



Quickstart Guide PN/PN Coupler

Order number: 700-158-3PN02

For firmware V2.0 and above

Version
7 en

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1 Safety instructions

Target audience



CAUTION

This description is only intended for trained personnel qualified in control and automation engineering who are familiar with the applicable national standards. For installation, commissioning, and operation of the components, compliance with the instructions and explanations in this operating manual is essential. The specialist personnel are to ensure that the application or the use of the products described fulfills all safety requirements, including all applicable laws, regulations, provisions, and standards.

Intended use



WARNING

The device has a protection rating of IP 20 (open type) and must be installed in an electrical operating room or a control box/cabinet in order to protect it against environmental influences. To prevent unauthorized operation, the doors of control boxes/cabinets must be closed and possibly locked during operation. The consequences of improper use may include personal injury to the user or third parties, as well as property damage to the control system, the product, or the environment. Use the device only as intended!

Operation



ATTENTION

Successful and safe operation of the device requires proper transport, storage, setup, assembly, installation, commissioning, operation, and maintenance. Operate the device only in flawless condition. The permissible operating conditions and performance limits (technical data) must be adhered to. Retrofits, changes, or modifications to the device are strictly forbidden.

Security



ATTENTION

The device is a network infrastructure component and therefore an important element in the security consideration of a plant. When using the device, therefore, observe the relevant recommendations to prevent unauthorized access to installations and systems.

2 Introduction



NOTE

This document explains the initial commissioning of the PN/PN Coupler. The latest version of the document and a detailed manual can be found at www.helmholz.de or scan the QR code directly.



3 Function of the PN/PN Coupler

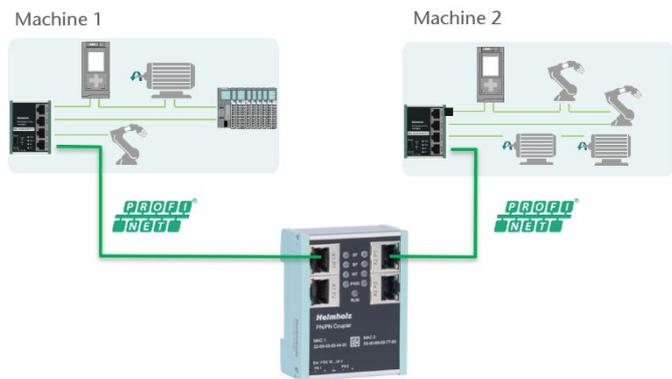
With the PN/PN Coupler, a simple and uncomplicated connection of two separate PROFINET networks is possible. The PN/PN Coupler enables data transmission between two PROFINET controllers. A PROFINET IO device is on both PROFINET network sides.

Received input data on one of the network sides is made available as output data to the other network side. The IO data transfer takes place live and as quickly as possible without additional handling blocks.

The maximum size of the transmitted I/O data is 1,024 bytes. Up to 16 slots for IO modules of 1 byte and up to 128 bytes are available.

With the "data record transfer" function, even large amounts of data with up to 4096 bytes can be exchanged between the machines using the FIFO principle (cross-network). The data record transfer uses standard PLC handling blocks.

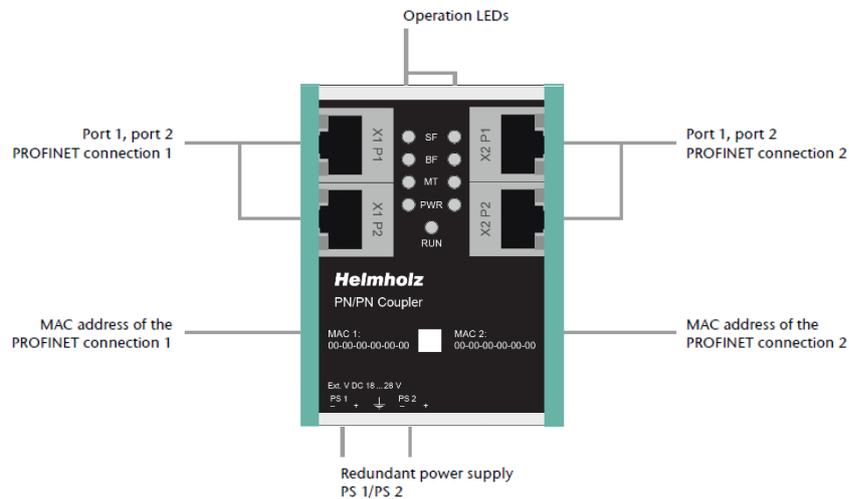
The integration into the PLC engineering tool is enabled by a GSDML file, an additional extra configuration software is not necessary. The configuration of the I/O data to be exchanged is done in the Siemens engineering tool.



