TURCK

Your Global Automation Partner

BL...-PG-EN-V3 Programmable Ethernet Gateways

Instructions for Use

Contents

1 About these instructions

These instructions describe the setup, functions and use of the product and help you to operate the product according to its intended purpose. Read these instructions carefully before using the product. This will prevent the risk of personal injury and damage to property. Keep these instructions safe during the service life of the product. If the product is passed on, pass on these instructions as well.

1.1 Target groups

These instructions are aimed at qualified personnel with knowledge of explosion protection (e.g. EN 60079-14 etc.) and must be carefully read by anyone mounting, commissioning, operating, maintaining, dismantling or disposing of the device.

1.2 Explanation of symbols

The following symbols are used in these instructions:

	**DANGER** DANGER indicates a hazardous situation with a high level of risk, which, if not avoided, will result in death or serious injury.
	**WARNING** WARNING indicates a hazardous situation with a medium level of risk, which, if not avoided, will result in death or serious injury.
	**CAUTION** CAUTION indicates a hazardous situation with a medium level of risk, which, if not avoided, will result in moderate or minor injury.
	**NOTICE** CAUTION indicates a situation which, if not avoided, may cause damage to property.
	**NOTE** NOTE indicates tips, recommendations and important information about special action steps and issues. The notes simplify your work and help you to avoid additional work.
▶	**MANDATORY ACTION** This symbol denotes actions that the user must carry out.
⇨	**RESULT OF ACTION** This symbol denotes the relevant results of an action.

1.3 Other documents

Besides this document, the following material can be found on the Internet at www.turck.com:

- Data sheet
- Declarations of conformity
- Approvals

1.4 Feedback about these instructions

We make every effort to ensure that these instructions are as informative and as clear as possible. If you have any suggestions for improving the design or if some information is missing in the document, please send your suggestions to techdoc@turck.com.

2 Notes on the product

2.1 Product identification

These instructions apply to the following devices:

Programmable Ethernet gateways with CODESYS-V3-PLC runtime:

- BL20-PG-EN-V3
- BL67-PG-EN-V3

Programmable Ethernet gateways with CODESYS-V3-PLC runtime and WebVisu license:

- BL20-PG-EN-V3-WV
- BL67-PG-EN-V3-WV

2.2 Scope of delivery

The following are included in the scope of delivery:

- Gateway
- Mounting clip (BL20 only)

2.3 TURCK service

TURCK supports you in your projects — from the initial analysis right through to the commissioning of your application. The TURCK product database at www.turck.com offers you several software tools for programming, configuring or commissioning, as well as data sheets and CAD files in many export formats.

For the contact details of our branches worldwide, please see page [▶ 81].

2.4 Software licenses

This product uses software-packages form third-party sources which are used within the scope of the licenses listed in the web server:

You can view the licenses valid for the product at the following link:

http://<device IP address>/license.html

Source code for the open-source packages included in this product can be requested at:

TURCK GmbH
Attn. Legal Department
Witzlebenstraße 7
D-45472 Mülheim an der Ruhr
or by e-mail to open.source@turck.com.

Your request should include:

1. the name of the covered binary
2. the version number of the TURCK product containing the covered binary
3. your name
4. your company name (if applicable)
5. your return mailing and email address (if available)

We may charge you a nominal fee to cover the cost of the media and distribution. Your request must be sent within three (3) years after delivery of the product or as long as we offer spare parts or customer support for this product model.

3 For your safety

The product is designed according to state of the art technology. Residual hazards, however, still exist. Observe the following safety instructions and warnings in order to prevent danger to persons and property. TURCK accepts no liability for damage caused by failure to observe these safety instructions.

3.1 General safety instructions

- The device must only be fitted, installed, operated, parameterized and maintained by trained and qualified personnel.
- Only use the device in compliance with the applicable national and international regulations, standards and laws.
- The device meets the EMC requirements for the industrial areas. When used in residential areas, take measures to prevent radio frequency interference.

3.2 Intended use

The gateways of type BL…-PG-EN-V3(-WV) are part of the BL… system. The CODESYS programmable gateways acc. to IEC 61131-3 can also be operated as autonomous PLCs to control applications or as peripheral components in a network for local and fast signal processing. Hence, programmable gateways serve to relieve the central control of a network.

The device must only be used as described in these instructions. Any other use is not in accordance with the intended use. TURCK accepts no liability for any resulting damage.

3.3 Obvious misuse

- BL20 and BL67 hardware cannot be used together in a system network. The BL20 gateway is only compatible with BL20 modules and the BL67 gateway is only compatible with BL67 modules.

3.4 Notes on Ex protection

- When using the device in Ex areas, the user must have knowledge of explosion protection (IEC/EN 60079-14 etc.).
- Observe national and international regulations for explosion protection.
- Only use the device within the permissible operating and ambient conditions (see certification data and Ex approval specifications).

4 Product description

The programmable BL20 and BL67 gateways can be used as autonomous PLCs or as decentralized PLCs in a network interconnection for fast, decentralized preprocessing of signals. The programmable gateways enable autonomous control of applications even without higher-level control. The Ethernet ports are used as an interface for programming, configuration and fieldbus communication. With multiprotocol technology, the device can be used as a device or server on controllers or PC-based systems with PROFINET, EtherNet/IP or Modbus TCP. In addition, the device can be operated as a Modbus TCP client. Gateways are the head component of each BL20 or BL67 station. The electronic modules communicate over the internal module bus with the gateway and can be configured independently of the fieldbus protocol.

4.1 Device overview

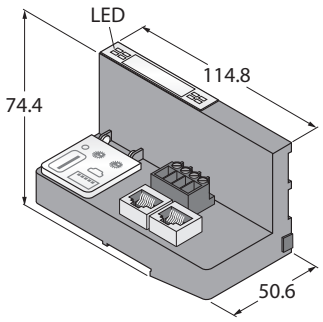


Fig. 1: Device dimensions BL20-PG-EN-V3

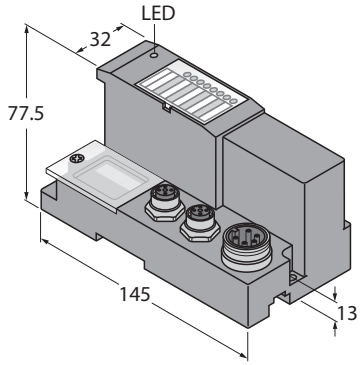
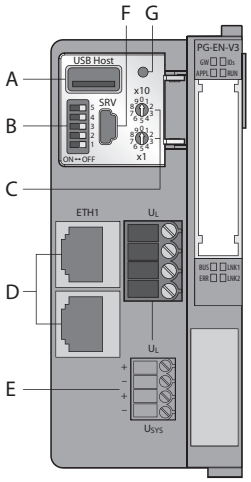
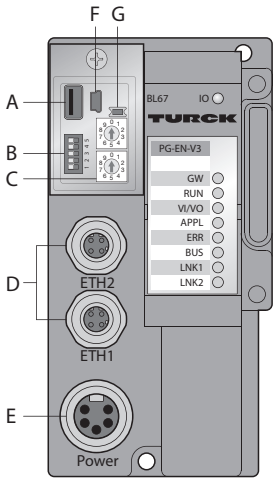


Fig. 2: Device dimensions BL67-PG-EN-V3

4.1.1 Device design

Device design BL20-PG-EN-V3	Device design BL67-PG-EN-V3	Description
		**A** USB host port **B** DIP switch for setting the operating mode **C** Rotary coding switch for addressing **D** Ethernet ports **E** Power supply **F** USB device port (Service) **G** SET button

