



## Quickstart Guide PN/ModbusTCP Coupler

Order number: 700-159-3MB02

For firmware V2.00 and above

Version  
**5** 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 is 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/ModbusTCP Coupler. The latest version of the document and a detailed manual can be found at [www.helmholz.de](http://www.helmholz.de) or scan the QR code directly.



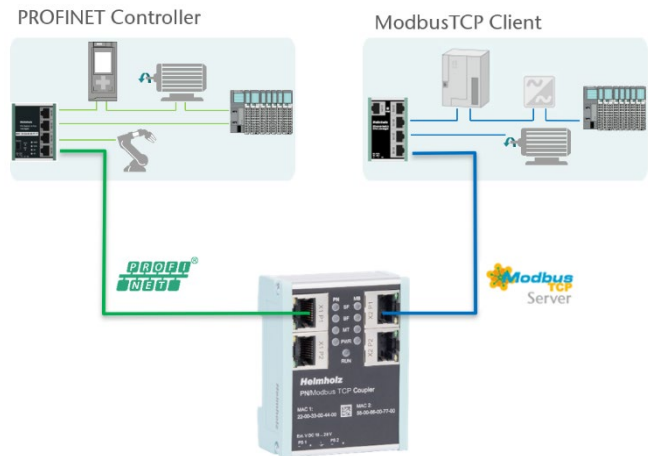
### 3 Function of the PN/ModbusTCP Coupler

With the PN/ModbusTCP Coupler a simple and uncomplicated connection of a PROFINET network with a ModbusTCP network is possible. The PN/ModbusTCP Coupler allows the data transfer between a PROFINET controller and ModbusTCP stations.

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 data is 1024 bytes of input/output data. Up to 300 slots for IO modules are available.

The integration into the PLC engineering tool is made possible by a GSDML file; special configuration software isn't necessary.

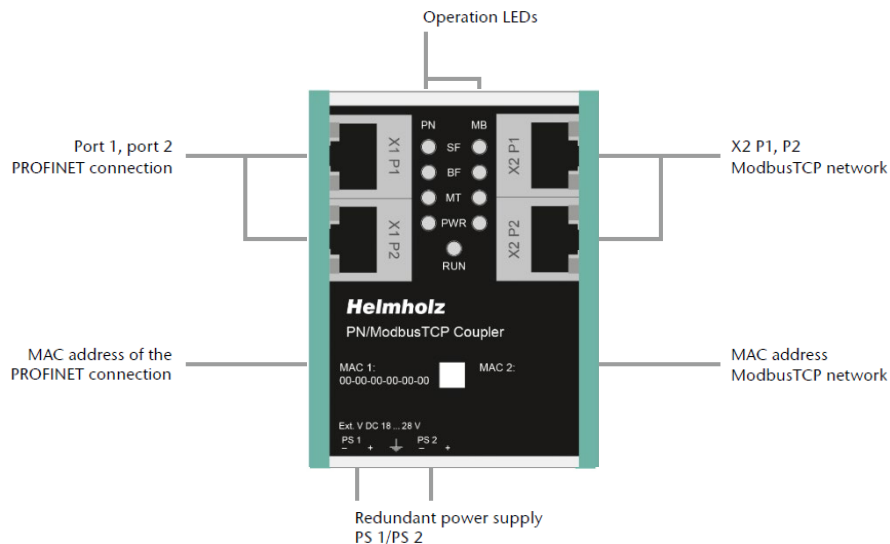


In addition to the PROFINET / ModbusTCP communication, the PN/ModbusTCP Coupler also makes an MQTT Publisher available on both network sides. In this way, the values exchanged via the gateway can also be distributed via MQTT to visualization or operating data recording systems.

### 4 Connection

#### 4.1 Power supply

The PN/ModbusTCP 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 left RJ45 sockets "X1 P1" and "X1 P2" are used to connect the PROFINET network, the right RJ45 sockets "X2 P1" and "X2 P2" are used to connect the ModbusTCP network. The ports X1 P1 and X1 P2, as well as X2 P1 and X2 P2 are each internally connected to a switch.

