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Quickstart Guide
DP/PN Coupler

Order number: 700-158-3DP02

For firmware V2.0 and above

Version
9 en

Content

1 Safety instructions

Target audience

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

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

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

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

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 DP/PN Coupler

With the DP/PN Coupler a simple and uncomplicated connection of PROFIBUS to PROFINET networks is possible. The DP/PN Coupler allows data transfer between the PROFIBUS master and the PROFINET controller, it is designed as a slave (device) both on PROFIBUS and PROFINET side.

Received input data on one of the network sides are made available as output data on the other network side. The EA data exchange takes place live and as fast as possible without further handling blocks.

The maximum size of the transmitted data is 244 bytes of input data and 244 bytes of output data (maximum data size on PROFIBUS-DP). Up to 16 slots are available for I/O modules from 1 byte up to 64 words.

The integration into the PLC engineering tool is enabled by a GSD or GSDML file, a special configuration software is not necessary. The configuration of the I/O data to be exchanged is done in the engineering tool.
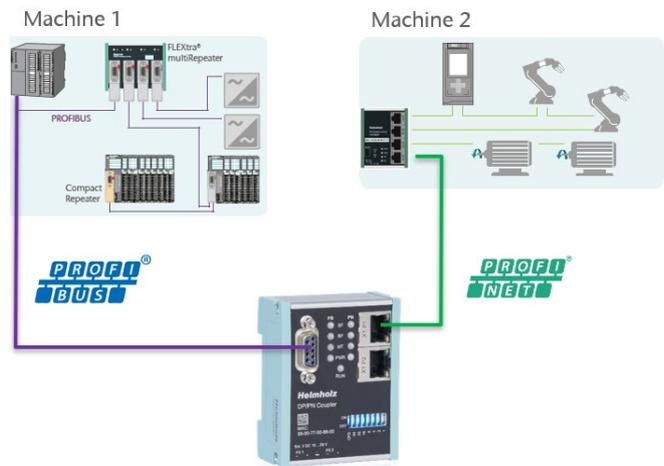
4 Connection

4.1 Power supply

The DP/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.

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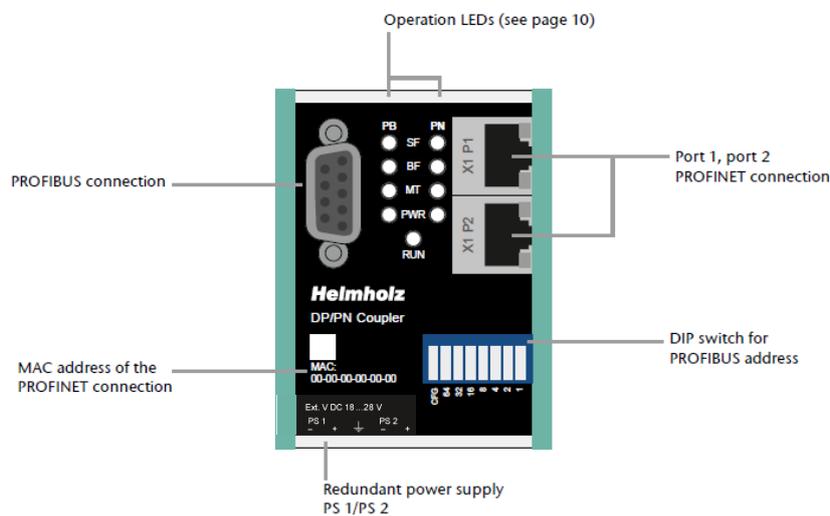
The housing of the PN/PN Coupler is not grounded. Please connect the functional earth terminal ⏚ of the PN/PN Coupler properly to the reference potential.

⚠ **WARNING**

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 Sub-D socket on the left side is for connecting the PROFIBUS network.

⚠️ **WARNING**
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 interface X1 (PROFINET) and PROFIBUS 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 DP/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 GSD- and GSDML file

Please download the GSD and GSDML file from www.helmholz.de or scan the QR code.

For the PROFIBUS side the GSD file ("HELM1130.gsd") is required, for the PROFINET side the GSDML file ("GSDML-V2.35-Helmholz-DP-PN-coupler-_____.xml").