4.1.2 Block diagrams

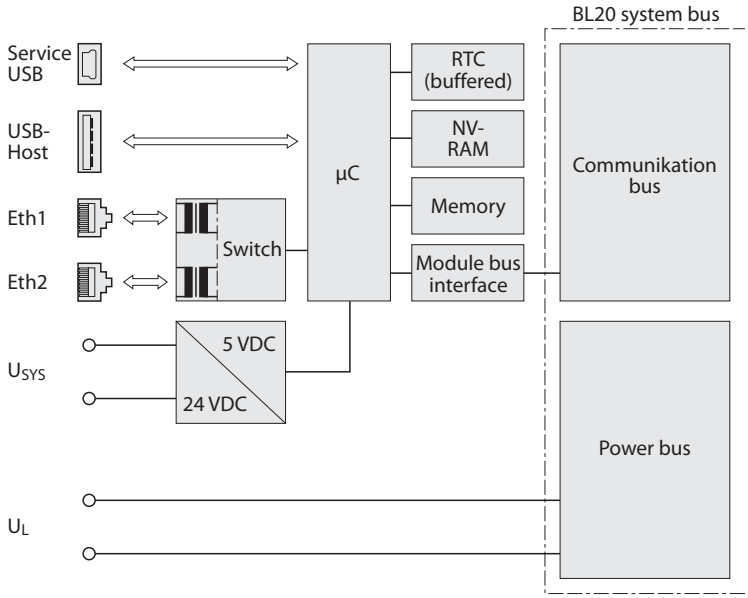


Fig. 3: Block diagram BL20-PG-EN-V3

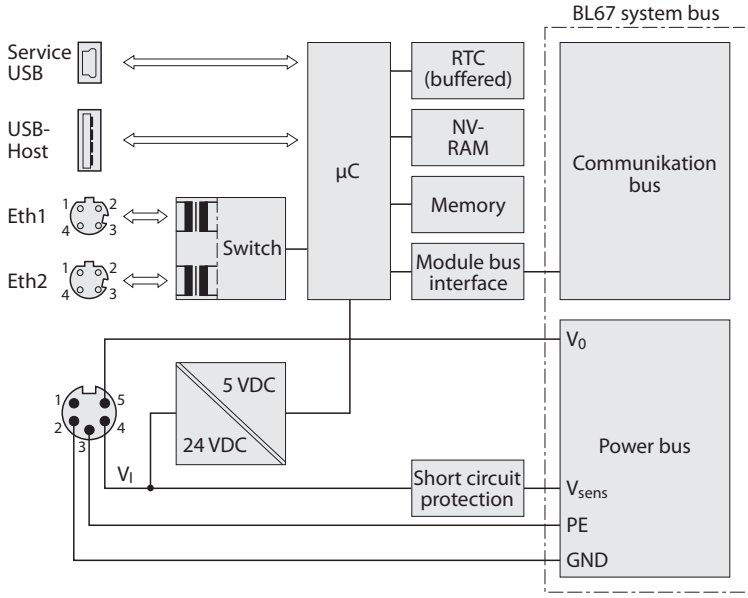


Fig. 4: Block diagram BL67-PG-EN-V3

4.1.3 Operating elements

The device has the following operating elements:

- Rotary coding switch and DIP switch to adjust network settings
- SET button

4.1.4 Indicators

The devices have the following LEDs:

- Power supply
- Collective and bus faults
- Status
- Diagnostics

4.2 Properties and characteristics

- Programmable according to IEC 61131-3 with CODESYS V3 in:
  - AWL = instruction list
  - KOP = ladder logic
  - FUP = function block diagram
  - SFC = Sequential Function Chart
  - ST = Structured text
- Integrated Gold CAP-buffered RTC (real-time clock)
- USB device port as programming and service interface
- USB host port for connecting USB memory sticks for firmware update, program backup, program recovery, data synchronization
- Protocol converters, for example, between Ethernet and serial communication
- LEDs for displaying PLC status (LED APL, LED RUN), supply voltage (LED VI/VO, BL67 only), collective faults (LED ERR) and bus faults (LED BUS)
- Integrated Ethernet switch enables line topology
- Integrated web server
- Fieldbus connection
- Dual MAC mode: Two separate Ethernet ports for connecting different Ethernet networks
  - BL67-PG-EN-V3: Ethernet, 2 × M12 female connector, 4-pin D-coded
  - BL20-PG-EN-V3: Ethernet, 2 × RJ45 ports
- Power supply
  - BL67-PG-EN-V3: 5-pin 7/8" connector
  - BL20-PG-EN-V3: screw terminals
- Type of protection
  - BL67-PG-EN-V3: IP67
  - BL20-PG-EN-V3: IP20

4.3 Functions and operating modes

4.3.1 Multiprotocol technology

The devices can be used in the following three Ethernet protocols:

- Modbus TCP
- EtherNet/IP
- PROFINET

5 Installing

5.1 Installing the BL20 station

DANGER
Potentially explosive atmosphere
Explosion due to ignitable sparks
For use in zone 2:

- ▶ Only install the device if there is no potentially explosive atmosphere present.
- ▶ Disconnect and connect circuits only when no voltage is present.
- ▶ Only actuate the switches when there is no voltage present.
- ▶ Mount the mounting rail on a conductive mounting plate with a thickness of at least 2 mm to establish a reference potential for protective and functional earth. For mounting rails that are not pre-drilled, observe a hole spacing of max. 150 mm.
- ▶ Observe the Ex approval requirements.

WARNING
Open electrical contacts
Danger to life due to electric shock when using 120/230 VAC

- ▶ Cover open contacts on the last base module of each station with end plate or place a power feeding module (24 V) to form a new potential group.

- A BL20 station consists of at least one gateway and one electronic module.
- BL20 stations must be mounted on the DIN rail using two end brackets (BL20-WEW-35/2-SW).
- The BL20 station can be mounted both vertically and horizontally.
- For vertical installation, the gateway can be positioned either above or below. In this case, sufficient ventilation and heat dissipation must be ensured.
- Keep space to the left of the gateway free for the first end bracket.
- Install the end plate after the last BL20 module.
- The first electronic component of each BL20 station is a gateway.
- The gateway is followed by the I/O modules in any order.
- Power feeding and bus refreshing modules are used for potential isolation and can be mounted between the other modules, if required.
- Potential distribution modules can be used if required. A maximum of two potential distribution modules may be mounted directly next to each other.
- Protect the mounting location from radiated heat, sudden temperature fluctuations, dust, dirt, humidity and other ambient influences.

5.1.1 Installing the DIN rail

Recommendation for mounting the BL… system on a DIN rail in the control cabinet:

- ▶ Mount the DIN rail on a rust-free, electrically conductive mounting plate. The mounting plate can be used to establish a reference potential for the protective and functional ground.

The minimum thickness of the mounting plate depends on the material:

- – Steel and stainless steel: min. 2 mm
- – Aluminum: min. 3 mm

- ▶ Attach the DIN rail to the mounting plate using suitable rivets (A) or screws (B) as shown in the figure "DIN rail mounting" below. The choice of rivets or screws depends on the composition of the mounting plate.
- ▶ When installing several DIN rails on top of each other, ensure there is sufficient distance between the DIN rails (C). The arrangement of the components in the control cabinet depends on the application.
- ▶ Maintain a distance of at least 10 mm from passive components.
- ▶ Maintain a distance of at least 75 mm from active components (e.g. power supply).

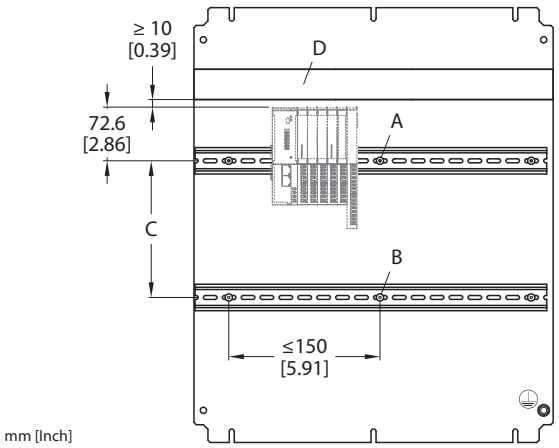


Fig. 5: DIN rail mounting

5.1.2 Installing the gateway

- The DIN rail must already be mounted.
- An end bracket must be mounted in front of the gateway. The end bracket can be mounted at the beginning or after the complete station has been mounted.
- The gateway is the first electronic element of each BL… station.

- ▶ Hang the groove of the gateway into the DIN rail from below.
- ▶ Turn the upper end of the gateway to the rear.
- ▶ Press the gateway against the DIN rail until the latching hook audibly engages.

5.1.3 Installing end bracket and end plate

- BL… stations must be mounted on the DIN rail using two end brackets (BL20-WEW-35/2-SW).
- The first bracket must be mounted in front of the gateway.
- The second bracket is integrated into the end plate and must be installed behind the last module.

Mount the end bracket in front of the gateway

- ▶ If necessary, loosen the screw in the end bracket.
- ▶ Latch the end bracket to the left of the gateway onto the DIN rail.
- ▶ Push the end bracket close to the gateway.
- ▶ Tighten the end bracket.

