length	Max. 100 m between 2 stations (segment length)
Transfer rate	100 Mbit/s
Transfer Diversel lover	100BASE-TX
Physical layer Half-duplex	Yes
Full-duplex	Yes
Autonegotiation	Yes
Auto-MDI/MDIX	Yes
Controller	netX100
Electrical properties	
Electrical isolation	PLC isolated from PROFINET IO (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
Ambient conditions	
Temperature	
Operation	
	-25 to 60°C
Horizontal mounting orientation	-25 to 60°C -25 to 50°C
Horizontal mounting orientation Vertical mounting orientation	-25 to 50°C

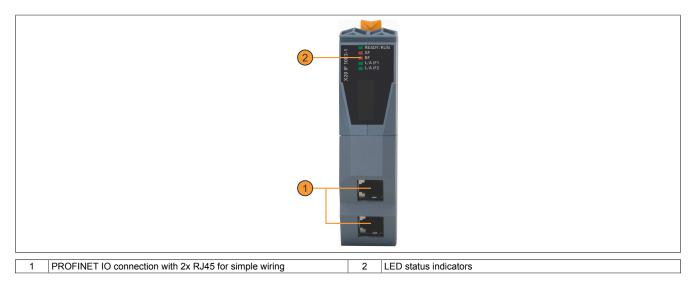
Table 2: X20IF10E3-1, X20cIF10E3-1 - Technical data

X20(c)IF10E3-1

Order number	X20IF10E3-1	X20clF10E3-1		
Relative humidity				
Operation	5 to 95%, non-condensing	Up to 100%, condensing		
Storage	5 to 95%, n	on-condensing		
Transport	5 to 95%, n	on-condensing		
Mechanical properties				
Slot	In the X20 CPU and expand- able bus controller X20BC1083	In the X20c CPU and expand- able bus controller X20cBC1083		
	able bus controller X20BC1083	able bus controller X20CBC1083		

Table 2: X20IF10E3-1, X20cIF10E3-1 - Technical data

5 Operating and connection elements



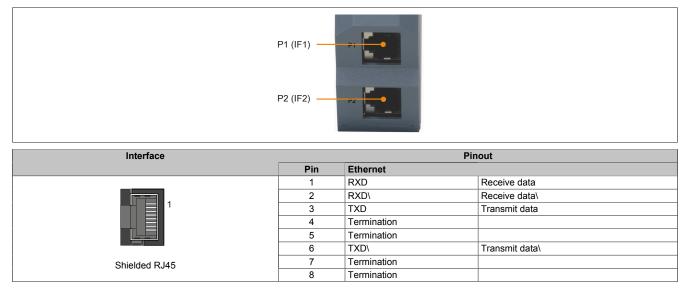
5.1 LED status indicators

Figure	LED	Color	Status	Description				
	READY/RUN	Green/red	Off	No power to module				
		Red	Blinking	Boot error				
			On	Communication on the PCI bus has not yet been started				
		Green	On	PCI bus communication in progress				
	SF	Red	Off	No error				
	READY/RUN SF BF L/A IF1 L/A IF2 BF Red D BI D O		Cyc. Blinking ¹⁾	DCP signal service triggered via bus				
			On	System errors				
BF		Red	Off	No error				
🗧 🔤 L/A IF1			Blinking	No data exchange				
			On	No configuration or physical connection error				
×		Off	No link to remote station					
	Flic		Flickering	A link to the remote station has been established. The LED blinks when Ethernet activity is taking place on the bus.				
			On	A link to the remote station has been established.				

1) Blinks cyclically at 2 Hz, duration 3 s.

5.2 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.



6 Use in the expandable X20BC1083 POWERLINK bus controller

6.1 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.

6.2 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.

6.3 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.

7 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".

8 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).

9 Minimum DTM version for coated modules

Information:

This module requires at least version 1.0.2.14 of the DTM, which can be downloaded from category "Software/DTM" of the Downloads section of the B&R website (<u>www.br-automation.com</u>).

10 Recognizing an invalid connection

All cyclic data is set to zero in the event of an invalid connection between the master and slave. An invalid connection may be caused by the following:

- No connection between the master and the slave
- Interface card initialization is not yet complete.
- The master is in error mode.
- Data is marked as invalid (IOPS = Bad).

It cannot be determined whether the data is valid or invalid based on the transmitted data. In order to be able to reliably recognize an invalid connection, it is necessary to evaluate the master's IOPS data additionally in the application.

Passing on IOPS data to the application can be enabled via the DTM of the interface card ("I/O status information" in Automation Studio).

11 PROFINET IO interface

2 steps are generally necessary for connecting module X20IF10E3-1 to an external master environment.

1) Add and configure the X20 interface module in B&R's Automation Studio.

2) Add the PROFINET device (slave) GSDML device description file in the external master environment, e.g. Siemens STEP 7 or Siemens TIA-Portal. The interface module must then be configured.

Information:

To ensure error-free PROFINET communication between controller (master) and device (slave), the settings for the interface module in Automation Studio must match the settings of the GSDML device description file in the master environment.

11.1 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.