Install the two files into the engineering tool so that both are available for configuration.
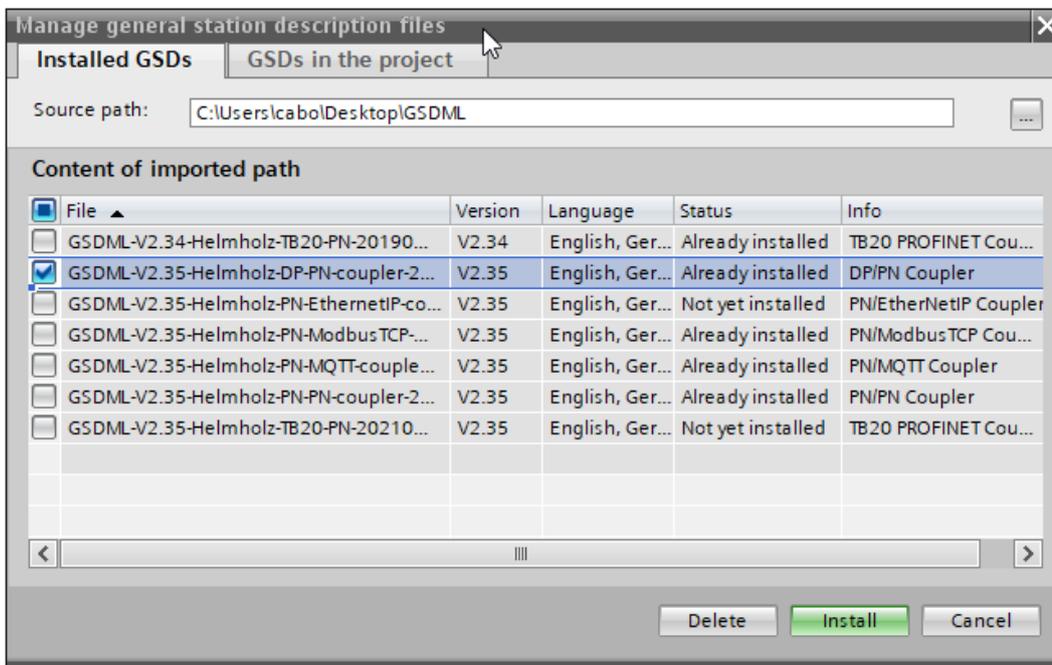
The DP/PN Coupler can be found in the hardware catalog at "Other field devices / PROFINET IO / Gateway / Helmholz GmbH & Co. KG".

For the latest hardware of the DP/PN Coupler (700-158-3DP02) use the devices entry "DP/PN Coupler V2"
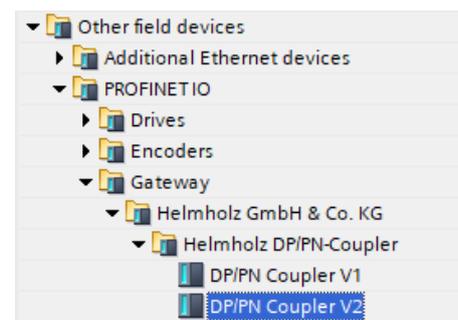
You install the GSD file accordingly in the same dialog:
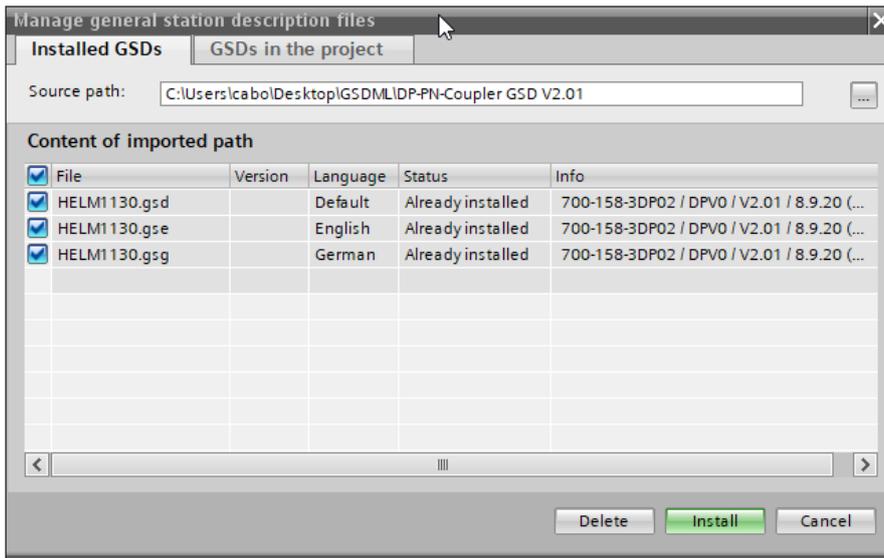
The entry for the PROFIBUS side of the DP/PN coupler may be found in the hardware catalog under "Other field devices / PROFIBUS DP / Gateways / HELMHOLZ".