4 Connection

4.1 Power supply

The PN/PN coupler must be supplied with DC 24 V at the wide-range input DC 18 ... 28 V via the supplied connector plug. The power supply is redundant, at least one supply path PS 1 or PS 2 must be connected.



The housing of the PN/PN Coupler is not grounded. Please connect the functional earth terminal of the PN/PN Coupler properly to the reference potential.



The device is intended to be supplied by an isolated Limited Energy Source according to UL61010-1 (3rd ed cl. 9.4) or according to UL60950-1/UL62368-1 or Class 2 according to NEC. Please use Cu power supply wires, AWG 28-12. Maximum length of removed insulation is 10 mm. Temperature cable rating is 87 °C.

4.2 Network

The RJ45 sockets “X1 P1” and “X1 P2” are for the connection of the left PROFINET network, the RJ45 sockets “X2 P1” and “X2 P2” are for the connection of the right PROFINET network. The ports X1 P1 and X1 P2, as well as X2 P1 and X2 P2 are each internally connected to a switch.

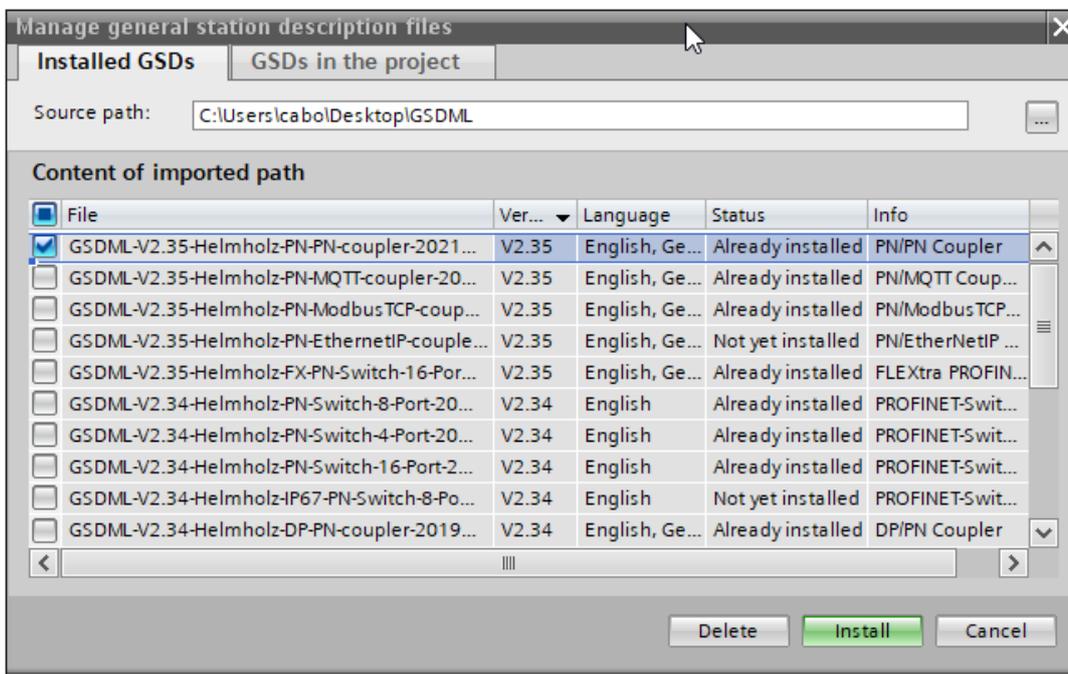


The ETHERNET connections are only intended for connection to computer networks (LANs) and must not be connected to telephone networks or telecommunication lines. The unit is to be connected only to internal Ethernet networks without exiting a facility and being subjected to TNVs.