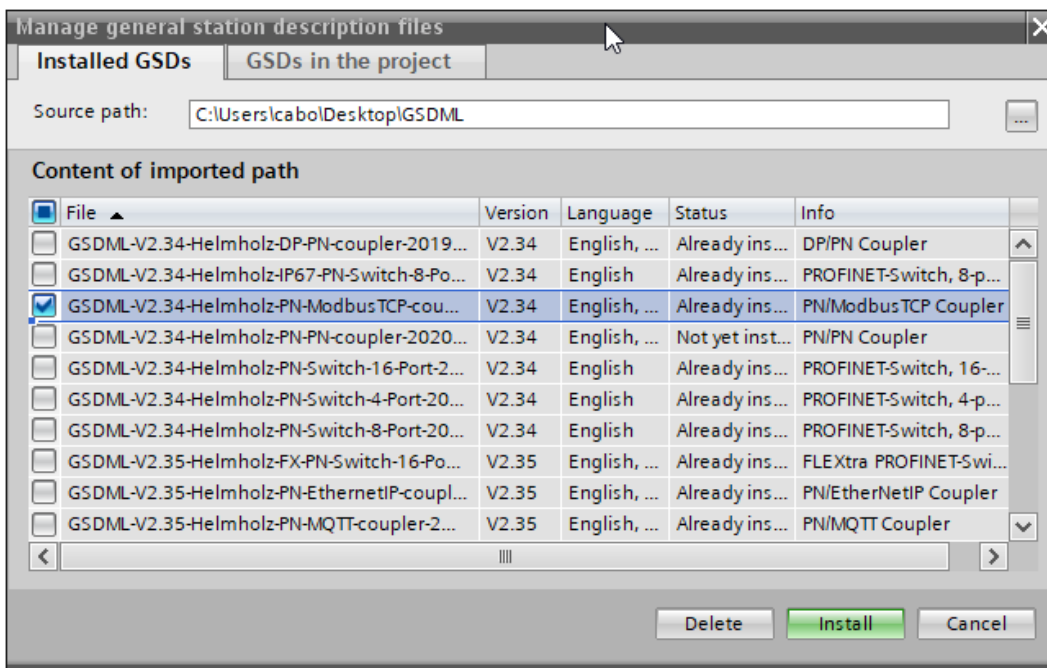


*The ETHERNET connections are only intended for connection to computer networks (LANs) and must not be connected to telephone networks or telecommunication lines. The unit is to be connected only to internal Ethernet networks without exiting a facility and being subjected to TNVs.*

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

## 5 Install GSDML file

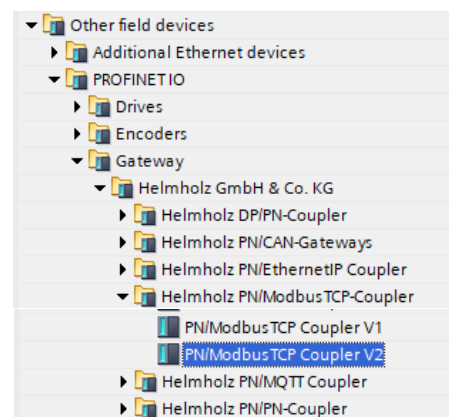
Please download the GSDML file ("GSDML-V2.34-Helmholz-PN-ModbusTCP-coupler-\_\_\_\_.xml") at [www.helmholz.de](http://www.helmholz.de) or scan the QR code. Install the GSDML file in the "Tools" / "Manage device description file (GSD)" menu in the TIA Portal.



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

For the PN/ModbusTCP coupler with order number 700-159-3MB02 select the "PN/ModbusTCP Coupler V2".

For the PN/ModbusTCP coupler with order number 700-159-3MB01 select the "PN/ModbusTCP Coupler V1".



## 6 Data exchange concept

The PN/ModbusTCP Coupler is a ModbusTCP server. It receives data via ModbusTCP, which is transferred to the IO image of the PROFINET PLC (inputs in the PLC) and provides data, which it receives from the PROFINET PLC (outputs in the PLC).

ModbusTCP distinguishes 4 different data types:

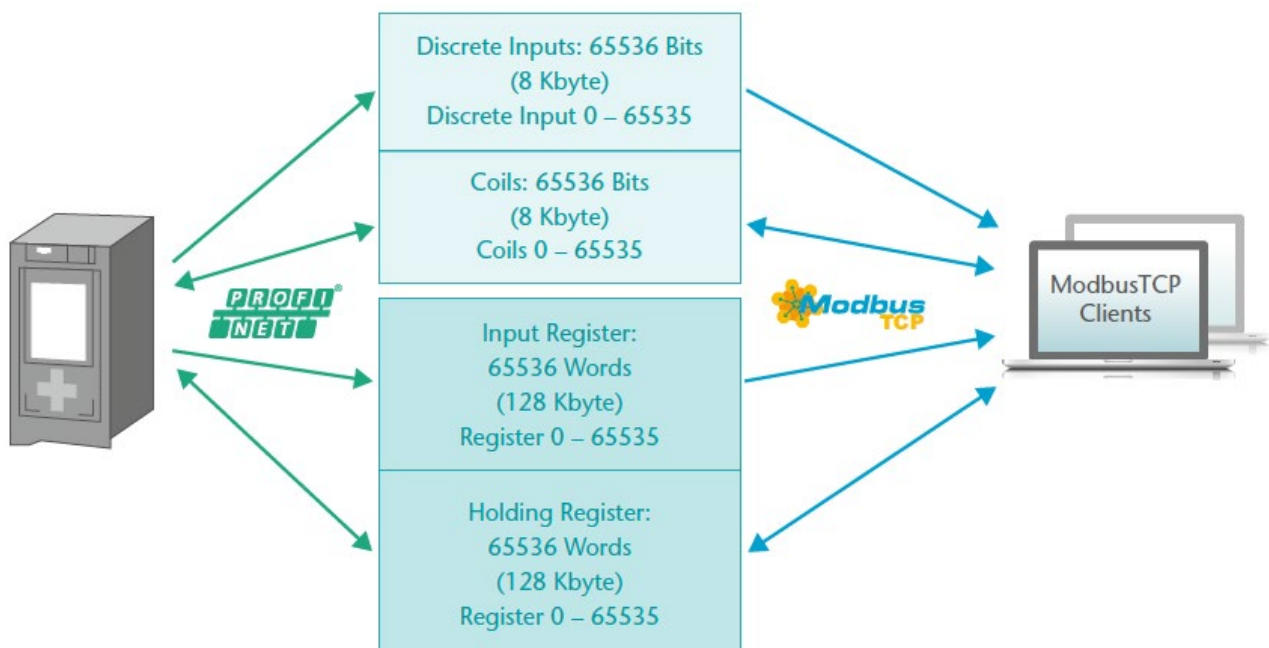
**Discrete Inputs:** Input bits; written by the PROFINET PLC

**Coils:** Output bits or internal data bits, are read by the PROFINET PLC, but can also be written

**Input Register:** Input word; written by the PROFINET PLC

**Holding Register:** Output word or internal data word; are read by the PROFINET PLC but can also be written

All data types are numbered from 0-65535. All data types have their own memory area in the PN/ModbusTCP coupler:



From the point of view of ModbusTCP communication, all coils, inputs and registers are always available in the PN/ModbusTCP coupler. So it is always possible to access all data types from address 0-65535.