For the latest hardware of the DP/PN couplers (700-158-3DP02) use the device entriy "DP/PN Coupler V2 ".
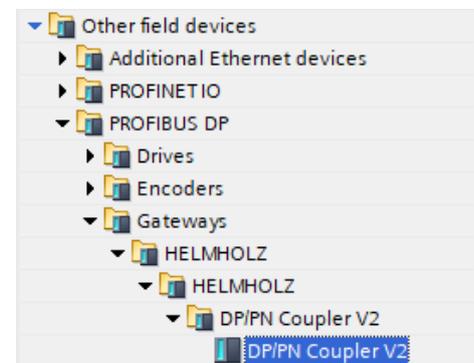

6   Project planning of the PROFIBUS side

6.1   Setting the PROFIBUS address

The PROFIBUS address of the DP/PN coupler can be set at the DIP switch of the device (see picture). The DIP switch is operated as a toggle switch. If the switch is pressed in at the top, the respective position or bit is ON. If the switch is pressed in at the bottom, the respective position or bit is OFF.

Setting the CFG key to ON causes the PROFIBUS address to be obtained from the project or the software. Set the CFG key to OFF (see figure) if the PROFIBUS address is to be specified by the DIP switch.
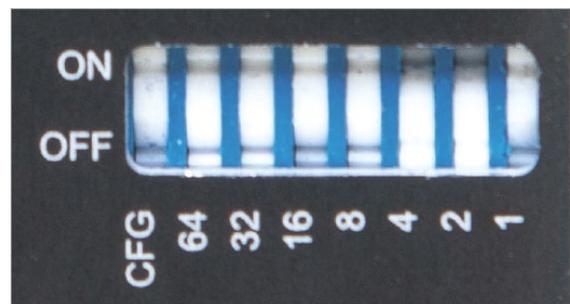
ℹ️ NOTE   *A changed PROFIBUS setting is only accepted after a restart of the device.*