The interfaces X1 and X2 are logically separate networks and not physically connected. Thus a clear separation between both machine networks is possible. A network penetration with other functions by the PN/PN coupler is not possible. The configured values are exchanged in the PN/PN Coupler only as IO data between both network sides.

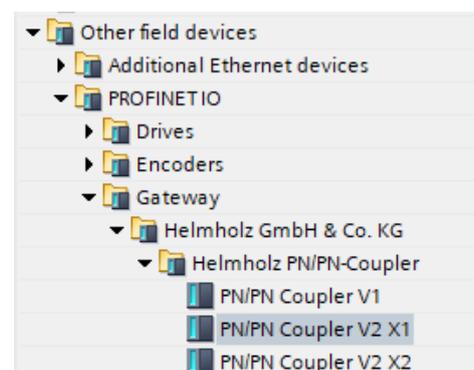
5 Install GSDML file

Please download the GSDML file ("GSDML-V2.35-Helmholz-PN-PN-coupler-____.xml") at www.helmholz.de or scan the QR code. Install the GSDML file in the "Tools" / "Manage device description file (GSD)" menu in the TIA Portal.



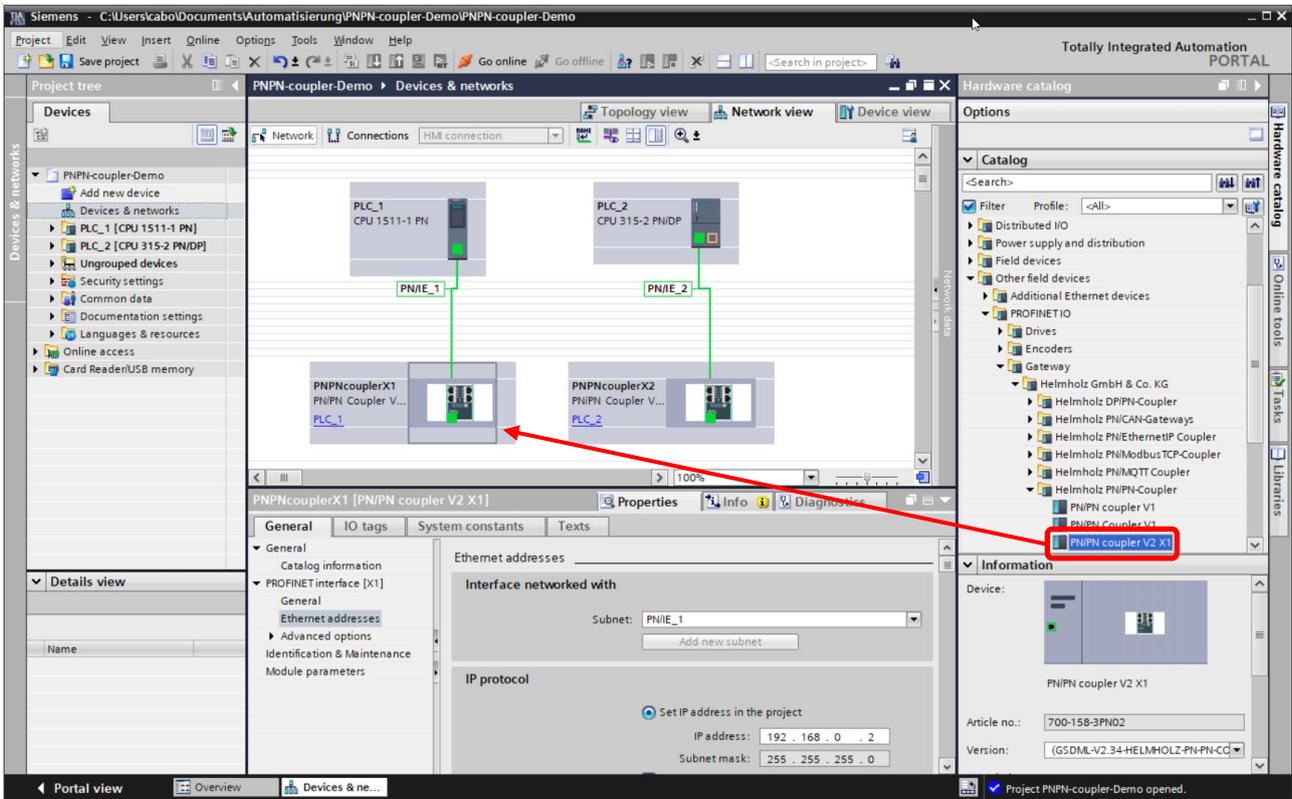
The PN/PN Coupler can be found in the hardware catalog at "Other field devices / PROFINET IO / Gateway / Helmholz GmbH & Co. KG".