Via the PROFINET configuration the ModbusTCP data can be assigned to the PLC I/O image in the slots, which are required in the PLC program. Up to 300 slots are available in the PN/ModbusTCP coupler for such assignments.

The following modules are available to access the ModbusTCP memory:

**Discrete Inputs (PLC writes only):**

- Write Discrete Inputs 1 - 32 Bytes (8 - 256 Bits)

**Coils (read/write):**

- Write Coils 1 - 16 Bytes (8 - 128 Bits)
- Read Coils 1 - 16 Bytes (8 - 128 Bits)

**Input Register (PLC writes only):**

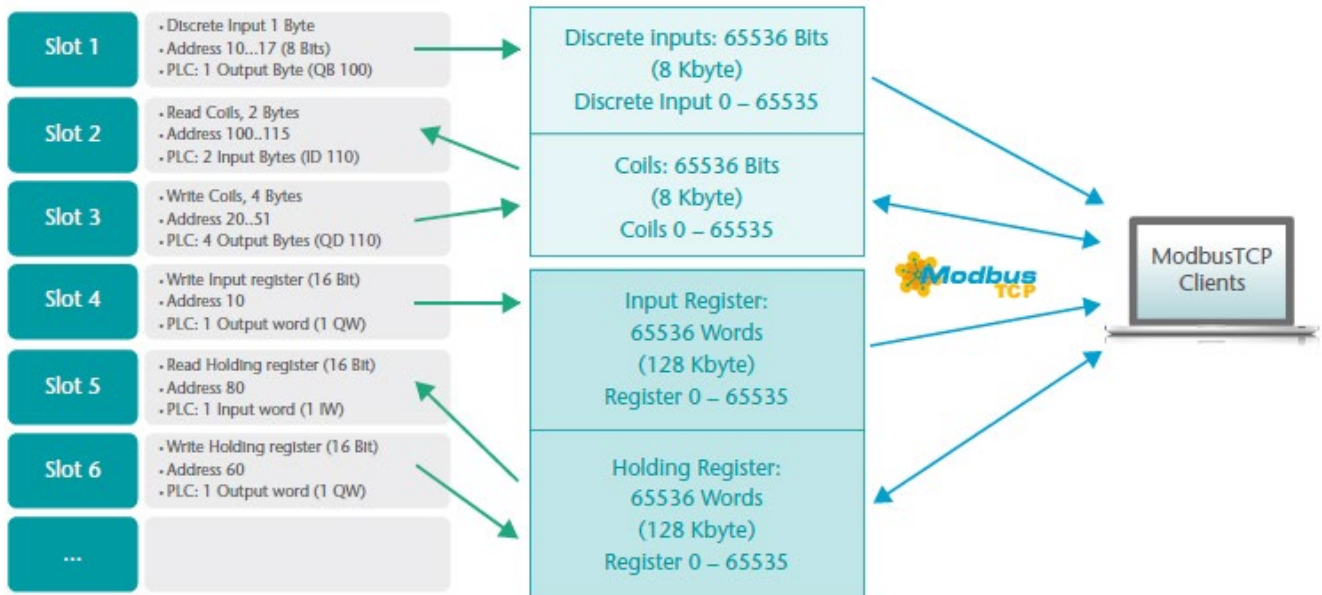
- Write Input Register (16 Bit)

## Holding Registers (read/write):

- Write Holding Register (16 Bit)
- Read Holding Register (16 Bit)

All modules have as **parameter** the register number (Input Register, Holding Register) or the first bit address (Discrete Inputs, Coils).