6.2 Configuration of the PROFIBUS side

Insert the DP/PN coupler from the hardware catalog into the project. The entry for the PROFIBUS side of the DP/PN coupler may be found in the hardware catalog at "Additional field devices / PROFIBUS DP / Network interfaces / HELMHOLZ".
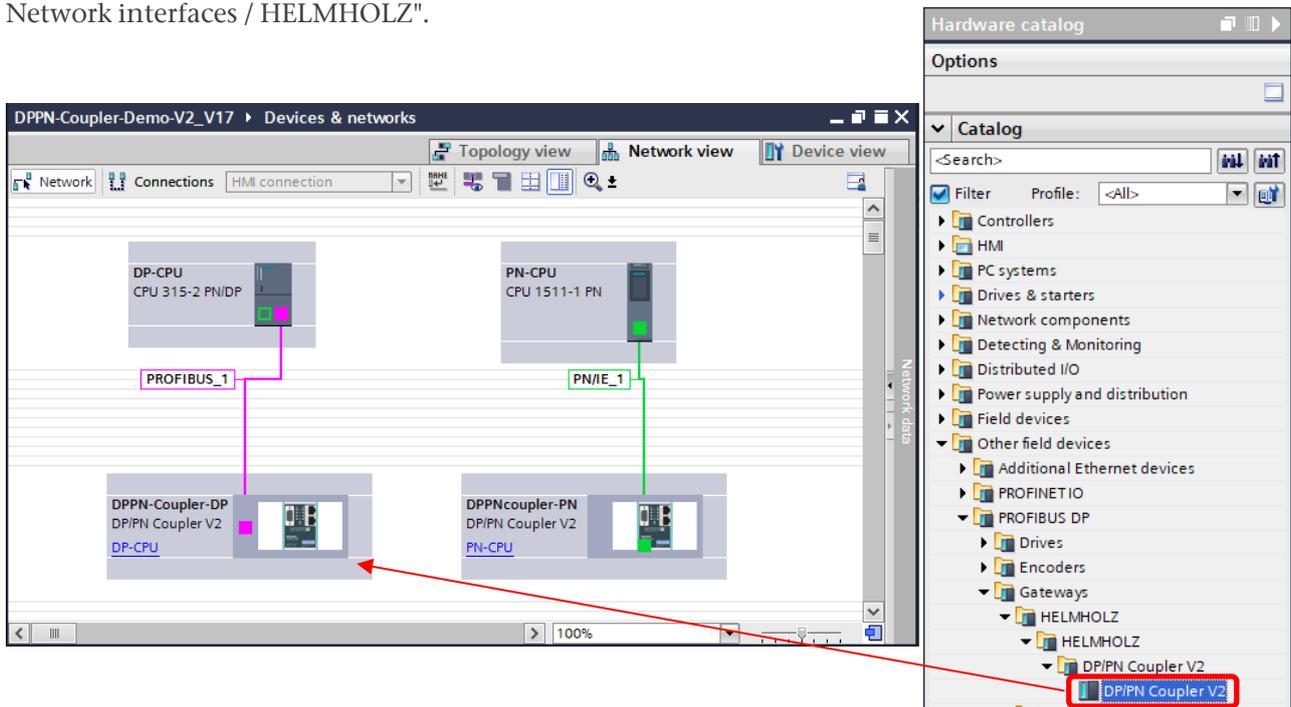
Connect the PROFIBUS network of the PROFIBUS CPU with the DP/PN Coupler. Now insert the desired IO modules into the slots. IO modules for 1, 2, 4, 8, 16, 32, 64 bytes and 64 words for input, for output and for input/output together are available.
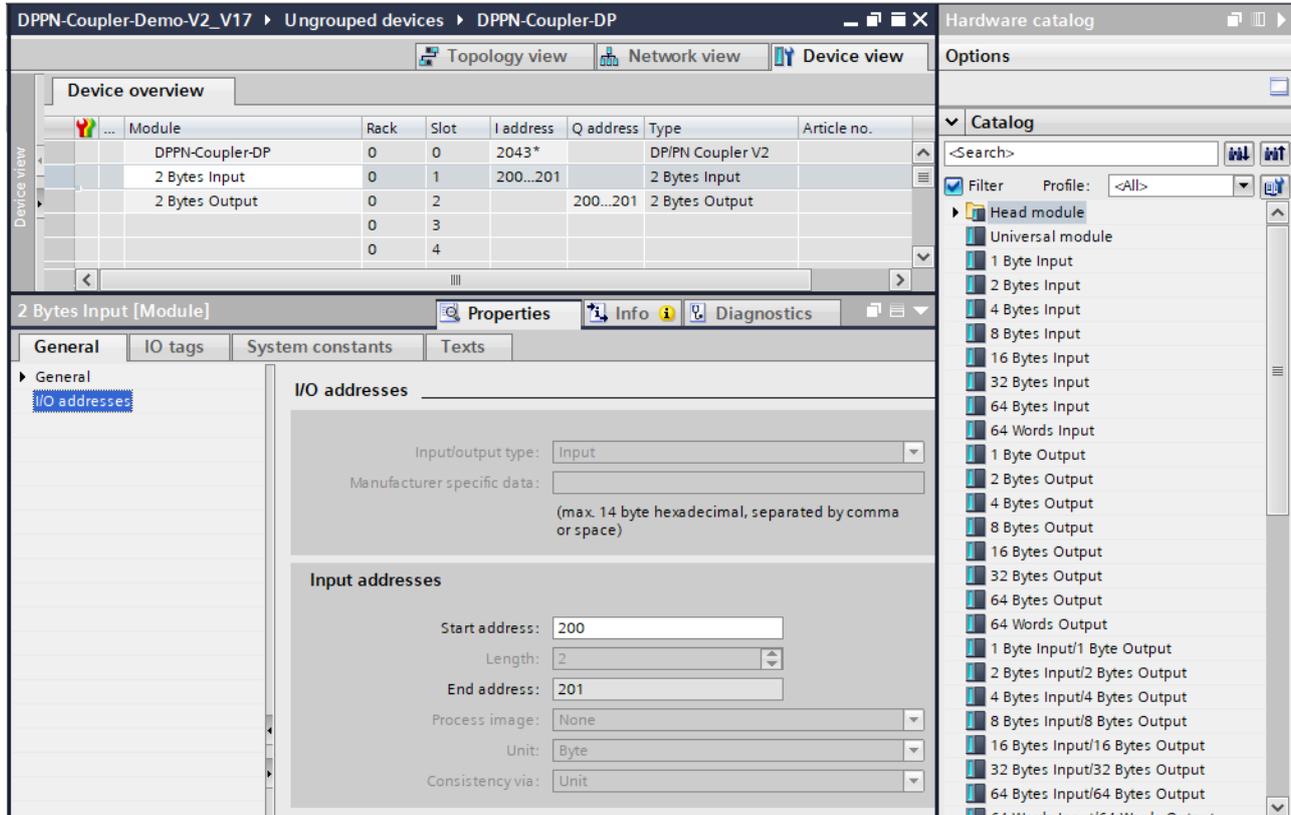
Consistent modules are also available as modules. Here the bytes are always transferred completely consistently between the PROFINET and the PROFIBUS side.