11.1.1 Creating an Automation Studio project

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

Fil	e Ec	it V	liew	Open	Project	Debug	Sou
į Ē.	Nev	Proje	ect			Ctrl+Shift	+N
F 🔄	Ope	n Proj	ject			Ctrl	+0

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

ation Studio - New Project Wizard
Name of the project: MyProject Path of the project:
C:\projects\MyProject\ Note: A subfolder with the same name as the project will be created automatically.
Next > Cancel Help

• Assign the hardware configuration type and configuration name.

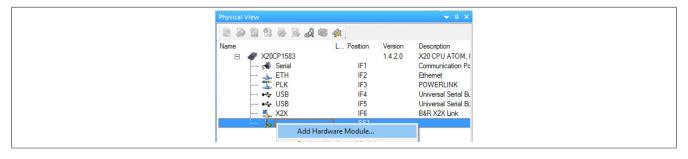
<i>i</i>	Name of the configuration: Config1
	Hardware Configuration
	Define a new hardware configuration manually
	Identify hardware configuration online
	Reference an existing hardware configuration (*.hw).

• 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".

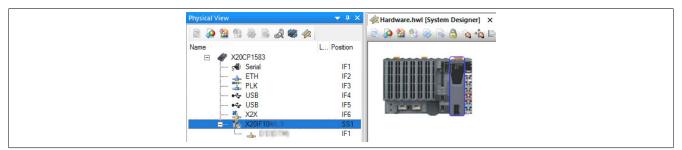
Catalog Favorites Recent	Saamh	R
Product Group		
Controller		
		-
System X20		<u> </u>
Name X20CP1486	Description X20 CPU Celeron 650, POWERLINK, 1x IF	
X20CP1583	X20 CPU ATOM, 0.3GHz, POWERLINK, 1x (
Activate Simulation Autor	mation Runtime type: AR Embedded	~
< Bao	k Finish Cancel H	Help

11.1.2 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".

Physical View				▼ # ×
Name		L Position	Version	Description
🖃 🦪 X2	20CP1583		1.4.2.0	X20 CPU ATI
- 54	Serial	IF1		Communicatio
		IF2		Ethemet
	E PLK	IF3		POWERLINH
	USB	IF4		Universal Ser
	USB	IF5		Universal Ser
- 5	X2X	IF6		B&R X2X Linl
ė 🚯	X20IF10	SS1	1.1.0.0	X20 Interface
	Device Configura			e de de de de de de de de 12

• General settings are made in the device configuration.

Navigation Area Firmware Download Configuration Name of station: Image: Configuration Modules Signal Configuration Address Table Device Settings Description Description Description Description Module Info Output		F10E3-1_NETX V1.3.x.x ecker + Rainer
Firmware Download Name of station: x20if10e3-1 General Modules Signal Configuration Address Table Device Settings IP address: Description Device Info Network mask: IP settings	Navigation Area	
Image: Signal Configuration Address Device Settings IP settings Device Settings IP address: Device Info Network mask:	Firmware Download	
Address Table Device Settings IP address: Image: Setting	🖙 🖨 General	Description: X20IF10E3_1
Description Device Info Network mask:		IP settings
Device Info Network mask:	Device Settings	IP address:
Module Info		Network mask:
GSDML Viewer		Gateway address:

11.1.2.1 General

The name of the station (slave) can be set here.

All other parameters are defined at the master. The PROFINET IO device (slave) is identified by the station name. As soon as there is a connection from the controller to the PROFINET IO device (slave), the other parameters (IP address, network mask, etc.) are transferred to the PROFINET IO device (slave).

11.1.2.2 Modules

Modules can be added to the PROFINET IO device (slave) here.

Parameter	Explanation						
+	Selecting a submodule If a submodule is selected, more detailed information about the submodule is displayed in the lower table.						
Slot	Shows the current slot number assigned to a module. The sequence of the modules can be changed by changing the slot number.						
Subslot	Shows the current subslot number assigned to a module. The sequence of the modules can be changed by changing the subslot number.						
!	Slot symbol: Indicates the use of the (sub)modules.						
	• No symbol: (Sub)slot number and name can be changed.						
	Pin symbol: No change possible						
Modules	The module type can be changed by selecting the desired type in the dropdown box. Image: The module type can be changed by selecting the desired type in the dropdown box. Image: The module type can be changed by selecting the desired type in the dropdown box. Image: The module type can be changed by selecting the desired type in the dropdown box. Image: The module type can be changed by selecting the desired type in the dropdown box. Image: The module type can be changed by the type. Image: The type can be changed by the type. Image: The type can be changed by type.						

"Add module" adds the default module "1 byte input" to the slave. This module can be changed via the dropdown menu in column "Modules".

Use "Remove" to remove the modules again.

- Submodule details

"Dataset" can be used to toggle between I/O data and parameters.

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

The modules are simple input and output modules. These have no adjustable parameters. I/O data cannot be changed in this table.

11.1.2.3 Signal configuration

The data structure of the individual modules can be defined here; the name and data type of the inputs and outputs can also be adjusted. Data types can also be combined.