## 6.1 Example of a configuration



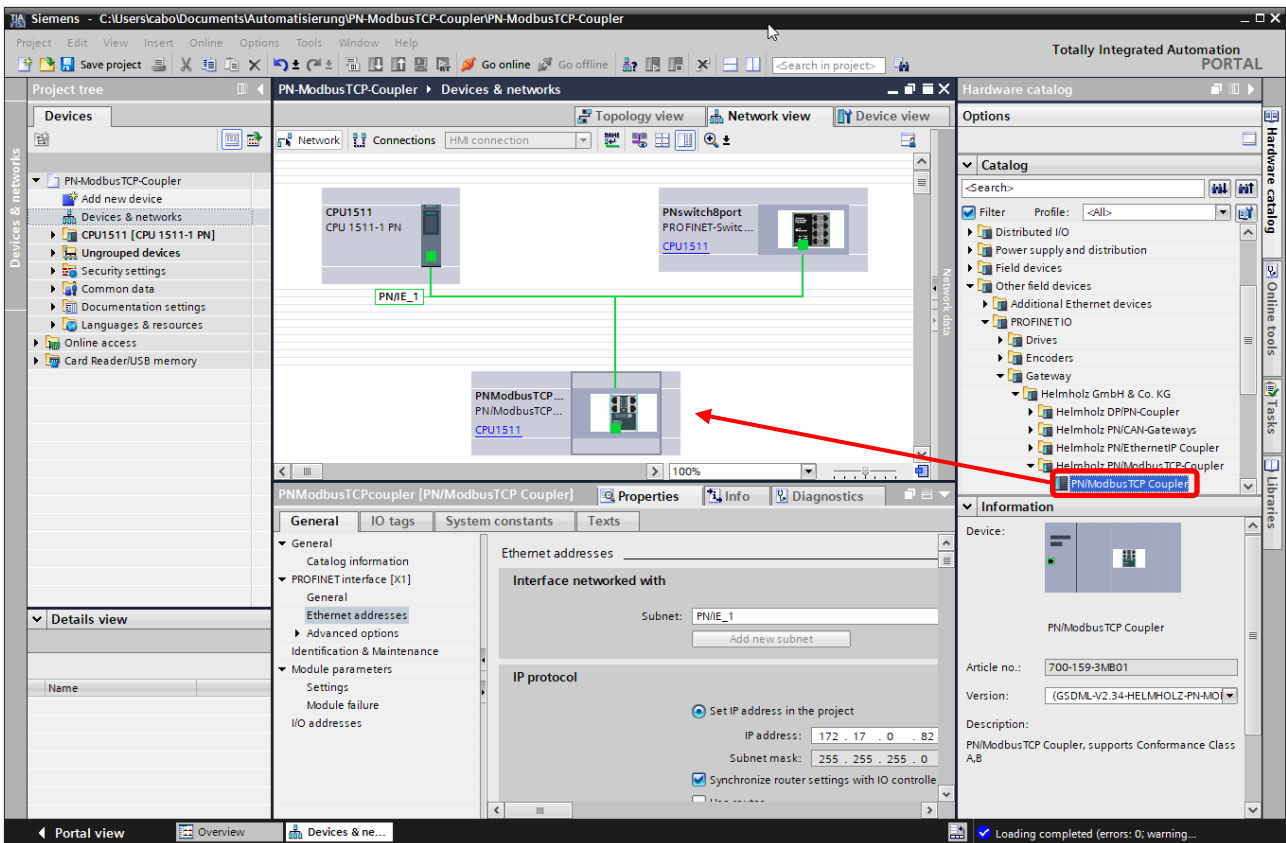
## 6.2 Supported ModbusTCP function codes

The PN/ModbusTCP Coupler supports the following function codes:

Data size	Data range	Function	Function code decimal	Function code hex
Bit access	Input bits	Read discrete inputs	2	0x02
	Output bits or internal bits	Read coils	1	0x01
		Write single coil	5	0x05
		Write multiple coils	15	0x0F
16 bit access	Input data	Read input register	4	0x04
	Output data or internal information	Read holding register	3	0x03
		Write single holding register	6	0x06
		Write multiple Register	16	0x10
		Read/write multiple holding registers	23	0x17
		Mask write holding register	22	0x16

## 7 Configuration in the TIA-Portal

Add the PN/ModbusTCP coupler to the project and connect the coupler to the PROFINET network.



Assign a device name and check the IP address on the PROFINET network (X1) for the device.

### 7.1 Parameters of the PN/ModbusTCP Coupler

The parameterization of the PN/ModbusTCP Coupler can be done completely via the PROFINET hardware configurator. However, some parameters for the ModbusTCP network (X2) can optionally also be set via the web page, e.g. the IP address of the ModbusTCP server or the DHCP host name.

#### Settings

ModbusTCP IP-address mode:	use IP from webpage setting
Static IP address:	192.168.128.112
Static IP subnet mask:	255.255.0.0
Static IP gateway:	192.168.2.250
DHCP hostname mode:	From PROFINET configuration
DHCP hostname:	PNModbusTCPCoupler
ModbusTCP port:	502
Connection watchdog time (ms):	10000
Maximum ModbusTCP connections:	5
Register for PROFINET-status:	65535
Status Webpage:	on both network sides active
MQTT Publisher option:	on ModbusTCP network side active
<input type="checkbox"/>	Diagnostic at P51 failure
<input type="checkbox"/>	Diagnostic at P52 failure



**ModbusTCP IP-address mode:** Setting the IP address for the ModbusTCP network. Selectable are "DHCP", "Static IP", "use IP from the web page setting".

**Static IP address:** If the address mode is set to "Static IP", the static IP address can be specified here.

**Static IP subnet mask:** If the address mode is set to "Static IP", the subnet mask can be specified here.

**DHCP hostname mode:** The host name of the device can be set in the PROFINET configuration or on the web page.

**DHCP hostname:** DHCP name of the device. DHCP names must begin with a letter, end with a letter or digit, and contain only letters, digits, and hyphens.

**ModbusTCP port:** Port on which the ModbusTCP driver listens. Port 502 is always active, even if another port is set here.

**Connection watchdog time (ms):** Time in which a ModbusTCP connection is closed when there is no more communication over that connection. Range: 1 - 65535 ms

**Maximum ModbusTCP connections:** Maximum number of nodes that can establish simultaneous connections with the PN/ModbusTCP coupler.