<table>
<tr>
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NOTE
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<td>
Please note that the sequence and the sizes of the modules must always be selected to match the modules on the PROFINET side. A 2 byte input module in slot 1 of the PROFIBUS side requires a 2 byte output module in slot 1 of the PROFINET side!
</td>
</tr>
</table>

6.3   Parameters of the PROFIBUS side

The diagnostic behavior of the DP/PN coupler can be set in the device-specific parameters on the PROFIBIUS side.
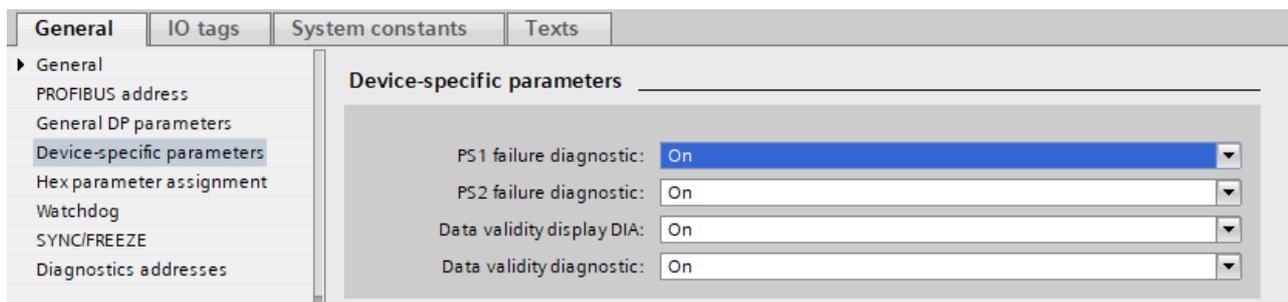
PS1/PS2 failure diagnostic: Sending a diagnostic message to the PLC in case of power supply failure at PS1 (left side) or PS2 (right side).

Data validity display DIA: In the least significant bit (bit 0) of the first input byte the validity of the data is indicated.

      0 = Data could not be transferred.
      1 = Data are all valid.

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

7   Project planning of the PROFINET side

Select in the device list in the hardware catalog "DP/PN Coupler V2" for. Provide the DP/PN coupler under "General" with a PROFINET name and check the Ethernet address of the device. Connect the PROFINET network of the PROFINET controller with the DP/PN coupler.
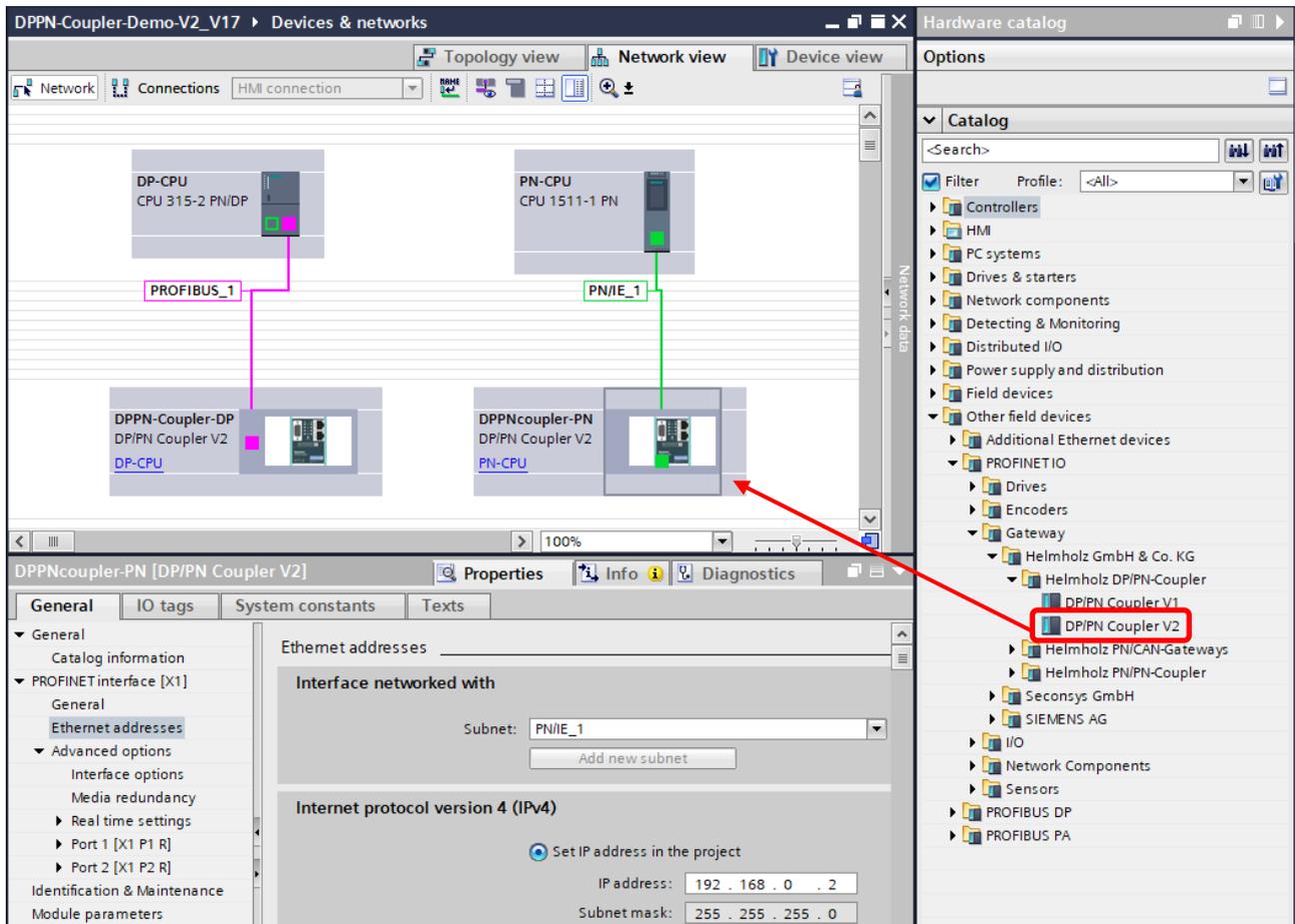
The two PLCs can be in the same project, as shown above, or in different projects or even in different engineering tools. The only thing that matters is that the IO configuration in both projects is configured appropriately for the other side (mirror image).