Parameter	Explanation
Slot	Position of the slot
Name	Name of the slot
Module type	Number of bytes and type of connection (input or output)

After selecting a slot, the type, data type and offset are displayed in another table below.

After right-clicking on the signal to be configured, the following options can be selected in the shortcut menu:

Edit signal

This allows the currently selected signal to be edited.

Parameter			Explanation					
Name			The new name for	or the signal				
New type			The new data typ	e for the sig	nal			
Count			structured; the qu - The maximum n type.	antity is not umber corre	adjusted. sponds to the qu	antity that the new d	Only the data of the originate ata type requires to displa	y the original
Apply as array	T		If selected, the n "Count" are displa		e is displayed a	is an array. Otherwi	se, the data type elemen	ts set under
		Edit Signal	X		Slot	Name		
					Slot 1 / Subslot 1	8 Bytes Input / 8 Bytes	Input	
	Name:	Outputs_Byte_4			Slot 2 / Subslot 1	8 Bytes Output / 8 Byte	es Output	
	Original Type:	4 byte array			Name		Туре	Offset
	N T	(L .			Outputs_Byte_	0	byte	0
	New Type:	byte	•		Outputs_Byte_	1	byte	1
	Count:	4	•		Outputs_Byte_	2	byte	2
					Outputs_Byte_	_3	byte	3
	Apply as A	пау			Outputs_Byte_	4	4 byte array	4
		OK	Cancel					

Reset

This can be used to undo the signal change or a merge previously completed with "Merge signal".

Merge signal

This allows all signals to be merged into a new group. The same settings can be made for the new group as under "Edit signal".

The settings made are reflected in the process image (I/O mapping).

	Configuring	the signal	
1	Slot Name		
\$	Slot 1 8 Bytes In		
1	Name	Туре	Offset
	Temp_1	byte	0
	Pressure_5	byte	1
	Input_3_Byte_0_Bit_0	bit	2.0
	Input_3_Byte_0_Bit_1	bit	2.1
	Input_3_Byte_0_Bit_2	bit	2.2
	Input_3_Byte_0_Bit_3	bit	2.3
	Input_3_Byte_0_Bit_4	bit	2.4
	Input_3_Byte_0_Bit_5	bit	2.5
	Input_3_Byte_0_Bit_6	bit	2.6
	Input_3_Byte_0_Bit_7	bit	2.7
	Input_4	byte	3
	Counter_Airflow_1	dword	4

Proces	ss image		
Module001_Temp_1	0	0	USINT
Module001_Pressure_5	0	0	USINT
Module001_Input_3_Byte_0_Bit_0	FALSE	FALSE	BOOL
Module001_Input_3_Byte_0_Bit_1	FALSE	FALSE	BOOL
Module001_Input_3_Byte_0_Bit_2	FALSE	FALSE	BOOL
Module001_Input_3_Byte_0_Bit_3	FALSE	FALSE	BOOL
Module001_Input_3_Byte_0_Bit_4	FALSE	FALSE	BOOL
Module001_Input_3_Byte_0_Bit_5	FALSE	FALSE	BOOL
Module001_Input_3_Byte_0_Bit_6	FALSE	FALSE	BOOL
Module001_Input_3_Byte_0_Bit_7	FALSE	FALSE	BOOL
Module001_Input_4	0	0	USINT
Module001_Counter_Airflow_1	0	0	UDINT

11.1.2.4 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
Modules	Name of the module
Submodule	Name of the submodule
Туре	Data type
Length	Length of the module/submodule in bytes
Address	Offset address of the data

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

11.1.2.5 Device 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.

Information:

Parameter "Manual start of bus communication" can be enabled under the I/O configuration of the PROFINET IO device (slave).

	L FOSILION	version	Description	Name	Value	Unit	Description
X20CP3586		1.4.2.0	X20 CPU ATOM, 1.6GH	X20IF10E3_1			
serial	IF1		Communication Port	Function model	standard		Module's operating mode
🚠 ETH	IF2		Ethernet	E			inclusion of operating inclusion
🌉 PLK	IF3		POWERLINK				
USB	IF4		Universal Serial Bus	🔤 📦 netX configuration module	asnxdb2		Module containing the netX configur
•💠 USB	IF5		Universal Serial Bus	🖗 Data exchange time (CPU-netX)	10000	μs	Cycle time for data exchange betwe
🐁 X2X	IF6		B&R X2X Link	Manual start of bus communication	on		If set to on, bus communication has
🖕 🗤 🚯 X20IF10E1_1	SS1	1.1.5.0	X20 Interface PROFINE	🚰 Channel configuration			
🗄 🛻 Profinet (DTM)	IF1						1 Byte Input
X20IF10E3_1_NE	ST1	3.5.x	DTM ProfiNet IO device	🗄 🚰 Output Image			1 Byte(s)
E X20IF10E3_1	I/O Mappi	ng	ROFINE	E- Channel 1			
Profinet (DTM)	Configura			[®] 🖗 Name	TODO		
<i>y</i> e	configura			Data type	BOOL		

The following settings must be made in order to avoid automatic data exchange:

- In the IF module configuration, "Manual start of bus communication" must be set to "On".
- "Start of bus communication" must be set to "Controlled by application".