**Register for PROFINET-Status:** Number of the register from which the status of the PN/ModbusTCP coupler can be read out via ModbusTCP. Range 0-65535

**Status Webpage:** On which network interfaces should the web page be displayed.

**MQTT Publisher Option:** On which network interfaces should the MQTT Publisher be activated (see Chap. 10).

**Diagnostic at PS1/PS2 failure:** In case of power supply failure at PS1/PS2 a diagnosis is sent to the PLC.

## 7.2 Configure ModbusTCP modules

For the data exchange between the ModbusTCP memory in the coupler and the PLC EA memory up to 300 modules can be plugged in the PROFINET configuration of the coupler. Now insert the desired modules for Discrete Inputs, Coils, Input Registers or Holding Registers into the slots.

Module	Rack	Slot	I address	Q address	Type	Article no.
PNModbusTCPcoupler	0	0	90...91	90	PN/ModbusTCP Coupler	700-159-3MB01
PN-HO	0	0 X1			PNModbusTCPcoupler	
Discrete Input 0..7	0	1		100	Discrete Input 1 Byte	
Discrete Input 32..47	0	2		101...102	Discrete Input 2 Bytes	
Read Coils 8..15	0	3	100		Read Coils 1 Byte	
Read Coils 16..47	0	4	101...102		Read Coils 2 Byte	
write Input Register 10	0	5		110...111	Write Input Register	
write Input Register 11	0	6		112...113	Write Input Register	
write Holding Register 20	0	7		120...121	Write Holding Register	
write Holding Register 21	0	8		122...123	Write Holding Register	
read Holding Register 19	0	9	120...121		Read Holding Register	
	0	10				
	0	11				
	0	12				
	0	13				

All modules have as **parameter** the **register number** (Input Register, Holding Register) or the first **bit address** (Discrete Inputs, Coils). For the Input Bits and Coils from 8 bits (1 byte) up to 256 bits (32 bytes) can be addressed together in one slot.

Module parameters

Parameter

first Discrete Input address: 32

Module parameters

Parameter

Register address: 20

Addressing of single bits is not possible via the PROFINET PLC, the smallest amount is a byte (8 Bits). However, the bit address can start at any position in the address space of the coils or discrete inputs, so it does not have to be divisible by 8.



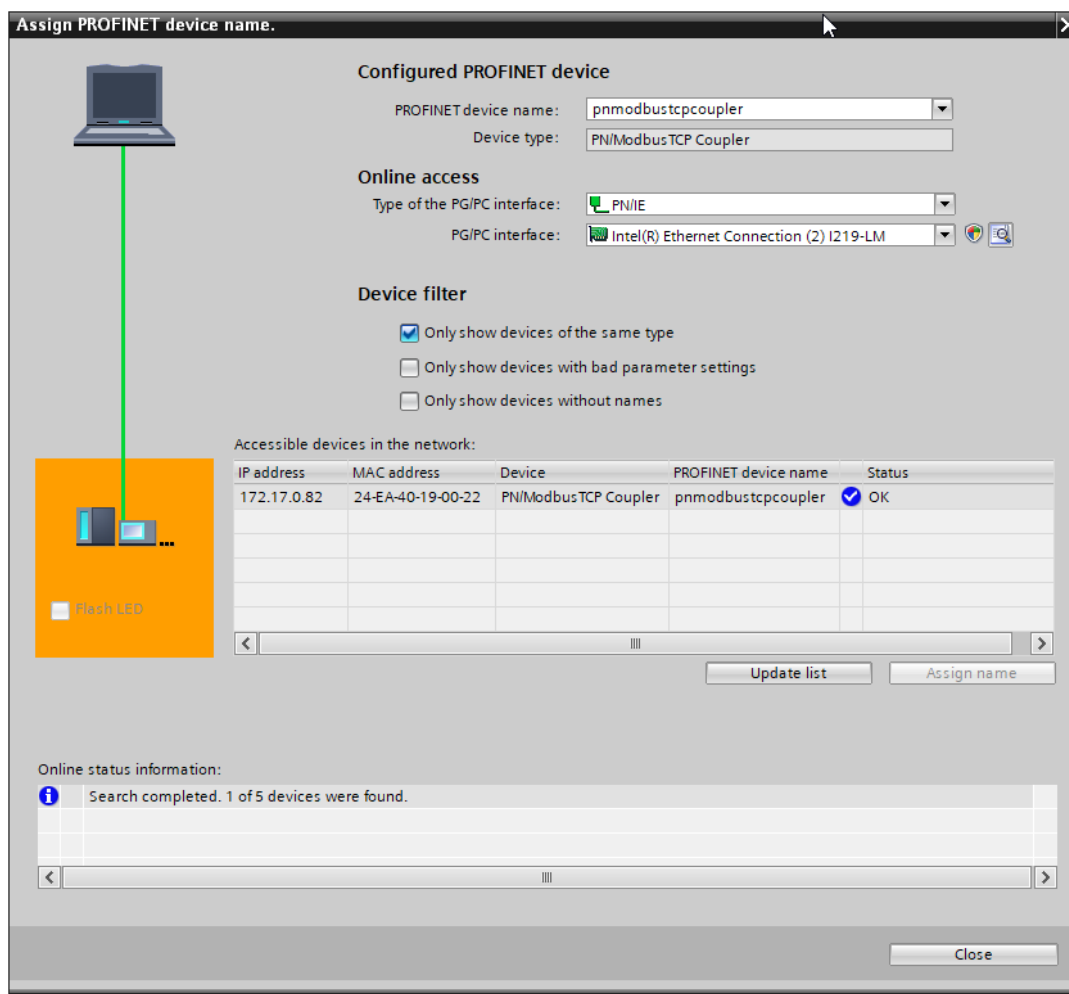
*Access to the same memory area by two modules is not permitted. There must be no gap in the configuration of the slots.*

### 7.3 Assign a PROFINET device name to the PN/ModbusTCP Coupler

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

In order that the PN/ModbusTCP Coupler can be found by the PROFINET controller, the PROFINET device name must be assigned to the PN/ModbusTCP Coupler. For this use the function "Assign device name" which you can reach with the right mouse button or in the menu Online if the PN/ModbusTCP Coupler is selected.