Installing the end plate

- ▶ If necessary, loosen the screw in the end bracket.
- ▶ Push the end bracket into the recess of the end plate.
- ▶ Hold the end plate and end bracket in such a way that the connectors on the end plate point toward the last module of the BL… station.
- ▶ Latch the end plate onto the DIN rail using the end bracket.
- ▶ Press the end plate with the end bracket close to the last module of the BL… station.
- ▶ Insert the connectors of the end-plate firmly into the recesses on the module.
- ▶ Screw the end bracket through the end plate.

5.2 Installing the BL67 station

NOTE
TURCK recommends assembling the BL67 station before mounting it on a mounting plate or on a DIN rail.

NOTICE
Lack of bolting and damaged seals
No guarantee of IP67 degree of protection
- ▶ Tighten the screws of the base modules securely.
- ▶ Check the seal on the left module bus connector of the base modules is correctly positioned and in good condition.

- The BL67 station can be mounted directly on a mounting plate or on a DIN rail.
- The BL67 station can be mounted both vertically and horizontally.
- When mounting on DIN rail: BL67 station mounted on the DIN rail using two end brackets (BL20-WEW-35/2-SW).
- The first electronic component of each BL67 station is a gateway.
- The gateway is followed by the I/O modules in any order.
- Mount the end plate after the last BL67 module. The end plate protects the module bus contacts of the last base module and ensures that protection class IP67 can be observed.

5.2.1 Installing the gateway and base modules

- The I/O modules are mounted to the right of the gateway.

▶ Insert the module bus contacts of the first base module into the module bus contacts of the gateway.
▶ Screw the gateway and the base module together.
▶ Mount all other base modules to the right of the last mounted base module in the same way.

5.2.2 Installing the electronic modules

NOTE
TURCK recommends that the station be blasted with compressed air before the electronic modules are plugged in. This prevents dust and dirt particles from impacting the plug contacts and therefore the error-free communication in the station.

✓ The associated base module must already be installed.
✓ Electronic modules are plugged into the installed and wired base modules.
▶ Press the electronic module evenly onto the base module.
▶ Tighten both screws on the electronic modules securely.

5.2.3 Installing the end plate

The end plate is attached to the last base module of a station using two screws. It is used to protect the module bus contacts of the last base module. The end plate ensures compliance with protection class IP67.

▶ Insert the end plate onto the last base module of the BL67 station in such a way that the module bus contacts of the base module are covered.
▶ Tighten both screws of the end plate securely.

NOTICE
Incorrect mounting of the end plate and damaged seals
No guarantee of IP67 degree of protection
▶ Mount the end plate correctly.
▶ Check the seal on the end plate is correctly positioned and in good condition.

5.2.4 Installing the BL67 station on a mounting plate

BL67 stations can be mounted directly on a pre-drilled mounting plate. The mounting plate must be connected to PE.

▶ Attach the BL67 station directly to the mounting plate using screws through the holes in the base modules and the gateway.

5.2.5 Installing the DIN rail

BL67 stations should be mounted on a DIN rail on a galvanized mounting plate with a thickness of at least 2 mm. This makes it possible to establish a reference potential for the protective and functional ground.

Ensure a hole spacing of max. 150 mm on DIN rails that have not been predrilled.

- ▶ Use a screwdriver to open the locking hooks of the gateway and all base modules of the station.
- ▶ Attach the station to the DIN rail from below and push it toward the support rail.
- ▶ Close the locking hooks of the gateway and all base modules of the station.
- ⇨ The locking hooks must tightly enclose the top edge of the DIN rail.

5.2.6 Installing the end bracket

BL67 stations must be secured by an end bracket at each end of the station when mounted on DIN rails.

- ▶ If necessary, loosen the screw.
- ▶ Latch the end bracket to the left of the gateway onto the DIN rail.
- ▶ Push the bracket close to the gateway or the last base module of the station and tighten the end bracket.

6 Connection

6.1 Connecting the BL20 gateways

6.1.1 Connecting gateways to Ethernet

BL20-PG-EN-V3

The device has two RJ45 connectors for connecting the device to an Ethernet system.

▶ Connect the device to the fieldbus according to the pin assignment shown below.

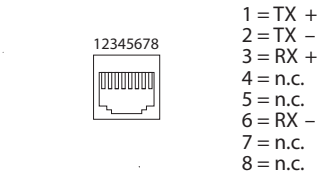


Fig. 6: Pin assignment for Ethernet connections

6.1.2 Connecting the supply voltage

▶ Connect the devices to the power supply as shown in the pin assignment below.

BL20-PG-EN-V3

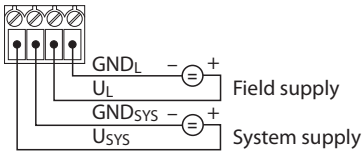


Fig. 7: Power supply BL20-PG-EN-V3

6.2 Connecting the BL67 gateways

6.2.1 Connecting gateways to Ethernet

BL67-PG-EN-V3

The device has two M12 Ethernet connectors for connection to an Ethernet system (4-pin, D-coded).

- ▶ Connect the device to the fieldbus according to the pin assignment shown below.

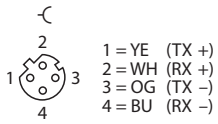


Fig. 8: Pin assignment for Ethernet connections

6.2.2 Connecting the supply voltage

- ▶ Connect the devices to the power supply as shown in the pin assignment below.

BL67-PG-EN-V3

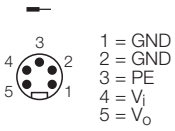


Fig. 9: Power supply BL20-PG-EN-V3

6.3 Using the USB device port

The USB device port is designed as a mini USB B port and can be used as a service interface for the device DTMs and as a programming interface for CODESYS.

RNDIS driver

The RNDIS driver for using the USB device port is automatically installed when the DTM is installed in PACTware. After installation, the USB device port is displayed in the DTM as an additional Ethernet port.

NOTE
The BL Service Ethernet interface is used in the DTM to access the device.

6.4 USB Host Port

The USB host port is designed as a USB 2.0 A port and is used to connect USB memory sticks for loading and backing up CODESYS programs and updating the device firmware.

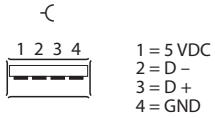


Fig. 10: USB Host Port

7 Commissioning

7.1 Naming convention

TURCK uses

- the terms "Client" and "Server" for Modbus.
- the terms "Controller" and "Device" for Profinet.
- the terms "Scanner" and "Device" for EtherNet/IP.

The following description uses the terms "Master" and "Slave" only because of the names in CODESYS, TIA-Portal and RSLogix 5000.

7.2 Adjusting network settings

7.2.1 Adjusting network settings using the switch on the device

Rotary coding switch	DIP switch A					Mode	Description
	5 (MODE)	4	3	2	1		
00	1	0	0	-	-	Restore IP	Resetting the device to default settings (see p. [▶ 19]): IP address: 192.168.1.254 Subnet mask: 255.255.255.0 Gateway: 192.168.1.1 Autonegotiation/AutoMDIX: active QuickConnect/FSU: inactive
40	1	-	-	-	-	DHCP	Addressing via DHCP (see p. [▶ 20]).
50	1	-	-	-	-	PGM	Addressing via PGM (see p. [▶ 21]).
60	1	-	-	-	-	PGM-DHCP	Addressing via PGM DHCP (see p. [▶ 21]). Condition on delivery
90	1	-	-	-	-	F_Reset	Reset to factory settings (see p. [▶ 22]).
1…99	0	-	-	-	-	Static rotary	Sets the last byte of the IP address (see p. [▶ 20]). The remaining three bytes are taken from the IP address previously stored in the device.
00	0	0	0	-	-	Address	Sets the last byte of the IP address to 100. The remaining three bytes are taken from the IP address previously stored in the device.

7.2.2 Resetting network settings (Restore IP)

With the Restore IP setting and a subsequent voltage reset, the station for IP-based services is set to the address 192.168.1.254.

NOTE
This switch position is not an operating mode.
▶ After resetting the IP address to the default values, set another mode.

7.2.3 Adjusting network settings using the rotary coding switch

When addressing using Rotary mode, the last byte of the IP address is set at the two rotary coding switches on the gateway.

The other network settings are permanently stored in the module EEPROM and cannot be changed in rotary mode.

Addresses from 1 to 99 can be set. The address 0 is used for broadcast messages on the subnet.

The following example shows the settings for address **05**.

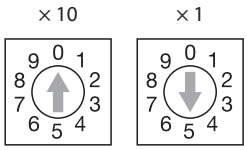


Fig. 11: Example: Set the address using the rotary coding switch

The setting made in Rotary mode is not stored in the EEPROM of the module, i.e. it is lost if there is a later address assignment via BootP/DHCP or PGM.