With this setting, the communication can only be started via function block AsNxPnS - nxpnsStartBusComm().

- 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.

Information:

This value refers exclusively to the software watchdog and not to the PROFINET watchdog time set in the PROFINET IO controller.

- Process image storage format

This is used to define how data is stored in the process image (I/O mapping). The storage format is only applied to data type "Word". This change has no effect on other data types.

Storage format		Explana	ation						
Big-endian		MSB/LS	B = Higher/Low	er byte (Motoro	ola format)				
Little-endian		MSB/LS	B = Higher/Low	er byte (Intel fo	ormat)				
Storage	format - Littl	e-endian (d	efault setting)			Storage form	nat - Big-er	ndian	
Module002_Output_1	16#00		16#00	USINT	Output_1 Output_1	16#00		16#00	USINT
+ Module003_Input_2	16#3344		16#0000	UINT	+ Module003_Input_2	16#4433		16#0000	UINT
Module004_Output_2	16#0000		16#0000	UINT	Output_2 Output_2	16#0000		16#0000	UINT

— I/O state information

The IOPS interface can be configured here. If configured, the PROFINET input/output object provider state (IOPS) permits the PROFINET IO device application program to recognize whether the received data from the PROFINET device is valid or not and declares the output data as valid or invalid.

Setting	Explanation
Disabled	I/O state information disabled.
Bit	The IOPS is treated as a bit list in the DPM (Dual Port Memory) of the PROFINET IO device. For this purpose, 2 I/O data points (InIOPS and OutIOPS) are listed in the I/O assignment for the individual input and output data.
	Respective bit set to 1: Data is valid.
	Respective bit set to 0: Data is invalid.
Byte	The IOPS is treated as a byte array in the dual-ported memory (DPM) of the PROFINET IO device. For this purpose, 2 I/ O data points (InIOPS and OutIOPS) are listed in the I/O assignment for the individual input and output data of the slave.
	Respective byte set to 0x80: Data is valid.
	Respective bit set to not equal to 0x80: Data is invalid.

11.1.2.6 Description

General device information and the entire GSDML file can be read here.

12 GSDML device description file

The module description is made available to the master in an GSDML file. This text file contains the description of the slave's complete range of functions. The GSDML file can be downloaded from the B&R website (<u>www.br-automation.com</u>) in the Downloads section for the interface module and then imported into the respective master environment.

13 TIA portal

Software and hardware used for this example:

- X20IF10E3-1 B&R PROFINET IO device (slave) interface module
- GSDML file from the B&R website
- · CPU315-2 PN / DP Siemens CPU as PROFINET master
- TIA portal version 13 (trial version)

13.1 Creating a new project

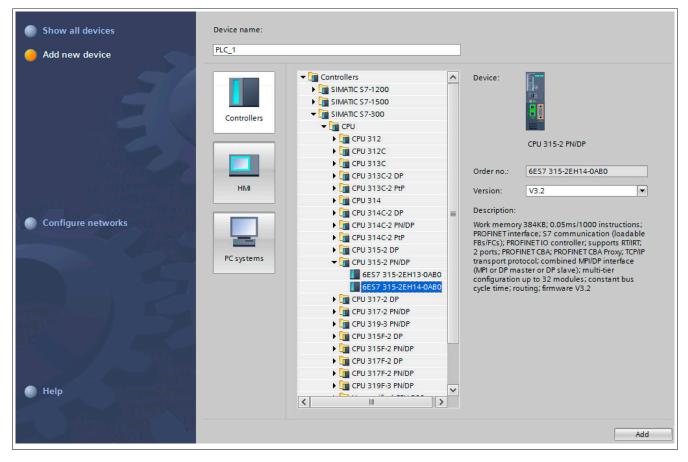
• After opening the TIA Portal development environment, a new project must first be created. To do this, select **Create new project** and specify the name and path of the new project. The new project is created with button **Create**.

	Create new project	
 Open existing project Create new project 		Project1 C:lUsers\BRIDocuments\Automatisierung BR
Migrate project Close project	Comment:	
		Create

• After the project is created, the necessary devices can be added and configured. The first step is to select **Configure a device**.

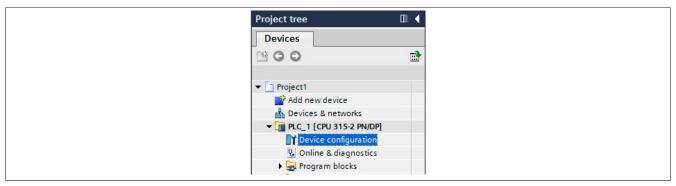


• The CPU used is selected using Add new device and added to the configuration with button Add.



13.2 Adding a PROFINET IO device (slave)

• To add a PROFINET IO device (slave), you must switch to the hardware view. To do this, select **Device configuration** by double-clicking in column **Project tree**.



• The hardware structure can be checked or updated via tab Network view.