With the "Update list..." button, the network can be browsed for PROFINET participants. The PROFINET device name can be assigned to the device with "Assign name".



The unique identification of the PN/ModbusTCP Coupler in the PROFINET network is guaranteed by the MAC address of the device. The PROFINET MAC address can be read on the front panel of the PN/ModbusTCP coupler on the left side at X1 ("MAC 1").

If the PN/ModbusTCP 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 should be off.

To set the PROFINET name, you can also use the Helmholz IPSet tool, which can be downloaded free of charge from the Helmholz website. Scan the following QR code to download the IPSet tool:



## 8 Status and control via PLC program

The PN/ModbusTCP Coupler provides a status and a control byte via the PROFINET input image.

### Status Byte 1: Status-Bits

7	6	5	4	3	2	1	0
PROFINET configuration completed. Device is ready to operate.	-	Power supply detected on PS 1 (left)	Power supply detected on PS 2 (left)	MQTT connection on network X1active	MQTT connection on network X1active	ModbusTCP network has an active IP address (static or obtained via DHCP)	Network cable detected

### Status byte 2: Number of active connections

### Control byte 1: Control Bits

7	6	5	4	3	2	1	0
-	-	-	-	-	-	ModbusTCP memory reset (coils, inputs, and registers)	Disconnect all ModbusTCP connections and prevent connection establishment

The PN/ModbusTCP coupler starts after successful PROFINET configuration and is immediately in operation after PLC RUN. A further release via PLC program is not necessary. If the automatic start is not desired, the PN/ModbusTCP coupler can be prevented from starting independently by setting bit 0 to 1 in the control byte during PLC startup. If the bit is later set to 0 in the PLC, the PN/ModbusTCP coupler is immediately ready for operation.

## 9 Web interface of PN/ModbusTCP Coupler

The web interface of the PN/ModbusTCP coupler provides an overview of the status and the configuration of the device, as well as the possibility to perform a firmware update.

Furthermore, the ModbusTCP configuration can be set in the web interface, if this is not specified by the PROFINET configuration.

When accessing the web interface for the first time, a password must be set for the default user "admin". The password can be adjusted subsequently in the "Account" menu.


It's the first time you're accessing the webpage. Please set the password.

New password must be at least 8 characters long.

Login	<input type="text" value="admin"/>
New password	<input type="text" value="New password"/>
Repeat password	<input type="text" value="Repeat password"/>

The "Overview" web page shows the current settings and status. In the upper line there is the menu for further web pages.

# PN/ModbusTCP COUPLER



COMPATIBLE WITH YOU

- Overview
- Module config
- ModbusTCP
- MQTT
- Account
- TLS certificates
- Firmware upgrade

## Overview

<b>PN Configuration X1</b>		<b>ModbusTCP Configuration X2</b>	
Device name	pnmodbus tcp coupler	Mode	Modbus server
Operating mode	Connected	Operating mode	Connected
LEDs	SF: ● BF: ● MT: ● PWR: ●	LEDs	SF: ● BF: ● MT: ● PWR: ●
MAC address	24:ea:40:19:00:22	MAC address	00:25:50:01:97:46
IP address	172.17.0.82	IP address	192.168.128.112
Port 1 status	Link up, 100 MB/FD	Port 1 status	Link up, 100 MB/FD
Port 2 status	Link down, -/-	Port 2 status	Link down, -/-
MQTT publisher	Off	MQTT publisher	On

<b>Software</b>		<b>Hardware</b>	
Firmware version	V1.00.110	Serial Number	50019746
Linux kernel version	4.9.4	Order Number	700-159-3MB01
License terms	pn-mb-coupler-licenses.txt	Hardware Revision	HW1-1

www.helmholz.com



NOTE

*Calling the website may influence the transmission performance of the PN/ModbusTCP Coupler.*

The "Module config" page shows the IO modules defined by the PROFINET configuration. On the ModbusTCP page the data type and the address are also indicated. The current value is displayed in brackets.