The new set IP address is adopted after a voltage reset at the gateway.

7.2.4 Adjusting network settings using DHCP mode

Activate DHCP mode

- ▶ Set the DIP switch mode to **ON**.
- ▶ Set the rotary coding switch to 40.

Addressing during commissioning of the gateway is carried out via a DHCP server in the network.

The subnet mask allocated by the DHCP server and the default gateway address are permanently stored in the gateway EEPROM. If the addressing mode is changed, the settings made here (IP address, subnet mask) are adopted from the EEPROM of the module.

- ▶ Carry out a voltage reset when the addressing mode is changed.

DHCP supports three types of IP address allocation:

- In the case of "automatic address assignment", the DHCP server assigns a permanent IP address to the Client.
- In "dynamic address assignment", the address assigned by the server is always only reserved for a specific period of time. After this time has expired, or if a Client explicitly "releases" the address within this time period, it is reassigned.
- In "manual address assignment", the network administrator assumes the assignment. DHCP is only used in this case to transfer the assigned address to the client.

DHCP for PROFINET

For PROFINET applications, make sure that the address assigned via the DHCP server matches the address assigned in the configuration tool.

7.2.5 Adjusting network settings using PGM mode

Activating PGM mode

- Set the DIP switch mode to **ON**.
- Set the rotary coding switch to 50.
- Carry out a voltage reset when the addressing mode is changed.

The PGM mode enables the FDT/DTM to access the gateway's network settings.

In PGM mode, all network settings (IP address, subnet mask, etc.) are assumed by the module's internal EEPROM.

7.2.6 Adjusting network settings using PGM DHCP mode (universal mode)

Activating PGM-DHCP mode

- Set the DIP switch mode to **ON**.
- Set the rotary coding switch to 60.
- Carry out a voltage reset when the addressing mode is changed.

The device sends DHCP requests until it is assigned an IP address (DHCP server, PROFINET controller, PACTware, TAS, web server).

The assigned address is stored in the device and the DHCP client is deactivated.

No more DHCP requests are sent from the device even after the device is restarted.

PGM-DHCP for PROFINET

This mode enables PROFINET-compliant operation of the device.

If a DHCP server is used on the network, problems may arise when assigning the IP address.

In this case, both the DHCP server and the PROFINET controller (via DCP) attempt to assign an IP address.

7.2.7 F_Reset (resetting to factory settings)

- ▶ Set the DIP switch mode to **ON**.
- ▶ Set the rotary coding switch to 90.

This mode resets all device settings to the default values and deletes all data in the device's internal flash memory.

NOTE
This switch position is not an operating mode.
- ▶ After resetting the IP address to the default values, set another mode.

The following properties are reset to the default settings or deleted during F_Reset:

		Default value	Comment
IP address/ subnet mask	Reset	192.168.1.254/ 255.255.255.0	The device can be reached via TAS and the web server at this IP address. The address is not stored in the device.
PROFINET device name	Reset	-	
CODESYS program	deleted	-	
Parameters (PG-V3)	Reset	See parameter [▷ 60]	
I/O module parameters	No		

Resetting to factory settings via DCP-based services (via TAS and the web server or TIA Portal and Step7) does not delete the CODESYS program.

7.2.8 Adjusting network settings via TAS (TURCK Automation Suite)

- Connect the device to a PC via the Ethernet interface.
- Open TAS.
- Click **Scan network**.

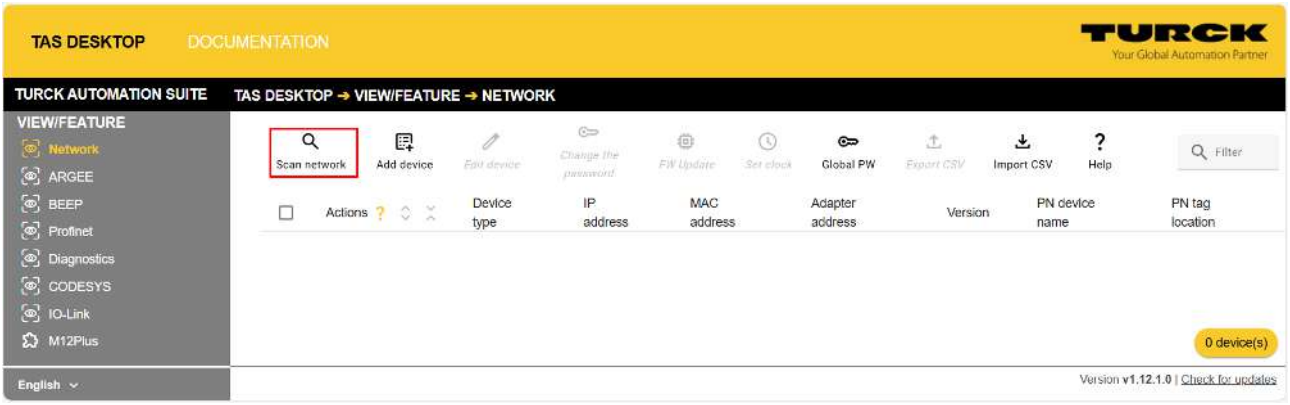


Fig. 12: Home screen in TAS

⇨ TAS shows the connected devices.

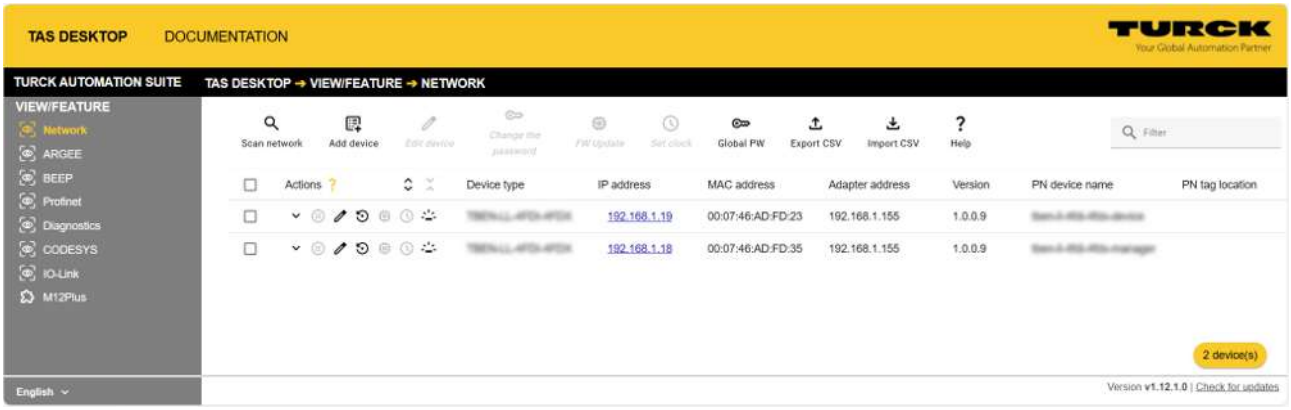


Fig. 13: Found devices in TAS

- Select the relevant device (check box).
- Click **Edit device**.

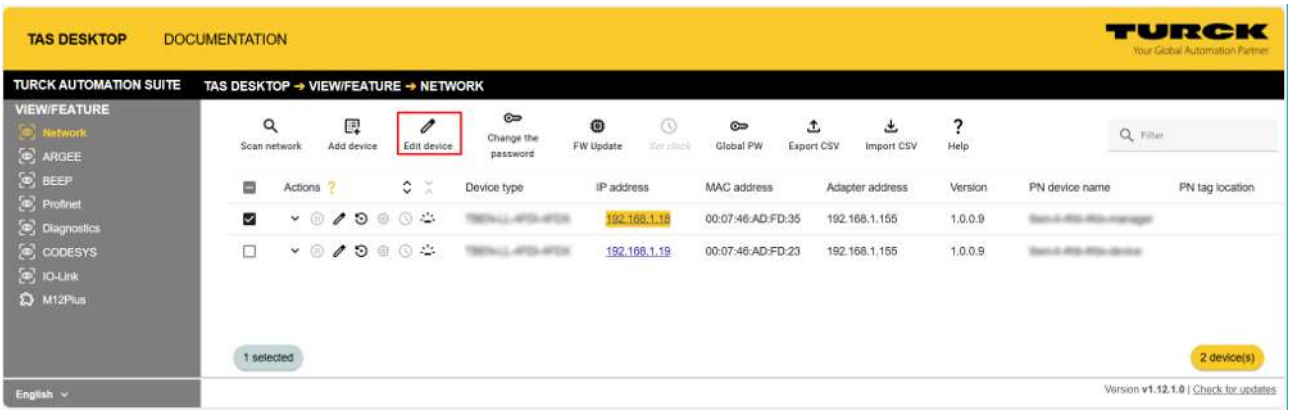


Fig. 14: Selecting the device in TAS

NOTE
By clicking on the IP address of the device, the configuration view of the device can be opened either in TAS or on the device website.