7.1   IO-Configuration

Now insert the desired IO modules into the slots. IO modules for 1, 2, 4, 8, 16, 32, 64 and 128 bytes for input or output are available. Modules with combined inputs and outputs are also available.
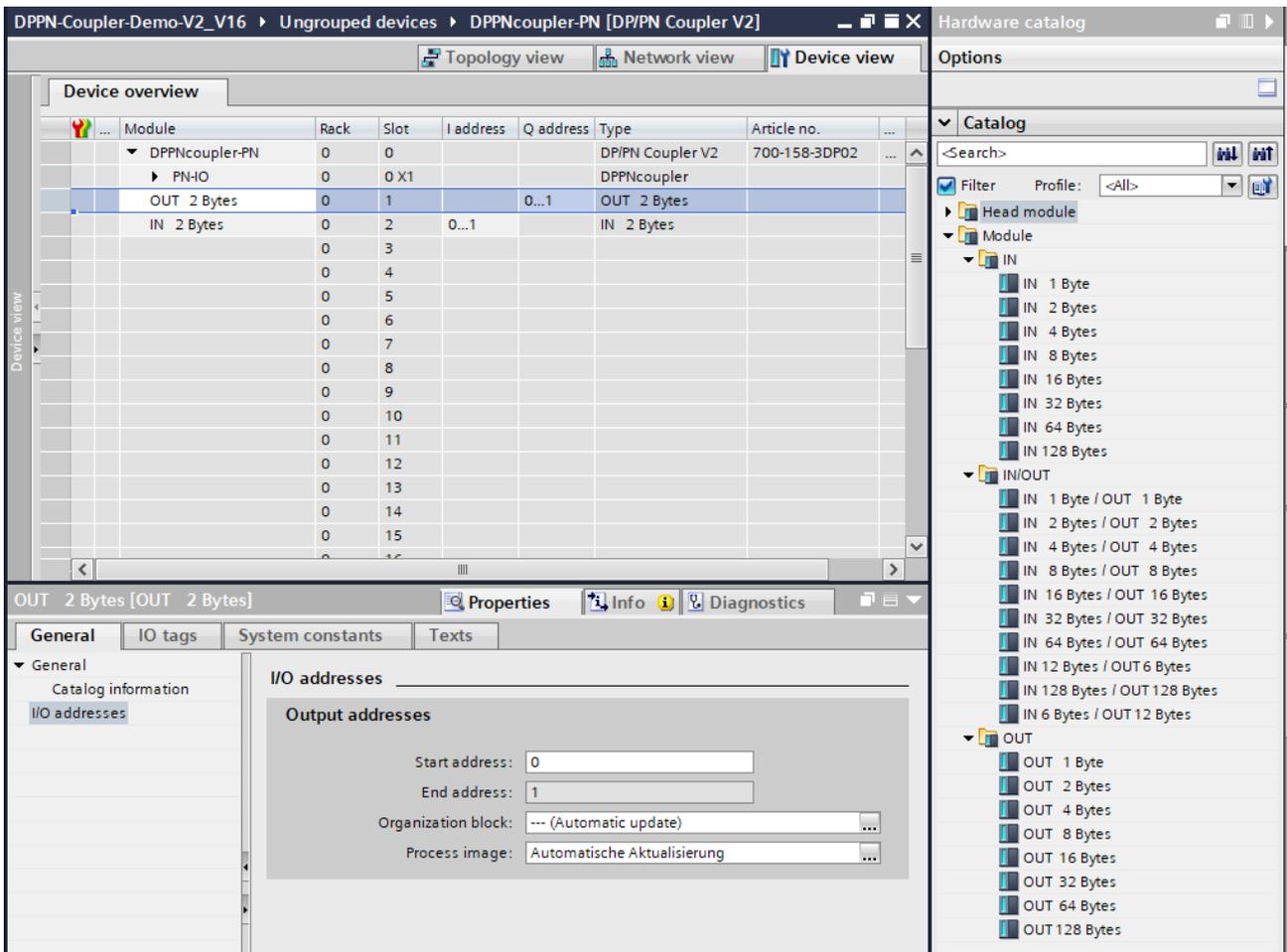
> **ATTENTION**
>
> *Please note that the sequence and sizes of the modules must always be selected to match the modules on the opposite PROFIBUS side.*