PN/ModbusTCP COUPLER			
Overview	Module config	Modbus TCP	MQTT
<b>Module Configuration</b>			
	<b>PN Configuration X1</b>	<b>ModbusTCP Configuration X2</b>	
Slot#: 0	IN 2 Bytes (3000)/OUT 1 Byte (00)	Control Register (00)/Status Register (3000)	
Slot#: 1	OUT 1 Byte (00)	Discrete Input - Address 0 (00)	
Slot#: 2	OUT 2 Bytes (0000)	Discrete Input - Address 32 (0000)	
Slot#: 3	IN 1 Byte (00)	Coils - Address 8 (00)	
Slot#: 4	IN 2 Bytes (0000)	Coils - Address 0 (0000)	
Slot#: 5	OUT 2 Bytes (0000)	Input Register - Address 10 (0000)	
Slot#: 6	OUT 2 Bytes (0000)	Input Register - Address 11 (0000)	
Slot#: 7	OUT 2 Bytes (0000)	Holding Register - Address 20 (0000)	
Slot#: 8	OUT 2 Bytes (0000)	Holding Register - Address 0 (0000)	
Slot#: 9	IN 2 Bytes (0000)	Holding Register - Address 0 (0000)	
Slot#: 10	Not configured	Not configured	
Slot#: 11	Not configured	Not configured	

On the web page "ModbusTCP server settings" the IP address and the DNS name of the ModbusTCP network interface can be set, as far as these were not fixed by the GSDML configuration.

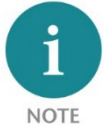
Overview	Module config	ModbusTCP	MQTT	Account	TLS certificates	Firmware upgrade
<b>ModbusTCP server settings</b>						
<b>Note:</b> Some settings may be disabled due to PROFINET configuration						
<b>Address</b>			<b>Parameters</b>			
Mode	<input type="radio"/> DHCP <input checked="" type="radio"/> Static		Listening port	502		
DHCP - Hostname	<input type="text" value="PNModbusTCPcoupler"/>		Maximum number of connected clients	5		
New IP address	<input type="text" value="192.168.128.112"/>		Client connection watchdog [ms]	10000		
New netmask	<input type="text" value="255.255.0.0"/>		PROFINET-status register address (input register)	65535		
New gateway	<input type="text" value="192.168.2.250"/>					
<input type="button" value="✔ Update settings"/>						

## 10 MQTT Publisher

The PN/ModbusTCP Coupler provides besides the PROFINET / ModbusTCP communication also a MQTT Publisher. MQTT is a widely used and simple protocol for distributing information in large networks.

For all IO modules defined in the PROFINET configuration, the current values can now be sent by the PN/ModbusTCP coupler via MQTT when the value changes.

The MQTT Publisher can be activated either on the PROFINET network side (X1) or on the ModbusTCP network side (X2), depending on which network side the data is required or where the MQTT Broker is installed. The MQTT Publisher cannot work on both network sides at the same time.



*Since MQTT works slower than the priority PROFINET/Modbus TCP communication, it may be that not all value changes are transmitted via MQTT, but always only the last value state.*

### 10.1 MQTT Publisher Settings

To be able to distribute data via MQTT in a network, an MQTT broker is always required. The broker can run anywhere in the network. The settings of the MQTT publishers can be specified separately for the two network sides on the website under "MQTT".

PN Configuration X1	ModbusTCP Configuration X2
ClientID: Pn/ModbusTCP Coupler	ClientID: Pn/ModbusTCP Coupler
Username (Optional): Username	Username (Optional): Username
Password (Optional): Password	Password (Optional): Password
Broker IP address: 0.0.0.0	Broker IP address: 192.168.128.42
Broker TCP port: 1883	Broker TCP port: 1883
Keep alive (Seconds): 60	Keep alive (Seconds): 60

**ClientID:** The name of the MQTT publisher

**Username / Password:** Optional username and password to login to the MQTT broker

**Broker IP address:** IP address of the MQTT broker

**Broker TCP port:** MQTT port on the MQTT broker

**Keep alive (seconds):** MQTT connection monitoring during inactivity



*The MQTT Publisher of the PN/ModbusTCP Coupler does not provide encryption!*

## 10.2 MQTT data format

Each configured slot sends its own MQTT message. An MQTT message consists of the topic name and the actual data value (payload). Both are usually transmitted in plain text format. The data is transmitted as hexadecimal bytes for coils and discrete inputs or as a 16-bit decimal number for holding registers and input registers.

The topic name is formed depending on which network - PROFINET (X1) or ModbusTCP (X2) - the MQTT Publisher is activated on.

	PROFINET network:	ModbusTCP network:
<b>Module</b>	MQTT Topic Name	MQTT Topic Name
Write discrete inputs	PN-ClientID/Slot X/Output, Y bytes (1 to 32 bytes)	ModbusTCP-ClientID/Discrete Inputs/Address X, Y Bytes (1 to 32 bytes)
Read Coils	PN-ClientID/Slot X/Input, Y bytes (1 to 16 bytes)	ModbusTCP-ClientID/Coils /Address X, Y Bytes (1 to 16 bytes)
Write Coils	PN-ClientID/Slot X/Input, Y bytes (1 to 16 bytes)	ModbusTCP-ClientID/Coils /Address X, Y bytes (1 to 16 single bytes)
Read holding register	PN-ClientID/Slot X/Output (2 byte decimal value)	ModbusTCP-ClientID/Holding Register/Register X (2 byte decimal value)
Write holding register	PN-ClientID/Slot X/Output (2 byte decimal value)	ModbusTCP-ClientID/Holding Register/Register X (2 byte decimal value)
Write input register	PN-ClientID/Slot X/Output (2 byte decimal value)	ModbusTCP-ClientID/Input Register/Register X (2 byte decimal value)
<b>Example</b>	PN_MQTT/Slot 1/Input, 3 bytes   0x12 0x23	MODBUS_MQTT/Coils/Address 49, 2 bytes   0x12 0x34
	PN_MQTT/Slot 5/Output   12345	MODBUS_MQTT/Holding Register/Register 10   12345

On both network interfaces the following MQTT topics can be read additionally:

**"ClientID/Modules List"**: Contains the list of all topics provided by the PN/ModbusTCP coupler via the addressed interface.