For the latest hardware of the PN/PN Coupler (700-158-3PN02) use the devices entries “PN/PN Coupler V2 X1/X2”

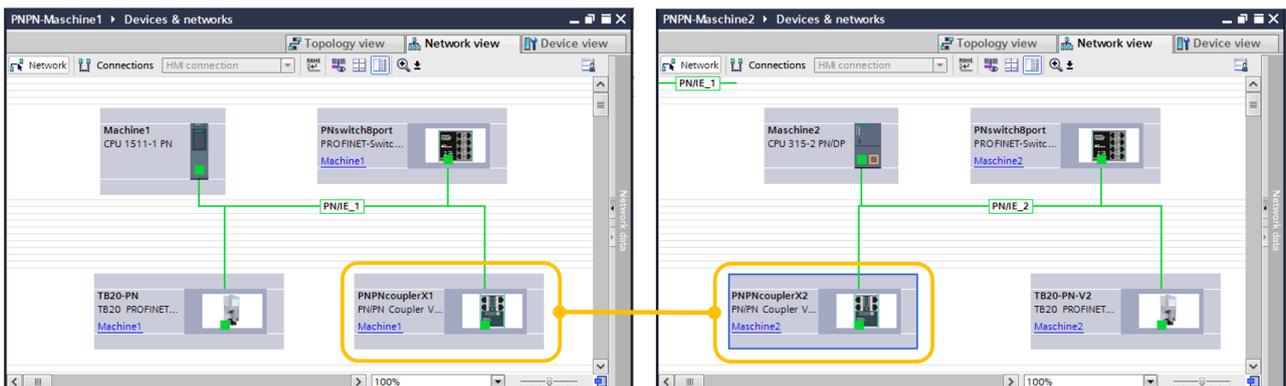


6 Configuration in TIA Portal

Select either “PN/PN Coupler V2 X1” for the left network side or “PN/PN Coupler V2 X2” for the right network side from the device list. Provide the PN/PN Coupler with a PROFINET name under “General” and check the Ethernet address for the device. Connect the PROFINET network of the PROFINET controller with the PN/PN Coupler.