Example: A 1 byte input module in slot 1 of the PROFIBUS side requires a 1 byte output module in slot 1 of the PROFINET side!

Slot	PROFIBUS	PROFINET
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
...	...	...

7.2 Parameterization of the DP/PN coupler

The parameters of the DP/PN Coupler can be set in "Properties/Module parameters".
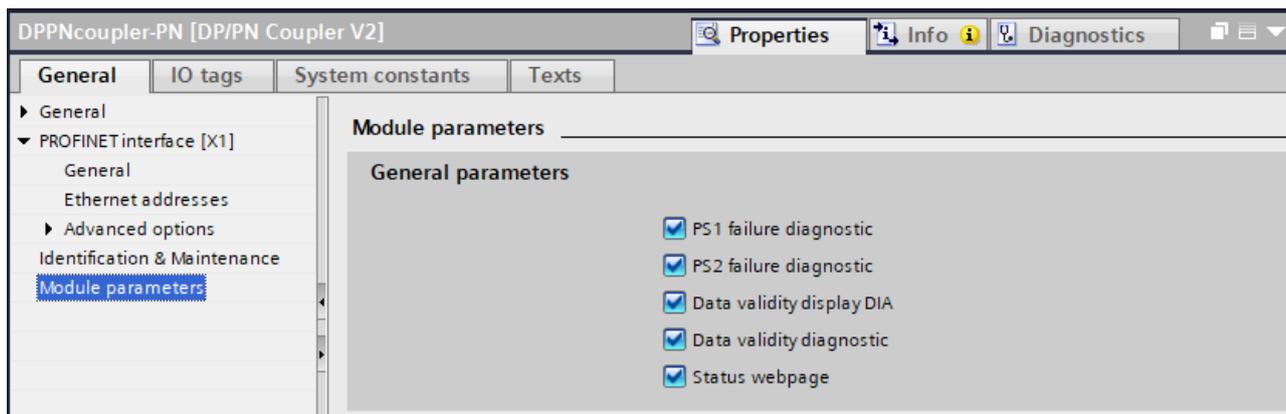
PS1/PS2 failure diagnostic: Sending of a diagnostic message to the PLC in the event of a power supply failure to PS1 (left side) or PS2 (right side).

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.