**"ClientID/Status Register"**: Contains the value of the two status bytes.



## 11 Firmware update

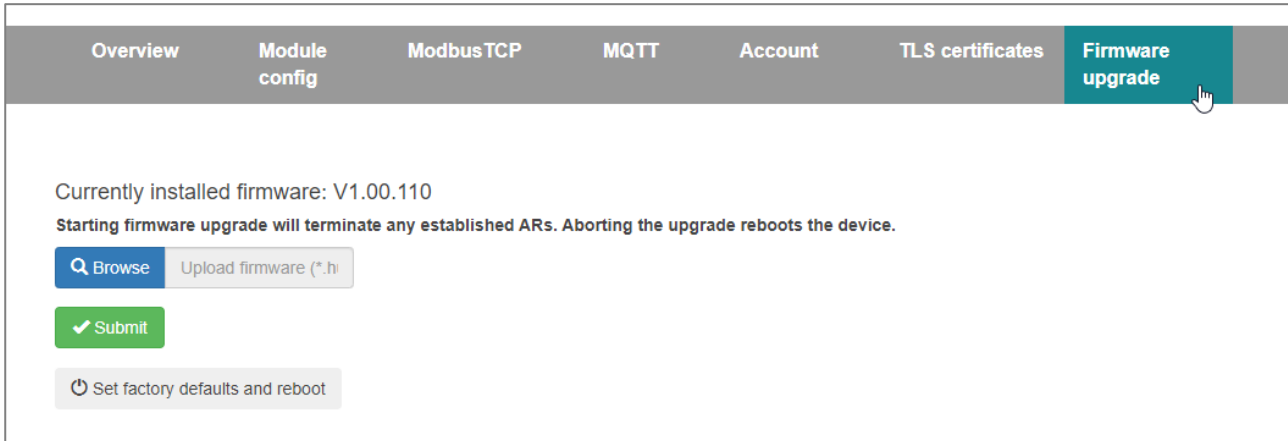
The firmware of the PN/ModbusTCP Coupler can be updated very easily via the website. You can get the firmware from the Helmholz website with the following link:

<http://www.helmholz.de/goto/700-159-3MB01#tab-software>



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

A firmware update can be performed via the web interface on the "Firmware upgrade" page.



Overview    Module config    ModbusTCP    MQTT    Account    TLS certificates    **Firmware upgrade**

Currently installed firmware: V1.00.110  
Starting firmware upgrade will terminate any established ARs. Aborting the upgrade reboots the device.

Upload firmware (\*.huf)

With the button "Browse" the firmware can be selected. With the button "Submit" the firmware is transferred to the PN/ModbusTCP coupler and burned. Afterwards the PN/ModbusTCP coupler executes a reboot, and the new firmware is active.



ACHTUNG

*During the update process the operation of the PN/MQTT Coupler is interrupted. Do not switch off the device during the update process!*

## 12 Resetting to factory settings

Resetting the PN/ModbusTCP Coupler to factory settings can be done via the web page or via the PROFINET function.

When resetting the PN/ModbusTCP coupler, the configuration is irretrievably deleted, and the settings are reset to the factory defaults. The firmware remains at the current status.

To reset via the website, use the button on the "Firmware upgrade" page:

To reset the PN/ModbusTCP Coupler, the Helmholz tool "IPSet" can also be used via the PROFINET network.

## 13 Technical data

Order no.	700-159-3MB02
Article designation	PN/ModbusTCP Coupler
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
I/O image size	Up to 1024 Byte of input and output data
Number of configurable slots	300
Features	PROFINET Conformance Class B, media redundancy (MRP-Client), automatic addressing, Topology detection (LLDP, DCP), diagnosis alarms
MQTT interface (X2)	
Connection	2x RJ45, integrated switch
Protocol	ModbusTCP Server
Transmission rate	10/100 Mbit/s, full-/half duplex
Storage size	65536 Coil Bits, 65536 Discrete Input Bits, 65536 Input Register, 65536 Holding Register
Supported function codes	1, 2, 3, 4, 5, 6, 15, 16, 22, 23
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

## 14 LED status information

	X1 PROFINET (left side)	X2 MQTT network (right side)
<b>SF (red)</b>		
Off	Configuration correct	Configuration correct
On	There is no configuration, the configuration does not agree with the configuration on the right side (X2), or a diagnosis exists.	PROFINET side not configured or failed
Flashing	PROFINET function "LED flashing" for finding the device is executed	-
<b>BF (red)</b>		
Off	The device is configured	The device is configured
On	The device has no configuration, the PROFINET device name is incorrect, or there is no connection with the PROFINET controller	No Ethernet cable plugged in or no Ethernet connection
Flashing	PROFINET function "LED flashing" for finding the device is executed	-
<b>MT (yellow)</b>		
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 being carried out	-
<b>PWR (green)</b>		
On	PS1 Power supply present	PS2 Power supply present
<b>RUN (green)</b>		
Off	Firmware or device defective. Please contact Support	
On	The device is ready to operate	
<b>RJ45 LEDs</b>	X1 P1/P2 und X2 P1/P2	
Green (Link)	Connected	
Orange (Act)	Data transfer at the port active	



*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](http://www.helmholz.de).*

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