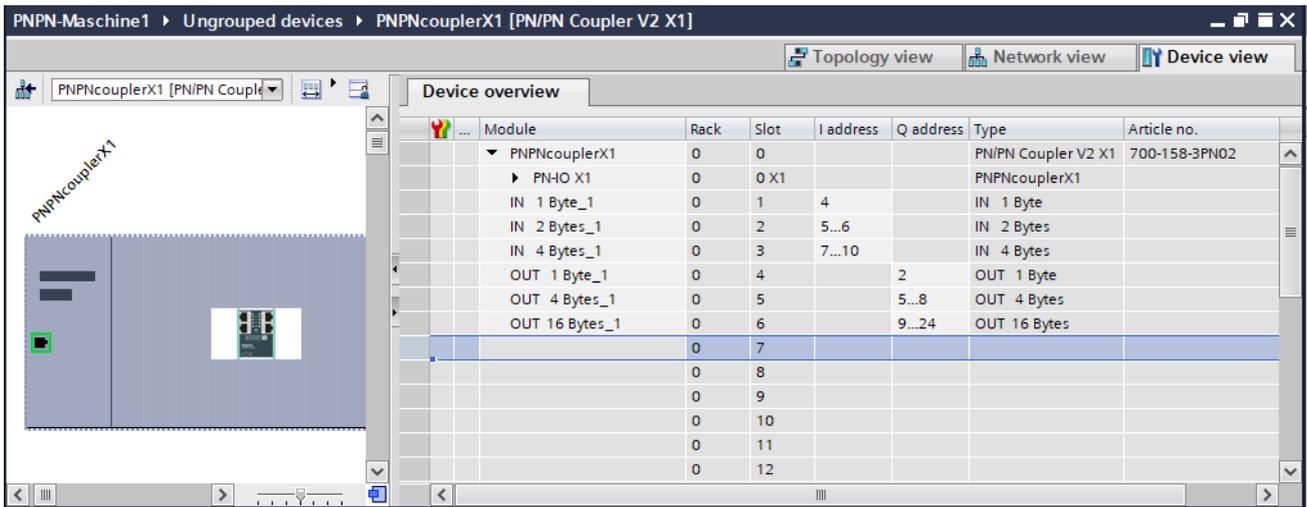
The two PLCs can be in the same project as shown above or in different projects.



The IP addresses of the PN/PN Coupler must be different on both network sides (X1, X2), but may be located in the same subnet.

6.1 IO Configuration

Now insert the desired IO modules into the plug points. IO modules for 1, 2, 4, 8, 16, 32, 64, and 128 bytes are available for input and output. Combined IN/OUT modules are also available.

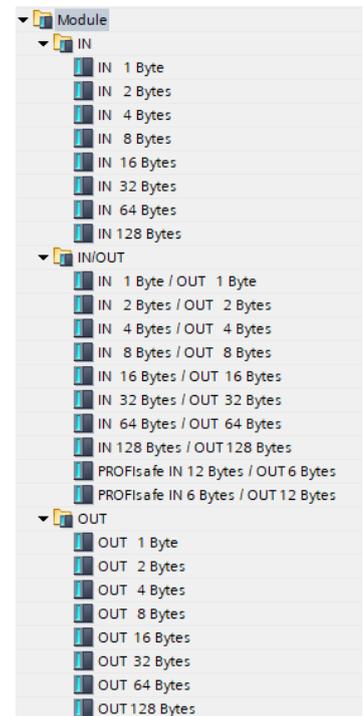


ATTENTION

The sequence and the sizes of the modules must always be selected consistently with the modules on the opposite PROFINET side.

Example: A 2-byte Input module in slot 2 of the left PROFINET side (X1) requires a 2-byte output module in slot 2 of the right PROFINET side (X2)!

Slot	PROFINET X1	PROFINET X2
1	1 Bytes Input	1 Bytes Output
2	2 Bytes Input	2 Bytes Output
3	4 Bytes Input	4 Bytes Output
4	1 Bytes Output	1 Bytes Input
5	4 Bytes Output	4 Bytes Input
6	16 Bytes Output	16 Bytes Input
...