7.3 Assign a PROFINET-name to the DP/PN coupler

When the configuration of the DP/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.
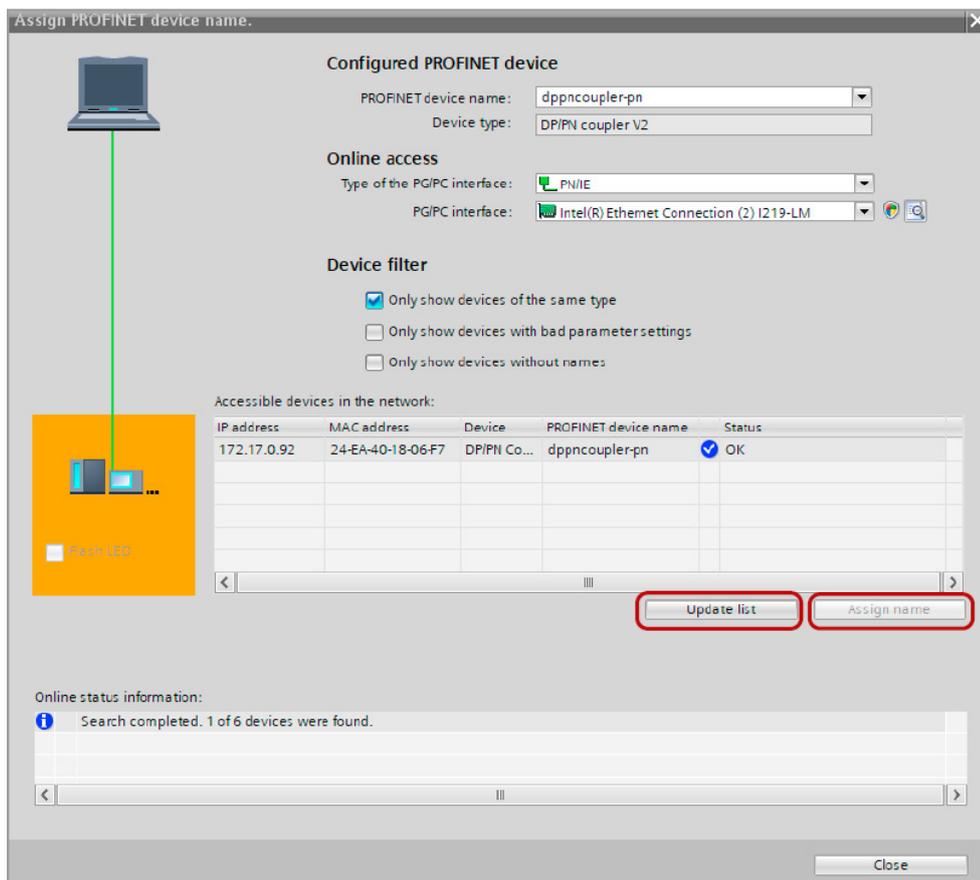
The unique identification of the DP/PN coupler is guaranteed here by the MAC address of the device. The PROFINET MAC address can be read on the front of the DP/PN Coupler.

If the DP/PN coupler has received the correct PROFINET name, then it is recognized and configured by the PLC. If the configuration is correct, the PROFINET "BF" LED is off. If the PROFIBUS side is also configured correctly, the PROFIBUS "BF" LED should also be off. If both network sides have been configured appropriately (number and size of the I/O areas are the same), the "SF" LEDs on both sides should also be off and data transmission should be running.

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

Scan the following QR code to download the IPSet Tool:

8 Web interface of the DP/PN Coupler

As soon as the DP/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.

The web interface of the DP/PN coupler provides an overview of the status and the configuration of the device, as well as the possibility for carrying out a firmware update. In the upper grey line is the menu for further web pages.

> **NOTE**
> *If the web page of the device is not available, please check the "Web page" parameter in the PROFINET configuration.*

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

> **NOTE**
> *Calling up the website can influence the transmission speed of the device.*

For firmware update please download the current firmware under the following link or scan the QR code:

http://www.helmholz.de/goto/700-158-3DP02#tab-software

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

9 Technical data

Order no.	700-158-3DP02
Article designation	DP/PN Coupler (V2)
PROFINET interface (X1)	
Connection	2x RJ45, integrated switch
Protocol	PROFINET IO Device as defined in IEC 61158-6-10
Transmission rate	100 Mbit/s full duplex
Number of configurable slots	16
Features	PROFINET Conformance Class B, media redundancy (MRP-Client), automatic addressing, Topology detection (LLDP, DCP), diagnosis alarms
PROFIBUS interface	
Connection	9-pin D-sub female connector
Protocol	PROFIBUS-DP
Transmission rate	Max. 12 Mbps, automatic baud rate detection
I/O image size	max. 244 Byte input / 244 Byte output data
Number of configurable slots	16
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)	35,5 x 58,5 x 76 mm
Weight	approx. 135 g
Certifications	PROFINET Conformance Class B
Protection rating	IP 20 *(not evaluated by UL)*
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

10 LED status information

	PB (PROFIBUS)	X2 PROFINET (right side)
SF (red)		
Off	Configuration correct	Configuration correct
On	There is no configuration, the PROFINET configuration does not match the PROFIBUS configuration or there is a diagnosis.	PROFINET diagnostic alarm pending in network X2
Flashing	-	PROFINET function "LED flashing" for finding the device is executed in network X2
BF (red)		
Off	The PROFIBUS connection is established	Connection to PROFINET controller in network X2 is established
On	The device has no configuration, the PROFIBUS address is not correct or there is no connection to the PROFIBUS master.	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 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 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	
Green (Link)	Connected	
Orange (Act)	Data transfer at the port active	