🚪 Topology view	v 🚠 Net	work view
ons HMI connection 🔻 👯 🚉 🔍 🛨		Network overview
	^	Y Device
	=	✓ S7300/ET200M station_1
PLC_1 CPU 315-2 PN/DP		▶ PLC_1

• In order to use the interface module, its description file must first be installed. The description file can be down-loaded from the B&R website and installed via *Options* \rightarrow *Install general station description file (GSD)*.

Settings Support packages Install general station description file (GSD) Show reference text	Options Tools Window Help
Install general station description file (GSD)	Y Settings
	Support packages
Show reference text	Install general station description file (GSD)
	Show reference text

• The downloaded description file is selected in the dialog box and added to the project with button **Install**. This adds the bus controller to the Hardware Catalog of the TIA portal.

Co	ontent of imported path				
	File	Version 🔺	Language	Status	
	GSDML-V2.34-BuR-X20IF10E3_1-20180919.xml	V2.34	English, Ge	Already installed	
<		ш			>

• Now the installed interface module can be used in the project. The interface module is selected in the Hardware Catalog and then dragged and dropped into the project.

PROFINET_X20IF10E3_1 → Devices & networks		_ 7 =	K Hardware catalog	7 0	1 >	
6	Topology view	Network view	Options			
R Network Connections HMI connection		Network overview	Þ.			Harr
	^	W Device	🗸 🗸 Catalog	ata catalonia	tintintin	Iwai
			e3-1	init (Hardware catalog
PLC_1 X20IF10E3-1 CPU 315-2 PN/DP X20IF10E3-1_N		- conductor d	··· ₩ Filter Profile: All>			alog
GD Not assigned		▶ ×20IF10E3-1			Â	
			Construction Construction			U
			Drives & starters			online tools
			Im Network components			nlit
			Detecting & Monitoring			ne t
			🕨 🛅 Distributed I/O			00
			Power supply and distribution			8
	-		Field devices			
	•		🗢 🛅 Other field devices			Tasks 1
			Additional Ethernet devices			se
	<u> </u>				=	ks
			Drives			
			Encoders			Ц
			🕨 🧰 Gateway			Libraries
						rar
			🕨 🥅 B&R Industrie-Elektronik			es
			B+R Industrial Automation GmbH			
			✓ Im PNS			
			20IF10E3-1_NETX V1.0.0.0-V1.2	l.x.x		
			20IF1.0E3-1_NETX V1.3.x.x			
			20IF10E3-1_SAFE_NETX V1.3.x3	x		
			Network Components			
			🕨 🕅 Sensors			

• The installed CPU and the interface module are connected via PROFINET. For this purpose, the PROFINET interface of the CPU is connected to the PROFINET interface of the interface module via drag-and-drop.

Network Connections HMI connection Image: Connection in the image: Connectine in the image: Connectine in the image: Con	ID system: PLC_1.PROFINET IO-System (100) PLC_1 X20IF10E3-1 X20IF10E3-1_N		📲 Topology view	🛔 Network view 🛛 🕅	Device view
PLC_1 X20IF10E3-1 X20 CPU 315-2 PN/DP X20IF10E3-1_N X20	PLC_1 X20IF10E3-1 X20IF10E3-1 X20IF10E3-1_N Ref (105)	Network 🚼 Connections HMI conr	nection 💌 🕎 📆	🔲 🔍 ±	3
PLC_1 X20IF10E3-1 X20 CPU 315-2 PN/DP X20IF10E3-1_N X20	PLC_1 CPU 315-2 PN/DP		џ Ю systi	em: PLC_1.PROFINET IO-Syste	rm (100)
	PLC_1.PROFINET IO-Syste	CPU 315-2 PN/DP X20IF1	XZU (MI		=

• To establish communication between the PROFINET IO controller (master) and PROFINET IO device (slave), the PROFINET device name of the slave must be set. This must match the set PROFINET device name of the interface module in Automation Studio.

😤 C:\000\AS_Projects\AAA_Test_3586\AA	A_Test_3586.apj/Config1	- Automation Studio	io V 4.5.2.102 # AS Single Computer License	
File Edit View Open Project D	ebug Source Control C	Online Tools Win	indow Help	
i 🛅 😋 🍋 🔲 💭 👘 🗇 🏠 i 🗠 i	* X 🕸 🗟 🗟 🕾	, i 🗃 📇 🗟 🗟	● = + ! ↑ 注纵 @ あるの •	🥝 ₌
Physical View		+ ‡ ×	Ardware.hwl [System Designer] 👔 SS1.JF1 [Device Configuration] 🗙	
			IO Device: X20IF10E3-1_NETX V1.3.x.x	
Name	L Position Version 1.5.0.0	X20 CPU ATOM	Vendor: Bernecker + Rainer	
s€ Serial ETH PLK ↓USB ↓USB ↓X20 E€X20 E€X20[F10E3_1	IF1 IF2 IF3 IF4 IF5 IF6 SS1 1.3.8.0	Communication Ethernet POWERLINK Universal Serial Universal Serial B&R X2X Link X20 Interface PI	Modules Description: X20IF10E3_1 Address Table	General
	IF1 SS2 1.3.0.0 IF1 ST1 1.0 SS3	X20 Interface PI DTM generic Pr	Device Info IP address:	

To set the PROFINET IO device name in the TIA portal, select the PROFINET interface module (X20IF10E3-1) from the **Device overview** in the drop-down list.