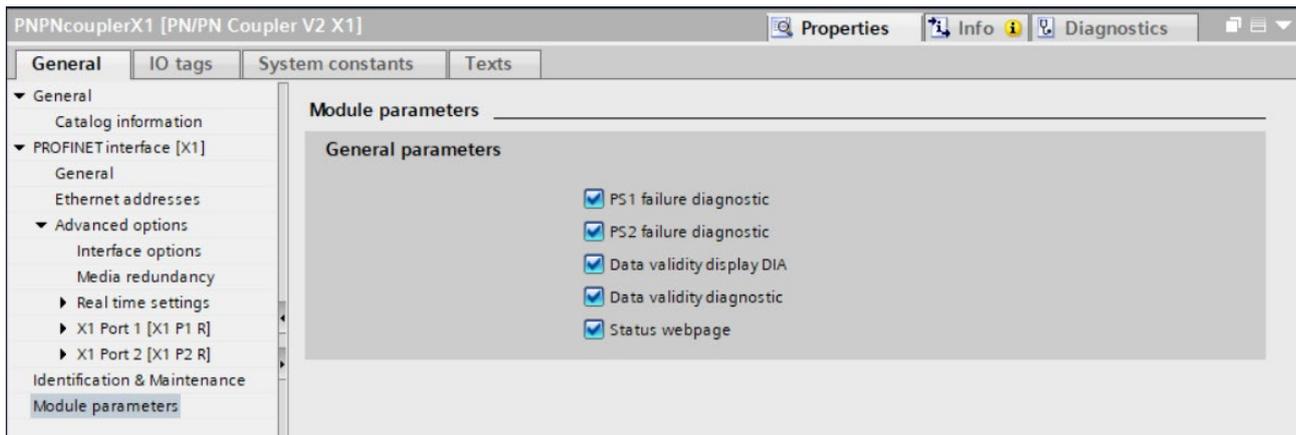


NOTE

For transferring PROFISAFE messages between two failsafe CPUs the “PROFIsafe IN/OUT” modules can be used.

6.2 Parameterization of the PN/PN coupler

The parameters of the PN/PN Coupler can be set in “Properties/Module parameters”.



Data validity display DIA: The validity of the data is displayed in the bit with the lowest value (Bit 0) of the first input byte of the corresponding PROFINET side:

0 = data could not be transmitted.

1 = data is all valid

Data validity diagnostic: Sending of a diagnostic message to the PLC when the data is not valid.

Status webpage: Display of webpage on the network interface.



NOTE

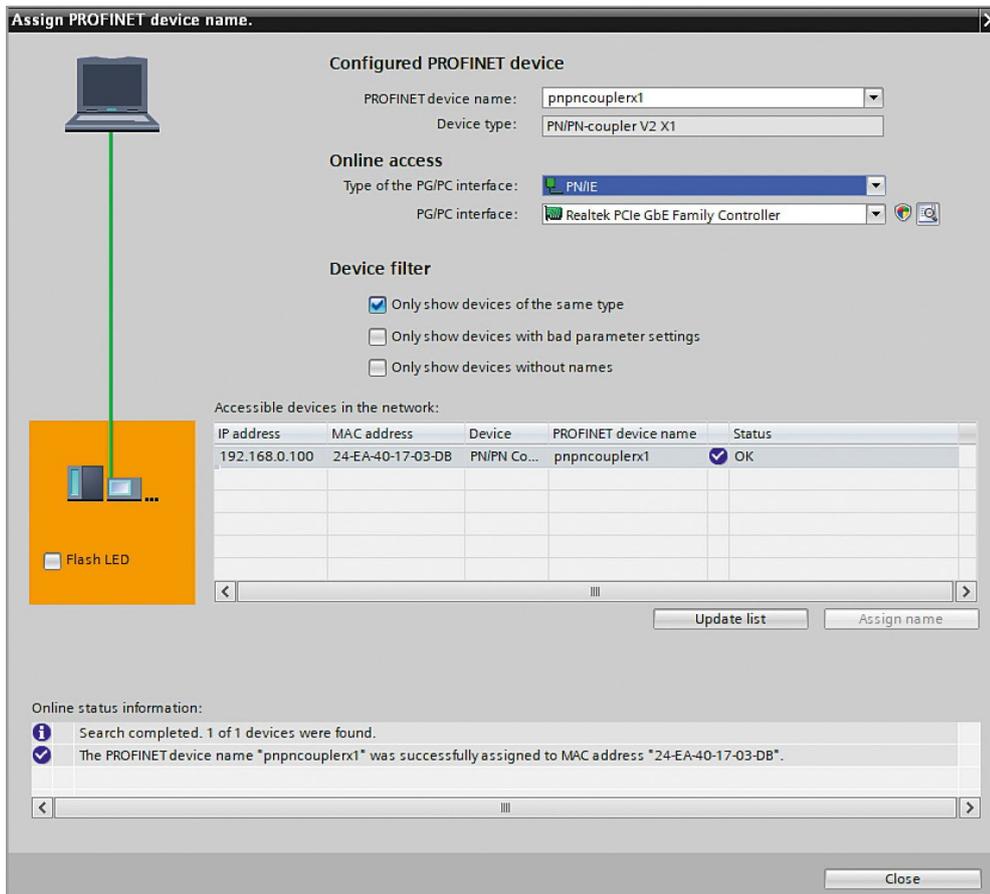
The parameters can be set separate on both network sides.

