



Quickstart Guide DP/PN Coupler

Order number: 700-158-3DP02 For firmware V2.0 and above



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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.



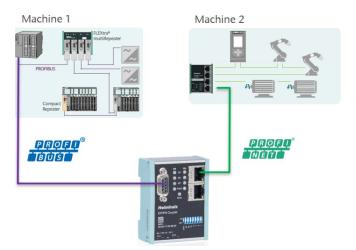
3 Function of the DP/PN Coupler

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

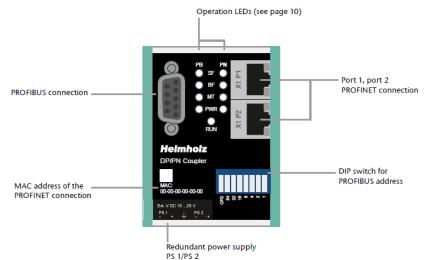


configuration software is not necessary. The configuration of the I/O data to be exchanged is done in the engineering tool.

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.





The housing of the PN/PN Coupler is not grounded. Please connect the functional earth terminal $\stackrel{\leftarrow}{=}$ 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 Sub-D socket on the left side is for connecting the PROFIBUS network.



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").

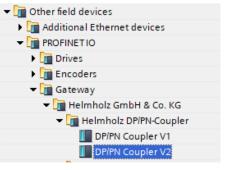


Install the two files into the engineering tool so that both are available for configuration.

	nage general station description files nstalled GSDs GSDs in the projec	t v			×
S	ource path: C:\Users\cabo\Desktop\GSD!	ML			
C	ontent of imported path				
	File 🔺	Version	Language	Status	Info
	GSDML-V2.34-Helmholz-TB20-PN-20190	V2.34	English, Ger	Already installed	TB20 PROFINET Cou
	GSDML-V2.35-Helmholz-DP-PN-coupler-2	V2.35	English, Ger	Already installed	DP/PN Coupler
	GSDML-V2.35-Helmholz-PN-EthernetIP-co	V2.35	English, Ger	Not yet installed	PN/EtherNetIP Coupler
	GSDML-V2.35-Helmholz-PN-ModbusTCP	V2.35	English, Ger	Already installed	PN/ModbusTCP Cou
	GSDML-V2.35-Helmholz-PN-MQTT-couple	V2.35	English, Ger	Already installed	PN/MQTT Coupler
	GSDML-V2.35-Helmholz-PN-PN-coupler-2	V2.35	English, Ger	Already installed	PN/PN Coupler
	GSDML-V2.35-Helmholz-TB20-PN-20210	V2.35	English, Ger	Not yet installed	TB20 PROFINET Cou
					>
	-1				
				Delete In	stall Cancel

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 (700-158-3DP<u>02</u>) use the devices entry "DP/PN Coupler V2"



You install the GSD file accordingly in the same dialog:

Manage general stat	tion descript GSDs in th		.	×
Source path: C:\L	lsers\cabo\Des	ktop\GSDML\	DP-PN-Coupler GSD	v2.01
Content of importe	d path			
🖌 File	Version	Language	Status	Info
HELM1130.gsd		Default	Already installed	700-158-3DP02 / DPV0 / V2.01 / 8.9.20 (
HELM1130.gse		English	Already installed	700-158-3DP02 / DPV0 / V2.01 / 8.9.20 (
HELM1130.gsg		German	Already installed	700-158-3DP02 / DPV0 / V2.01 / 8.9.20 (
<				>
				Delete Install Cancel

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 ".



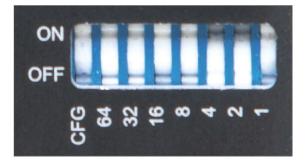
6 Project planning of the PROFIBUS side

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.

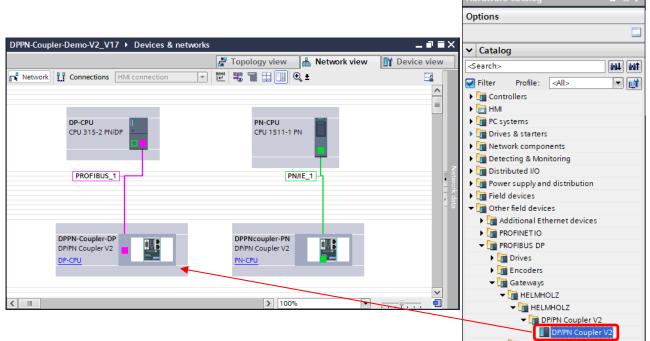




A changed PROFIBUS setting is only accepted after a restart of the device.

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.