- Enter the device password and click **Login** The default password is "password".
  Note: TURCK recommends changing the password after the first login for security reasons.

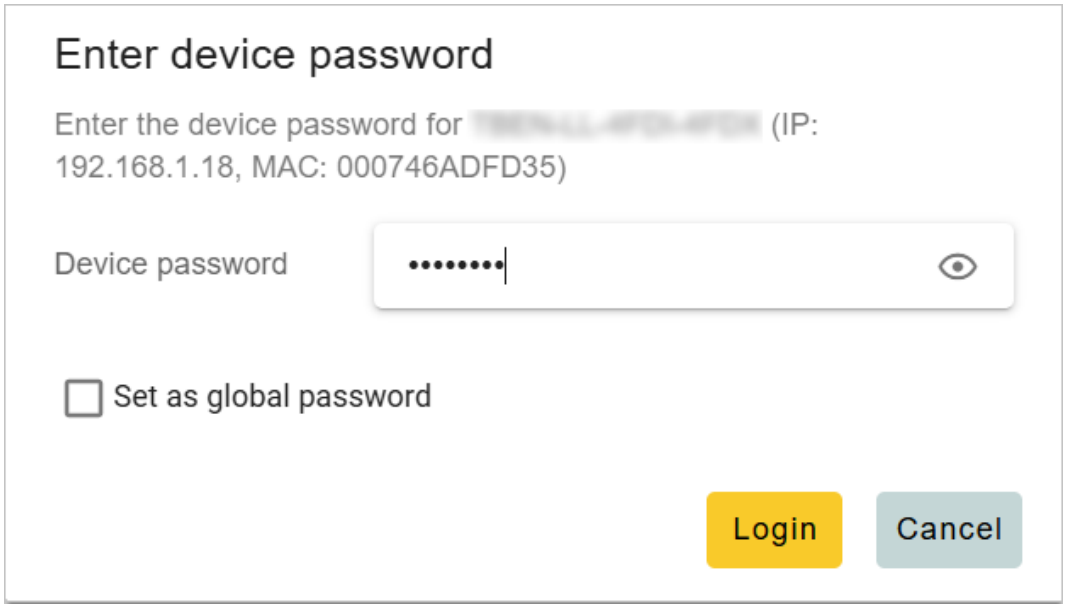


Fig. 15: Entering the device password

- Change the PN device name, IP address and, if necessary, the default gateway, subnet mask and PN tag location.
- Save changes by clicking on **Apply** .

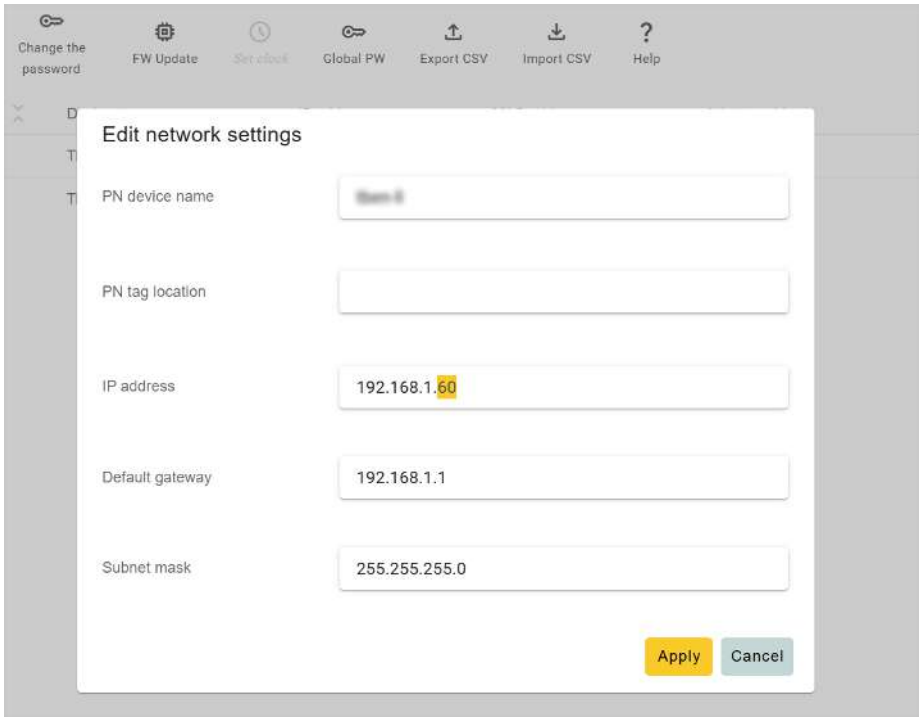


Fig. 16: Changing network settings in TAS

7.2.9 Adapting network settings via PACTware

- Open PACTware.
- Right-click on **HOST PC**.
- Click **Add device**.

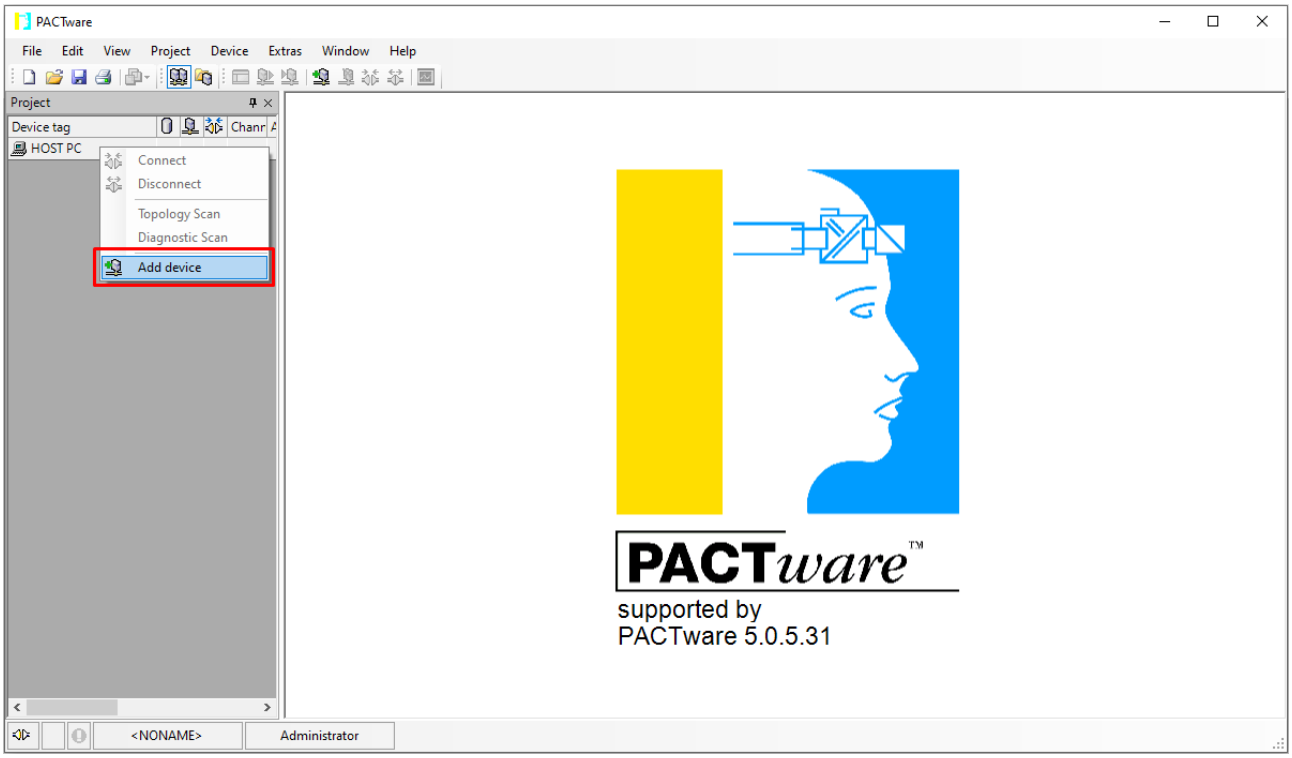


Fig. 17: PACTware — add a device

- Select **BL Service Ethernet** and confirm with **OK**.