By double-clicking on the image of the module, the setting options become visible below. The desired PROFINET IO device name must be set here.

If flag "Generate PROFINET device name automatically" is active, the default name stored in the PROFINET IO device is assigned automatically.

In addition, the PROFINET IO device must also be assigned an IP address. An IP address is assigned from the IP address range of the PROFINET IO controller by default. The IP address of the PROFINET IO controller corresponds to the management IP address of the CPU. For additional information, see "Establishing a connection to hardware" on page 20.

PROFINET_X20IF10E3_1 > Ungrouped devices > X20IF10E3-1	[X20IF10E3-1_NETX V1.3.x.x]			_ # = ×
		📲 Topology view	h Network view	Device view
🔐 🔀 🖽 🛄 🔍 ±			Device overview	
X20			Y Module ▼ X20IF10E3-1 ▶ PN-IO	Ra 0 0 ▲ 0 0 ■ 0 0 0 0 0 0 0 0 0 0 0 0 0
X20IF10E3-1 [X20IF10E3-1_NETX V1.3.x.x]	▶ 100% ▼	Properties	< III Diagr	nostics
Catalog information PROFINET interface [X1] Identification & Maintenance Hardware interrupts Diagnostics addresses Shared Device	Subnet mask: 255 . 255 . 255 Synchronize router settings with IO cont Use router			
PROFINET device name:	Generate PROFINET device name autom x20if10e3-1 x20if10e3-1 1	natically		

• Any additional modules can be added with the Hardware Catalog. To do this, drag and drop the modules into the **Device overview**.

.FINET_X20IF10E3_1 → Ungrouped devi	ices → X20IF10E3-1 [X	20IF10E3-1_NETX V1.3.x.x]	_∎∎×	Hardware catalog	- 11
	🚽 Topology view	🔒 Network view 🛛 🕅 D	evice view	Options	
* X20IF10E3-1 [X20IF10E3-1_N - 🛄 🕮		Device overview			
	<u> </u>	\Upsilon Module	Ra	✓ Catalog	
portosa		 X20IF10E3-1 	0 ^	e3-1	[ini] [ini
10E3		► PN-IO	0	Filter Profile: <all></all>	
COIF	=	1 Byte Input_1	0	▼ Inter Prome • m>	
+		1 Byte Output_1	0	×20IF10E3-1_NETX V1.3.xx	
		8 Bytes Input_1	0	▼ Module	
		8 Bytes Output_1	0	Imput Modules	
			0	1 Byte Input	
			0	1 byte input	
			0	1 Integer 16 Input	
			0	1 Integer64 Input	
	X20IF10E3-1		0		
			0	1 Real32 Input	
			0	1 Real64 Input	
			0	1 Unsigned16 Input	
			0	1 Unsigned32 Input	
			0	1 Unsigned64 Input	
			0	12 Bytes Input	
			0	16 Bytes Input	
			0	2 Bytes Input	
			0	1 20 Bytes Input	
			0	3 Bytes Input	
			0	III 32 Bytes Input	
			0	4 Bytes Input	
			0	64 Bytes Input	
			0	📗 8 Bytes Input	
			0	🗢 🛅 Output Modules	
				I Byte Output	
			0	🛄 1 Integer16 Output	
			0	🚺 1 Integer32 Output	
			0	📗 1 Integer64 Output	
			0	📗 1 Real32 Output	
				🚺 1 Real64 Output	
	~			🚺 1 Unsigned16 Output	
100%		<	>	📗 1 Unsigned32 Output	

• After modules are added, they can be easily configured by selecting them.

Example

"End address" of a module is read out via *Properties* \rightarrow *General* \rightarrow *I/O addresses* in order to be able to link it with a variable created in the application.

8 Bytes Output_1 [8 Bytes C	utput]		🖳 Properties	🚺 Info 🧯 🗓 Diagnostic	
General IO tags S	ystem constants Texts				
 ✓ General Catalog information 	VO addresses				
Hardware interrupts	Output addresses Start address: End address: Process image:	264			v

13.3 Creating an application

• An application can be added via *Project tree* \rightarrow *Program blocks*.

Project tree	
Devices	
📴 O O	B
▼ T Project1	7
Add new device	
Devices & networks	
▼ 🛅 PLC_1 [CPU 315-2 PN/DP]	
Device configuration	
🖳 Online & diagnostics	
🖛 🚘 Program blocks	
Add new block	

• If a new program is created using **Add new block**, the name of the block and the programming language are first set and confirmed with **OK**.

In this example, this is **SCL** (Structured Text), but any programming language can be used.

Organization block	Language: SCL Number: Manual Automatic
Function block	Description: Functions are code blocks or subroutines without dedicated memory.
Function	
Data block	More
Add new and ope	

- The block is divided into two parts.
 - Variables can be created in the upper part of the block.
 - The application is programmed in the lower part.