D	PPN-Couple	r-Demo-V2_V17 ▸	Ungrouped dev	ices 🕨 D	PPN-Coup	oler-DP		_ 7 =	×	Hardware catalog	- - -
				📇 Торо	logy viev	v 🖁 🖁 N	etwork view	Device view		Options	
E	Device	overview							1		
L		Module	Rack	Slot	I address	Q address	Turpe	Article no.		✓ Catalog	
5	-	DPPN-Coupler-DP	0	0	2043*	Q address	DP/PN Coupler V2	Article no.		<pre></pre>	tini tini
viev	4	2 Bytes Input	0	1	2043		2 Bytes Input				
8		2 Bytes Output	0	2	200201		2 Bytes Output		=	Filter Profile: <all></all>	- 📑
l e	<u>}</u>	2 Bytes Output	0	3		200201	2 Bytes Output			🕨 📊 Head module	~
			0	4						📗 Universal module	
			0						\sim	📘 1 Byte Input	
	<							>		🚺 2 Bytes Input	
2	Bytes Input	t [Module]		🔍 Pro	perties	🔄 🚺 Infe	o 追 🗓 Diagnost	ics	-	🚺 4 Bytes Input	
	General	IO tags Sys	tem constants	Texts	-					📗 8 Bytes Input	
P.		IO tags Sys	tem constants	Texts					-	📗 16 Bytes Input	=
1	General		I/O addresses							🚺 32 Bytes Input	=
	I/O addresse	S								🚺 64 Bytes Input	
					_					🚺 64 Words Input	
				Input/outpu	ut type:	Input			×	🚺 1 Byte Output	
			Manufact	turer specifi	ic data:					📘 2 Bytes Output	
					(max 14 hvt	e hexadecimal, sepai	rated by comma		📗 4 Bytes Output	
						or space)	e nexadeennai, sepai	area by comma		📗 8 Bytes Output	
										📗 16 Bytes Output	
			Input addres	ses						32 Bytes Output	
										🚺 64 Bytes Output	
				Start a	ddress: 2	200				🚺 64 Words Output	
					ength:					📗 1 Byte Input/1 Byte Output	
										2 Bytes Input/2 Bytes Output	
				End a	ddress: 2	201				4 Bytes Input/4 Bytes Output	
				Process	image: 🛛	None			-	📗 8 Bytes Input/8 Bytes Output	
		-			Unit:	Byte			-	16 Bytes Input/16 Bytes Output	
				Constato		-			Į.	32 Bytes Input/32 Bytes Output	
		-		Consister	ncyvia:	Unit				📕 64 Bytes Input/64 Bytes Output	_
										EA Words Input/64 Words Output	· ~

Consistent modules are also available as modules. Here the bytes are always transferred completely consistently between the PROFINET and the PROFIBUS side.



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!

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.

General IO tags Sys	tem constants Texts	
▶ General	Device energific perspectors	
PROFIBUS address	Device-specific parameters	
General DP parameters		
Device-specific parameters	PS1 failure diagnostic:	On 💌
Hex parameter assignment	PS2 failure diagnostic:	On 💌
Watchdog	-	
SYNC/FREEZE	Data validity display DIA:	On 🔻
Diagnostics addresses	Data validity diagnostic:	On 🔻

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.

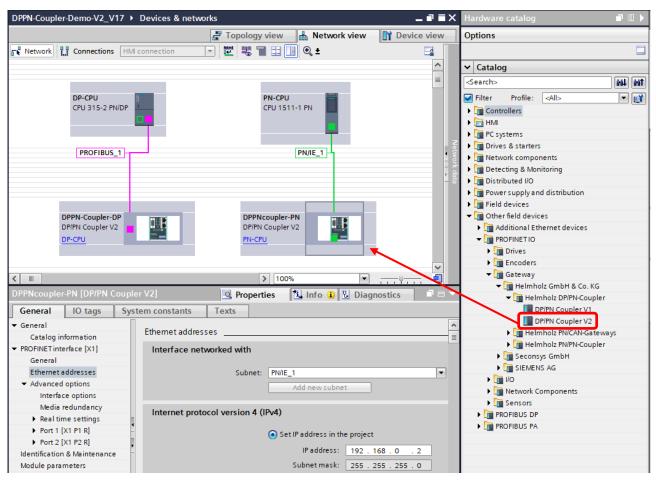
0 = Data could not be transferred.

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.

					Topolog	y view	📥 Network view	Device vi	ew	Options
Devic	e overview									
· •	Module		Rack	Slot	I address	Q address	Туре	Article no.		✓ Catalog
	 DPPNcoupler 	PN	0	0			DP/PN Coupler V2	700-158-3DP02	^	<search> M↓ M</search>
	▶ PN-IO		0	0 X1			DPPNcoupler			
	OUT 2 Bytes		0	1		01	OUT 2 Bytes			Filter Profile: <all></all>
	IN 2 Bytes		0	2	01		IN 2 Bytes			Head module
	· · · · ·		0	3					_	▼ Module
			0	4					=	
			0	5						IN 1 Byte
			0	6						IN 2 Bytes
			0	7						IN 4 Bytes
			0	8						IN 8 Bytes
			0	9						IN 16 Bytes
			0	10						IN 32 Bytes
			0	11						📗 IN 64 Bytes
			0	12						IN 128 Bytes
			0	13						→ In/out
			0	14						📗 IN 1 Byte / OUT 1 Byte
			0	15						📗 IN 2 Bytes / OUT 2 Bytes
			0	10					~	📗 IN 4 Bytes / OUT 4 Bytes
<									>	📗 IN 8 Bytes / OUT 8 Bytes
2 Byte	es [OUT 2 Byte	sl			Prope	rties 1	🗓 Info 追 🖪 Dia	anostics	1 🗏 👻	📗 IN 16 Bytes / OUT 16 Bytes
								ghostics		📗 IN 32 Bytes / OUT 32 Bytes
eneral	IO tags	System o	constar	nts	Texts					📗 IN 64 Bytes / OUT 64 Bytes
eneral										IN 12 Bytes / OUT 6 Bytes
Catalog i	nformation	1/U a	ddress	es						IN 128 Bytes / OUT 128 Bytes
) address	es	Ou	itput ac	dresse	5					IN 6 Bytes / OUT 12 Bytes
										▼ In OUT
				St	art address:	0				OUT 1 Byte
				F	nd address:	1				OUT 2 Bytes
										OUT 4 Bytes
				Organi	zation block:	(Autor	matic update)		-	OUT 8 Bytes
				Pro	cess image:	Automat	ische Aktualisierung			OUT 16 Bytes
		1								OUT 32 Bytes
										OUT 64 Bytes
		-								OUT 128 Bytes