6.3 Assign a name to the PN/PN coupler

When the configuration of the PN/PN coupler is completed in the hardware configurator of the engineering tool, it can be loaded into the PLC.

To enable the PN/PN Coupler to be found by the PROFINET controller, the PROFINET device name must be assigned to the PN/PN Coupler. To do this, use the "Assign device name" function, which you can access with the right mouse button or in the Online menu if the PN/PN Coupler is selected.

Use the "Update list" button to search the network for PROFINET stations. With "Assign name" the PROFINET device name can be assigned to the device.



If the PN/PN coupler has received the correct PROFINET name, it is recognized and configured by the PLC. If the configuration is correct, the PROFINET "BF" LED should be off.

To set the PROFINET name, the Helmholtz IPSet Tool can also be used, which can be downloaded free of charge from the Helmholtz website.

Scan the following QR code to download the IPSet Tool:



7 Web interface of the PN/PN Coupler

As soon as the PN/PN Coupler has been configured by the PROFINET PLC, the web interface of the device is accessible if it is activated in the PROFINET configuration.

PN/PN COUPLER



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Overview
Module Configuration
Firmware Update
System ▾

Overview

PN Configuration X1 (left)

Device Name	pnpncouplerx1
Operating Mode	Connected
LEDs	SF: ● BF: ● MT: ● PWR: ●
MAC Address	24:EA:40:17:02:85
IP Address	172.17.0.92
Port 1 Status	Link up, 100 MB/FD
Port 2 Status	Link down, -/-

PN Configuration X2 (right)

Device Name	pnpncouplerx2
Operating Mode	Connected
LEDs	SF: ● BF: ● MT: ● PWR: ●
MAC Address	24:EA:40:17:02:88
IP Address	172.17.0.93
Port 1 Status	Link up, 100 MB/FD
Port 2 Status	Link down, -/-

Software

Firmware version	V2.10.000
Linux kernel version	4.9.4
License terms	pn-pn-coupler-licenses.zip

Hardware

Serial Number	50023888
Order Number	700-158-3PN02
Hardware Revision	2-1



If the web page of the device is not available, please check the "Web page" parameter in the PROFINET configuration. (See chap. 6.2).

The menu “Module Configuration” shows an overview of the IO-configuration of all slots with a short view of the actual data.



Calling up the website can influence the transmission speed of the device.

Module Configuration		
	PN Configuration X1 (left)	PN Configuration X2 (right)
Slot#: 1	OUT 1 Byte (0x00)	IN 1 Byte (0x01)
Slot#: 2	IN 1 Byte (0x01)	OUT 1 Byte (0x00)
Slot#: 3	OUT 2 Bytes (0xE1 15)	IN 2 Bytes (0xE1 15)
Slot#: 4	IN 2 Bytes (0xE1 15)	OUT 2 Bytes (0xE1 15)
Slot#: 5	OUT 4 Bytes (0xE1 15 E1 15)	IN 4 Bytes (0xE1 15 E1 15)
Slot#: 6	IN 4 Bytes (0xE1 15 E1 15)	OUT 4 Bytes (0xE1 15 E1 15)
Slot#: 7	OUT 8 Bytes (0xE1 15 E1 15 ...)	IN 8 Bytes (0xE1 15 E1 15 ...)