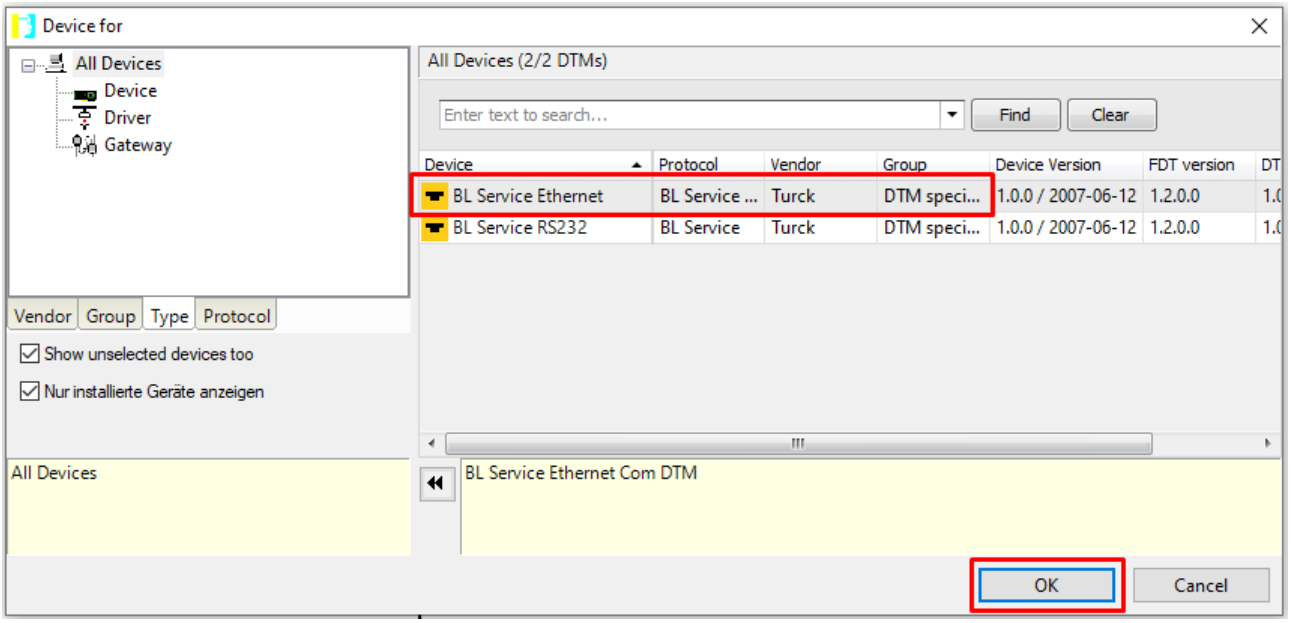


Fig. 18: PACTware — select BL Service Ethernet

▶ Double-click the created device.

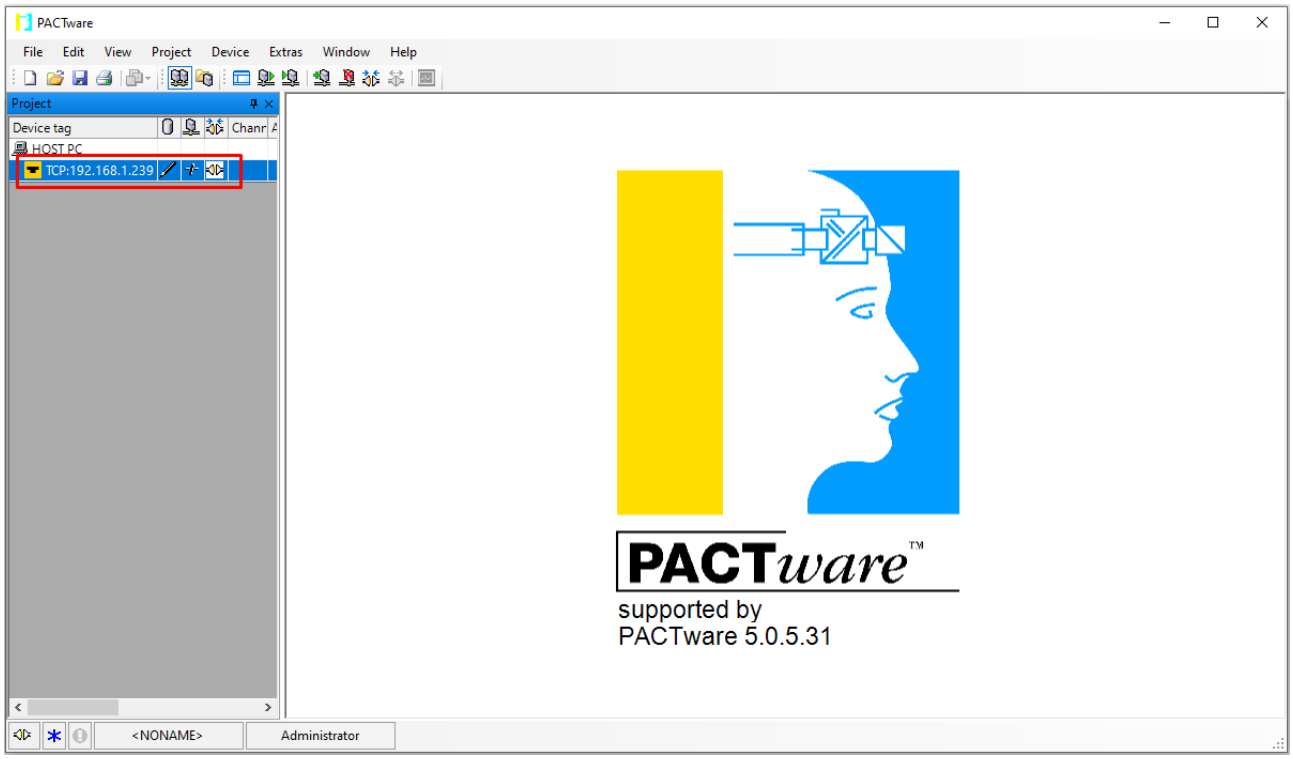


Fig. 19: PACTware — select the device

▶ Click **Search for nodes**.

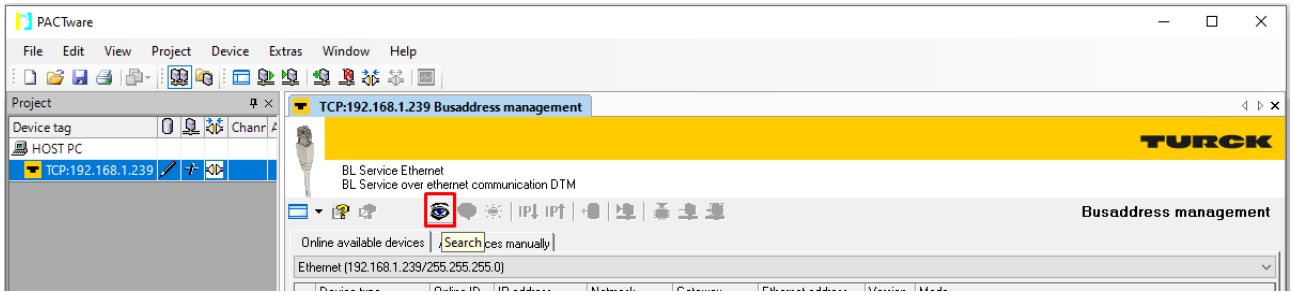


Fig. 20: PACTware — search for nodes

- ▶ Click the IP address.
- ▶ Set the IP address and confirm by clicking **Accept**.