Example

A variable named "Test" of data type "BYTE" should be created and assigned value 10 using the application.

	ې لاې ⊜ دې ۵۹ 😢	.	₩ ५ ⊾ 🕨	() ()	
Name	Data type	Offset	Default value	Comment	
1 🕣 👻 Input					
2 📲 Test	Byte 🔳				
3 Add new>					
4 🕣 👻 Output					
E Contraction of the second					
12 🕣 💌 Return					
13 🕣 🔹 Block_1	Void				
<		III			>
IF CASE FOR WHILE. (**)					

• A **tag** can now be created in the application to link the variable to an output via an address. This is created with "%QB + Address" or "%IB + Address":

Example

Tag %QB256 is assigned to variable "#Test".

1 <u>#Test := 10;</u> 2 "Tag_1" := #Test;			100%	Ţ
Tag_1 [PLC tag]		Oroperties	Info 👔 🗓 Diagnostics	
		Name: Tag_1		
	A	ta type: Byte ddress: %QB256 nment:		• •
	History			

13.4 Establishing a connection to hardware

• To establish a connection from the TIA Portal to the CPU, the IP address and CPU subnet mask must be configured in the TIA portal. To do this, select the CPU in the **Device view**. Clicking on the Ethernet interfaces with the mouse opens the corresponding window in menu "Properties". The IP address and subnet mask can be entered here.

Information:

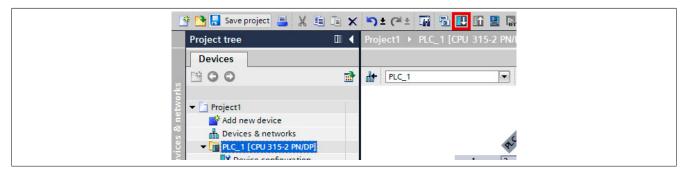
The management IP address of the CPU corresponds to the PROFINET IO controller IP address. See "Adding a PROFINET IO device (slave)" on page 13.

PROFIBUS_CPU315-2_PN-DP	▶ PLC_1 [CP	'U 315-2 Pr	VUPJ									_ =	
							^P Topolo	ogy view	📥 Netwo	ork view	De 1	vice vie	w
PLC_1 [CPU 315-2 PN/DP]			🗉 🔍 ±				De	vice over	rview				
						^		Modu	ule		Rack	Slot	1
ec)											0	1	1
								▼ P	'LC_1		0	2	
1 2 🕶 4	5 6	5 7	8	9	10	11			MPI/DP interf	ace_1	0	2 ×1	2.
Rail_0							Real	•	PROFINET int	erface_1	0	2 ×2	2.
											0	3	
											0	4	
							-				0	5	
											0	6	
											0	7	
Lines.						_	-				0	8	
											0	9	
72											0	10	
											0	11	
						~							
< III	> 100	1%			<u></u>	1	<	1					[
ROFINET interface_1 [PN-I0	51												
	2						Q Pro	operties	*i Info	P. Diag	nostics		
General IO tags 5	System consta	ants T	exts				Rec Pro	operties	1 Info	🛿 Diag	nostics		
General IO tags 5 General Ethernet addresses Time synchronization Advanced options	System consta	ants T t addresse ace networ	s ked with				Rec Pro	operties	1 Info	Diag	nostics		
General IO tags S General Ethernet addresses S Time synchronization S S	System consta	t addresse	s	t: PN/IE	The second s			operties	1 Info	U Diag	nostics		
General IO tags S General Ethernet addresses S Time synchronization Advanced options	System consta	t addresse	s ked with	t: PN/IE	_1 Add n			operties	1 Info	Diag	nostics		
General IO tags S General Ethernet addresses S Time synchronization Advanced options	System consta	t addresse ace networ	s ked with	:t: PN/IE	The second s			operties	1 Info	2 Diag	nostics		
General IO tags S General Ethernet addresses S Time synchronization Advanced options	Etherner	t addresse ace networ	s ked with Subne		Add n	iew st	ibnet	perties	1 Info	R Diag	nostics		
General IO tags S General Ethernet addresses S Time synchronization Advanced options	Etherner	t addresse ace networ tocol	s ked with Subne	5: 192	Add n	iew st	ibnet	perties	1 Info	R Diag	nostics		_
General IO tags S General Ethernet addresses S Time synchronization Advanced options	Etherner	t addresse ace networ tocol	s ked with Subne	s: 192 k: 255	Add n . 168 . 255	. 0 . 255	ibnet	pperties	1 Info	R Diag	nostics		_
General IO tags S General Ethernet addresses S Time synchronization Advanced options	Etherner	t addresse ace networ tocol	s ked with Subne	s: 192 k: 255	Add n	. 0 . 255	ibnet	perties	1 Info	R Diag	nostics		_
General IO tags S General Ethernet addresses Time synchronization Advanced options	Etherner	t addresse ace networ tocol	s ked with Subne	s: 192 k: 255	Add n . 168 . 255	. 0 . 255	ibnet	perties	1 Info	L Diag	nostics		
General IO tags S General Ethernet addresses S Time synchronization Advanced options	Etherner	t addresse ace networ tocol	s ked with Subne IP addres Subnet mas	s: 192 k: 255	Add n . 168 . 255 se route	. 0 . 255	. 1 . 0	perties	1 Info	L Diag	nostics		
General IO tags S General Ethernet addresses Time synchronization Advanced options	Etherner Interfa	t addresse ace networ tocol	s ked with Subne IP addres Subnet mas	s: 192 k: 255 U: s: 0	Add n . 168 . 255 se route . 0	. 0 . 255 er	. 1 . 0		automatically	E Diag	nostics		
General IO tags S General Ethernet addresses S Time synchronization Advanced options	Etherner Interfa	t addresse ace networ tocol Ro NET	s ked with Subne IP addres Subnet mas	s: 192 k: 255 Us s: 0	Add n . 168 . 255 se route . 0	. 0 . 255 er	. 1 . 0			V. Diag	nostics		_
General IO tags S General Ethernet addresses S Time synchronization Advanced options	Etherner Interfa	t addresse ace networ tocol Ro NET	s ked with Subne IP addres Subnet mas	s: 192 k: 255 U: s: 0	Add n . 168 . 255 se route . 0	. 0 . 255 er	. 1 . 0			V. Diag			_
General IO tags S General Ethernet addresses S Time synchronization Advanced options	Etherner Interfa	t addresse ace networ tocol Ro NET PROFINET (Com	s ked with Subne IP addres Subnet mas uter addres	s: 192 k: 255 U: s: 0 e: plc_1 e: plc_t	Add n . 168 . 255 se route . 0	. 0 . 255 er	. 1 . 0			V. Diag]