For firmware update please download the current firmware under the following link or scan the QR code: <http://www.helmholz.de/goto/700-158-3PN02#tab-software>



The firmware file can be recognized by the file extension "HUF" (Helmholz Update File) and is encrypted to protect it from modification.

PN/PN
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Overview Module Configuration **Firmware Update** System ▾

Firmware update

Currently installed firmware version is V2.10.000.
The latest firmware update file can be found on [here](#).

**ATTENTION! Please note that the Device will be unavailable during update procedure.
Communication with other devices will be interrupted or stopped.**



8 Technical data

Order no.	700-158-3PN02
Article designation	PN/PN Coupler (V2)
PROFINET interfaces (X1 & X2)	
Connection	2x RJ45, integrated switch
Protocol	PROFINET IO Device as defined in IEC 61158-6-10
Transmission rate	100 Mbit/s full duplex
I/O image size	Up to 1024 Byte of input and output data
Number of configurable slots	16
Features	PROFINET Conformance Class B, media redundancy (MRP-Client), automatic addressing, Topology detection (LLDP, DCP), diagnosis alarms
Status indicator	9 LEDs function status, 8 LEDs Ethernet-status
Voltage supply	DC 24 V (18 - 28 V DC)
Current draw	max. 210mA
Power dissipation	max. 5 W
Dimensions (D x W x H)	32,5 x 58,5 x 76 mm
Weight	approx. 135 g
Certifications	PROFINET Conformance Class B
Protection rating	IP 20 (<i>not evaluated by UL</i>)
Relative humidity	95% non-condensing
Mounting position	any
Ambient temperature	0° C to 60° C
Transport and storage temperature	-20° C to 80° C
UL	UL 61010-1 / UL 61010-2-201
Power supply	DC 24 V (18 ... 28 VDC, SELV and limited energy circuit)
Pollution degree	2
Altitude	Up to 2000m
Temperature cable rating	87 °C

9 LED status information

	X1 PROFINET (left side)	X2 PROFINET (right side)
SF (red)		
Off	Configuration correct	Configuration correct
On	PROFINET diagnostic alarm pending in network X1	PROFINET diagnostic alarm pending in network X2
Flashing	PROFINET function "LED flashing" for finding the device is executed in network X1	PROFINET function "LED flashing" for finding the device is executed in network X2
BF (red)		
Off	Connection to PROFINET controller in network X1 is established	Connection to PROFINET controller in network X2 is established
On	The device has no configuration, the PROFINET device name is incorrect, or there is no connection with the PROFINET controller in network X1	The device has no configuration, the PROFINET device name is incorrect, or there is no connection with the PROFINET controller in network X2
Flashing	PROFINET function "LED flashing" for finding the device is executed in network X1	PROFINET function "LED flashing" for finding the device is executed in network X2
MT (yellow)		
Flashing	A firmware update is being carried out	A firmware update is being carried out
Flashing with SF and BF	PROFINET function "LED flashing" for finding the device is executed in network X1	PROFINET function "LED flashing" for finding the device is executed in network X2
PWR (green)		
On	PS1 Power supply present	PS2 Power supply present
RUN (green)		
Off	Firmware or device defective. Please contact Support	
On	The device is ready to operate	
RJ45 LEDs	X1 P1/P2 und X2 P1/P2	
Green (Link)	Connected	
Orange (Act)	Data transfer at the port active	



NOTE

The contents of this Quick Start Guide have been checked by us so as to ensure that they match the hardware and software described. However, we assume no liability for any existing differences, as these cannot be fully ruled out. The information in this Quick Start Guide is, however, updated on a regular basis. When using your purchased products, please make sure to use the latest version of this Quick Start Guide, which can be viewed and downloaded on the Internet from www.helmholz.de.

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