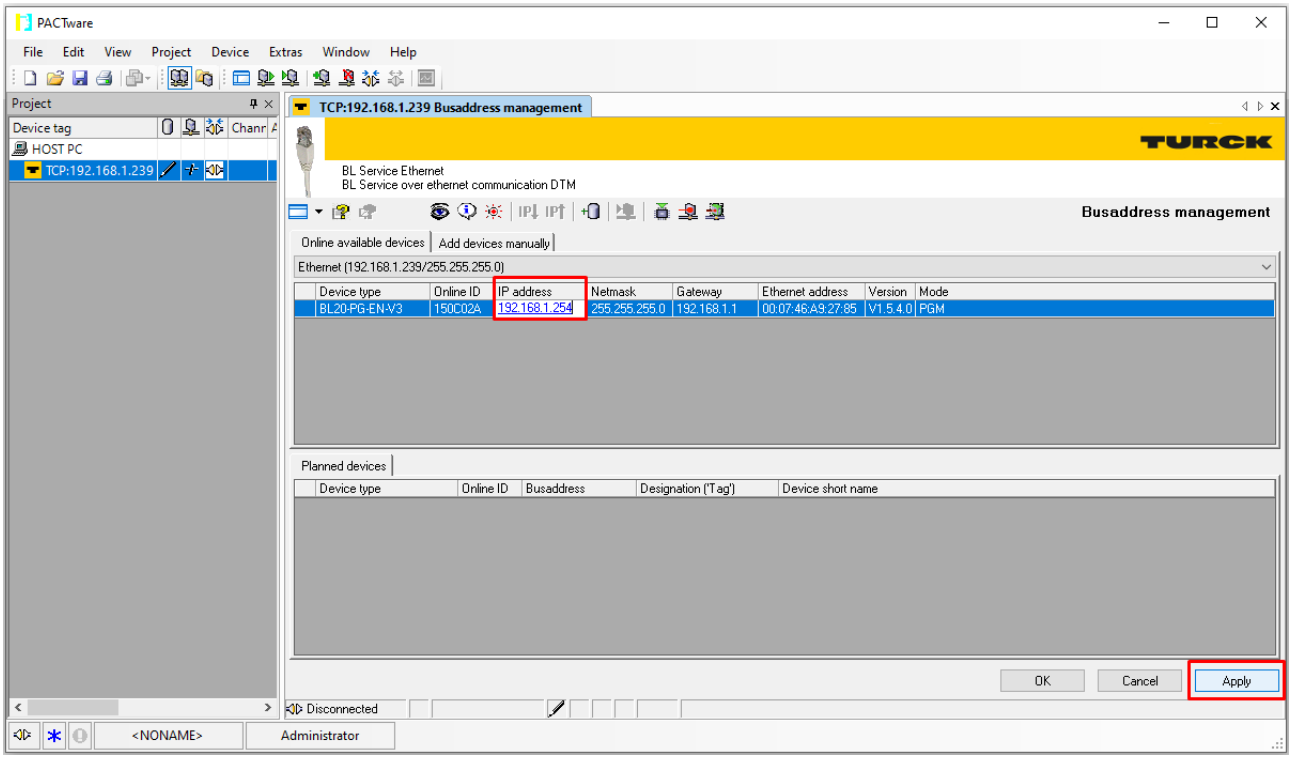


Fig. 21: PACTware — set the IP address

- ▶ Click **Yes** in the dialog window.

7.2.10 Adjusting network settings via the web server

If the device is operated in switch mode, the IP address of the device can be set in the web server.

If the device is operated in dual MAC mode, the two IP addresses of the separate Ethernet ports (ETH1 and ETH2) can be adjusted via the web server.

NOTE
The device must be in PGM mode in order to set the IP address via the web server.

- Open the web server.
- Log into the device as administrator. The default password for the web server is "password".
- Click **MAIN → Parameter → Network**.
- Change the IP address and, if applicable, subnet mask and default gateway for the respective port.
- Write the new IP address, subnet mask and default gateway via **SET NETWORK CONFIGURATION** to the device.

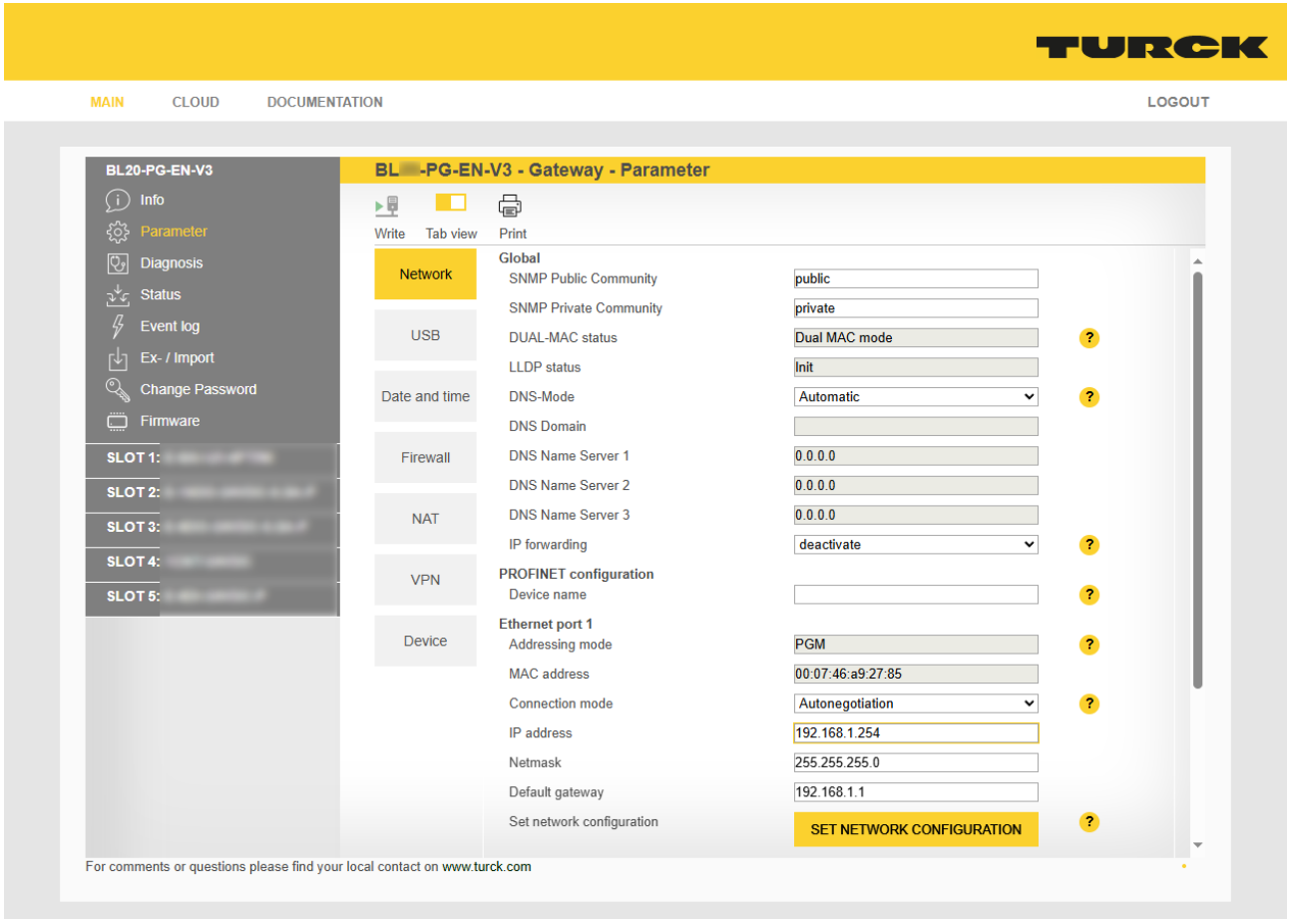


Fig. 22: Set the IP address in the web server

7.2.11 Adjusting Ethernet port mode (dual MAC mode)

Dual MAC mode can be activated using the rotary encoder switches on the gateway.

Setting dual MAC mode

- Set the rotary encoder switches x10 and x1 to 1.