• Now the project can be compiled. To do this, select CPU "PLC_1[CPU 315-2 PN/DP" in the **Project tree** view and button **Compile** in the toolbar.

📑 🎦 🔒 Save project 🚊 🐰 🧃	<u>ت</u> ×	🍽 ± (4 ± 🖬 🖥 🖳 🗈 🖳
Project tree		Project1 > PLC_1 [CPU 315-2 PN/I
Devices	e	
	a	H PLC_1
orks		
₹ Project1		
🗧 📑 Add new device		
Devices & networks		A
PLC_1 [CPU 315-2 PN/DP]		*
Douico configuration		1 2

• After the project has been successfully compiled, it can be loaded onto the device. To do this, select button **Download to device** in the toolbar.



• A query dialog box opens in which the interface configuration is set.

With button **Start search**, the network is scanned for devices. If no devices are found, this indicates that an incorrect IP address was set in the CPU.

	Device	Device type	Slot	Interface type	Address	Subnet
	PLC_1	CPU 315-2 PN/DP	2 ×2	PN/IE	192.168.0.1	PN/IE_1
-		CPU 315-2 PN/DP	2 X1	PROFIBUS	1	PROFIBUS_1
		Type of the PG/PC in	tarfaca	PN/IE		
			terface:			
					000 GT Desktop Ad	1
		Connection to interface/		Direct at slot '2	×2'	• •
		1 st g	ateway:			
	Select target	device:			Show all compatib	le devices
	Device	Device type	Inter	face type Ad	dress	Target device
	<u></u> -	<u> </u>	PN/II	E Ac	cess address	_
	-					
Flash LED						
						Start searc
					<u> </u>	
Online status informati	on:				Display only error	or messages

• If the search is successful, the devices found are listed under **Compatible devices in target subnet**. After selecting the CPU, the data can be loaded to the CPU with button **Load**.

	Device	Device type	Interface type	Address	Target device
	CPU 315-2 PN/DP	CPU 315-2 PN/DP	PN/IE	192.168.0.1	CPU 315-2 PN/DP
81	-	_	PN/IE	Access address	-
Flash LED					
Online status inform	ation:			🗌 Display only en	<u>S</u> tart search or messages
	blished to the device with				1
🚹 Scan completed	. 1 compatible devices of 2	accessible devices fou	nd.		
🗹 Scan and inform	ation retrieval completed.				
"? Retrieving device	e information				8

• Before loading, a notification window opens and lists a preview of all loading processes. This can be used to check whether the correct data is being transferred. The data is transferred after pressing **Load**.

Status	1	Target	Message	Action
+0	0	▼ PLC_1	Ready for loading.	
	0	Stop modules	The modules are stopped for downloading to device.	Stop all
	0	Device configurati	Delete and replace system data in target	Download to device
	•	 Software 	Download software to device	Consistent download
<			10	>

• The result of the loading process is listed and must be confirmed with Finish.

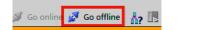
Status	1	Target	Message	Action	
4	<u> </u>	▼ PLC_1	Downloading to device completed without error.		
	▲	Start modules	Start modules after downloading to device.	Start all	
<					>

• Select button **Go online** to establish a connection to the CPU. The connection is established and, if configured correctly, the slave is set to state "Run".

In state "Run", no changes can be made to the configuration or application.

Go online 🧭

• With button **Go offline**, the connection to the CPU can be disconnected.



• The application can be started or stopped in the toolbar via buttons Start CPU and Stop CPU.