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".

DPPNcoupler-PN [DP/PN Coupl	er V2]	Section 2017 Properties	🗓 Info 🔒 🗓 Diagnostics	
General IO tags Sys	stem constants Texts			
 ▶ General ▼ PROFINET interface [X1] 	Module parameters			
General	General parameters			
Ethernet addresses				
Advanced options		🛃 PS1 failure diagnos	tic	
Identification & Maintenance		PS2 failure diagnos	tic	
Module parameters		🗹 Data validity displa		
		🛃 Data validity diagno	ostic	
		🗹 Status webpage		

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.

Assign PROFINET device name.				_	×
	Configured PROF	INET devi	ce		
	PROFINET device	name:	dppncoupler-pn		-
	Devic	e type:	DP/PN coupler V2		
	Online access				
	Type of the PG/PC int	erface:	PN/IE		-
	PG/PC int	erface:	💹 Intel(R) Ethernet Conr	nection (2) I219-LM	• 🖲 🖸
	Device filter				
	🗹 Only show d	evices of the	e same type		
	Only show d	evices with	bad parameter settings		
	Only show de	evices with	outnames		
Accessible	e devices in the network:				
IP address		Device	PROFINET device name	Status	
172.17.0.	92 24-EA-40-18-06-F7	DP/PN Co	dppncoupler-pn	🔮 ок	
Flash LED					
			1111		
				Jpdate list	Assign name
Online status information:					
Search completed. 1 of 6 devic	es were <mark>f</mark> oun <mark>d</mark> .				
<		III			>
					Close

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.

DP/PN COUPLEF	2		COMPATIBLE WITH YOU
Overview	Module cor	ıfig	Firmware upgrade
DP Configura	ition	PN Configurat	tion X1
Device address	3	Device name	dppncoupler-pn
Operating mode	Connected	Operating mode	Connected
LEDs	SF: BF: MT: PWR: -	LEDs	SF: BF: MT: PWR:
Baud rate	12Mbps	MAC address	24:ea:40:18:06:f7
		IP address	172.17.0.92
		Port 1 status	Link up, 100 MB/FD
		Port 2 status	Link down, -/-
Software		Hardware	
Firmware version	V2.02.002	Serial Number	50031140
Linux kernel version	4.9.4	Order Number	700-158-3DP02

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.



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.



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

	DP Configuration	PN Configuration X1
Slot#: 1	IN 1 Byte (0×01)	OUT 1 Byte (0x00)
Slot#: 2	OUT 1 Byte (0x00)	IN 1 Byte (0x01)
Slot#: 3	IN 2 Bytes (0x49 A3)	OUT 2 Bytes (0x49 A3)
Slot#: 4	OUT 2 Bytes (0x49 A4)	IN 2 Bytes (0x49 A4)
Slot#: 5	IN 4 Bytes (0x49 A3 49 A3)	OUT 4 Bytes (0x49 A3 49 A3)
Slot#: 6	OUT 4 Bytes (0x49 A4 49 A4)	IN 4 Bytes (0x49 A4 49 A4)
Slot#: 7	IN 8 Bytes (0x49 A4 49 A4)	OUT 8 Bytes (0x49 A4 49 A4)
Slot#: 8	OUT 8 Bytes (0x49 A4 49 A4)	IN 8 Bytes (0x49 A4 49 A4)
Slot#: 9	IN 16 Bytes (0x49 A4 49 A4)	OUT 16 Bytes (0x49 A4 49 A4)
Slot#: 10	OUT 16 Bytes (0x49 A4 49 A4)	IN 16 Bytes (0x49 A4 49 A4)

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.



DP/PN COUPLER		Helmholz [®]
Overview	Module config	Firmware upgrade
Currently installed firmware: V2		tots the device
	ate any established ARs. Aborting the upgrade rebo	ots the device.
Starting firmware upgrade will termin	ate any established ARs. Aborting the upgrade rebo	ots the device.

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		



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