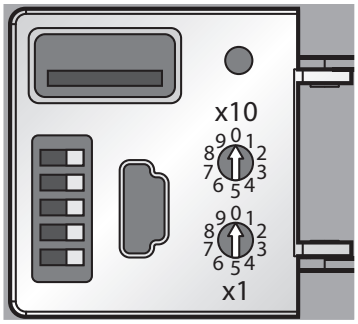


Fig. 23: DIP switches (BL20-PG-EN-V3)

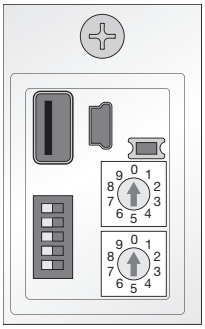


Fig. 24: DIP switches (BL67-PG-EN-V3)

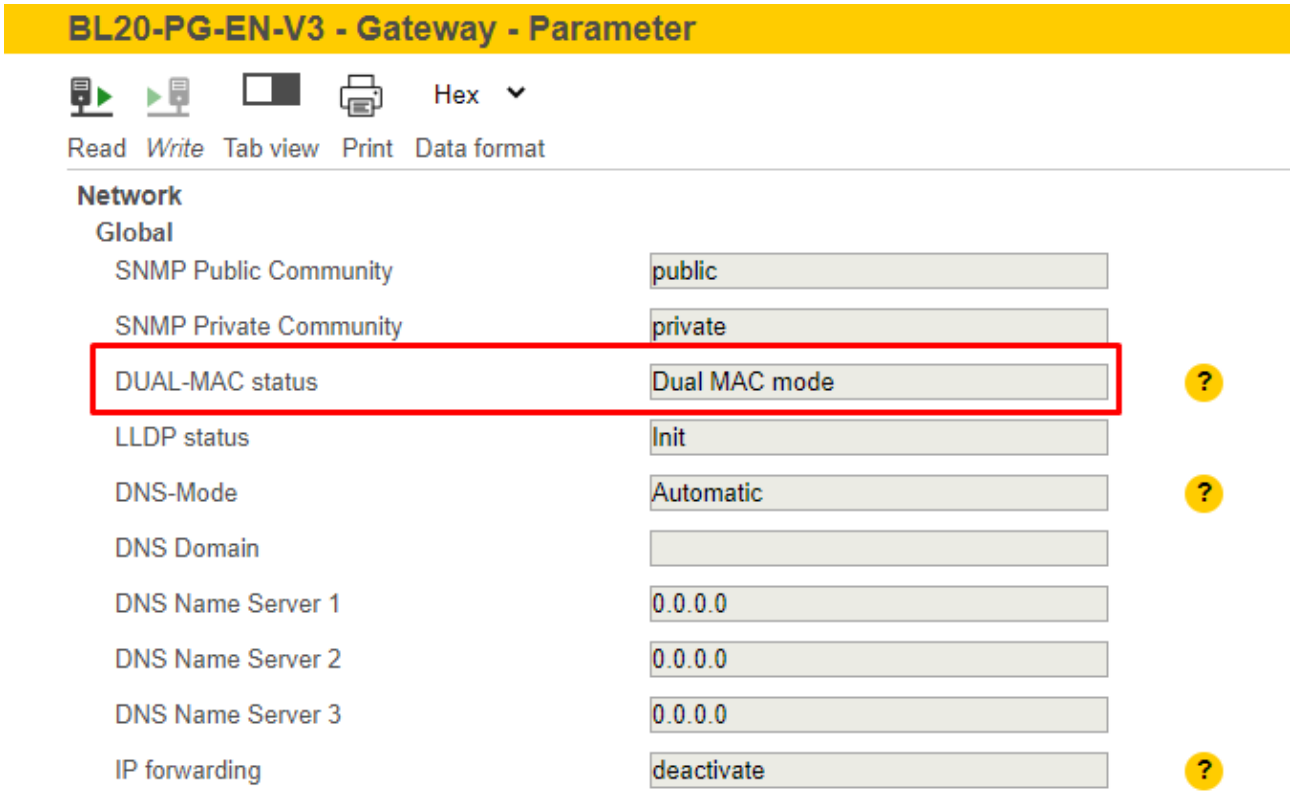


Fig. 25: Dual MAC mode in the web server and TAS

7.3 General commissioning in CODESYS

7.3.1 Installing the device package in CODESYS

The device package for the device is available as a free download from www.turck.com.

The device package contains the following files:

- CODESYS device description
- CODESYS libraries
- GSDML File
- EDS file

Installing the device package

- ▶ Download the device package "BL…-PG-EN-V3 CODESYS Package V…" at www.turck.com.
- ▶ Open **Codesys Installer…**

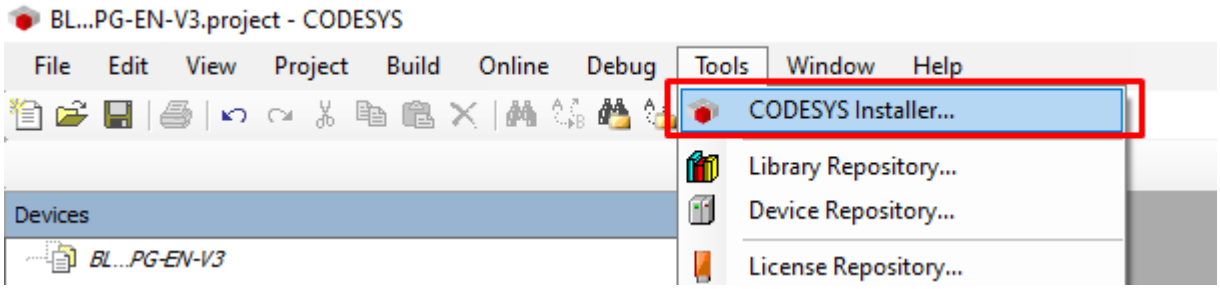


Fig. 26: Open the installer in CODESYS

- ▶ In the CODESYS Installer, insert the package file by clicking **Install File**.

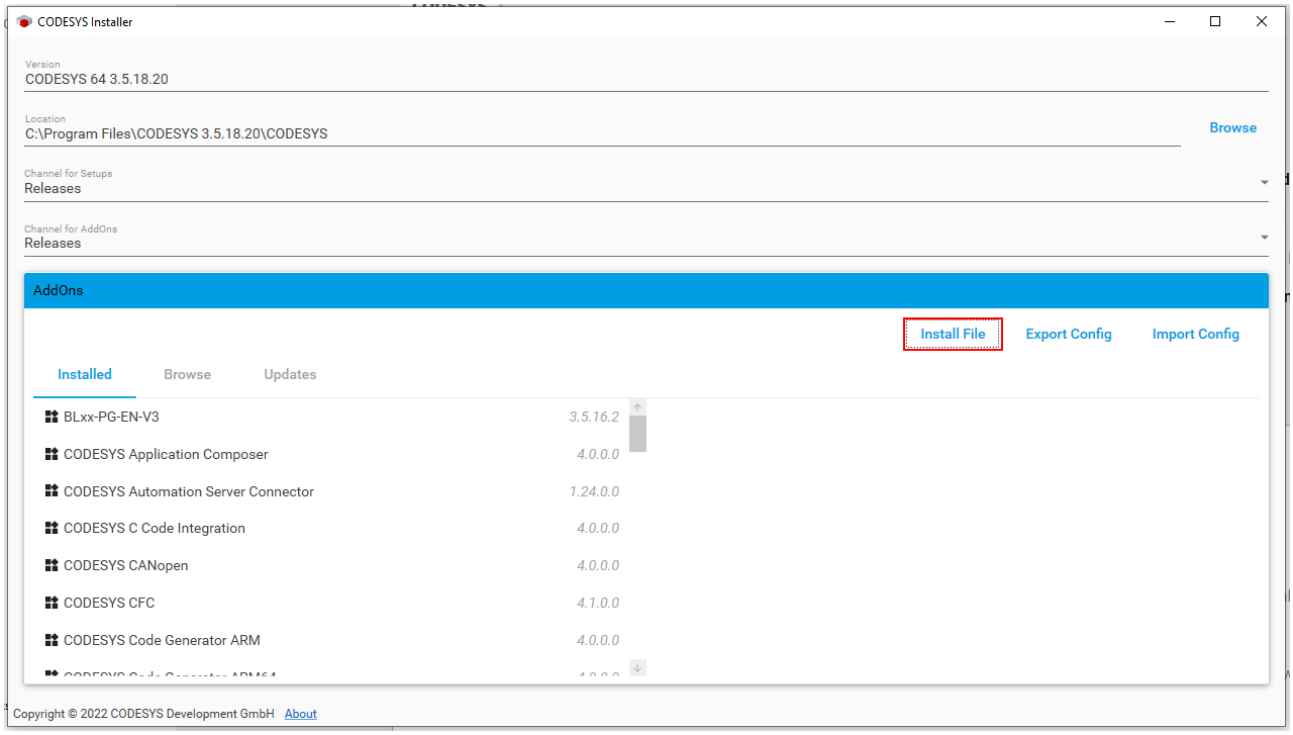


Fig. 27: CODESYS installer

⇨ The package file is listed in the CODESYS Installer.

7.3.2 Creating a standard project with BL…-PG-EN-V3 CODESYS

The process for the initial project creation of the three fieldbus systems, Modbus TCP, Profinet and EtherNet/IP, is identical.

- Create a new project in Codesys.
- Select the device.
- Select **Structured text (ST)** as the programming language.
- Click **OK**.

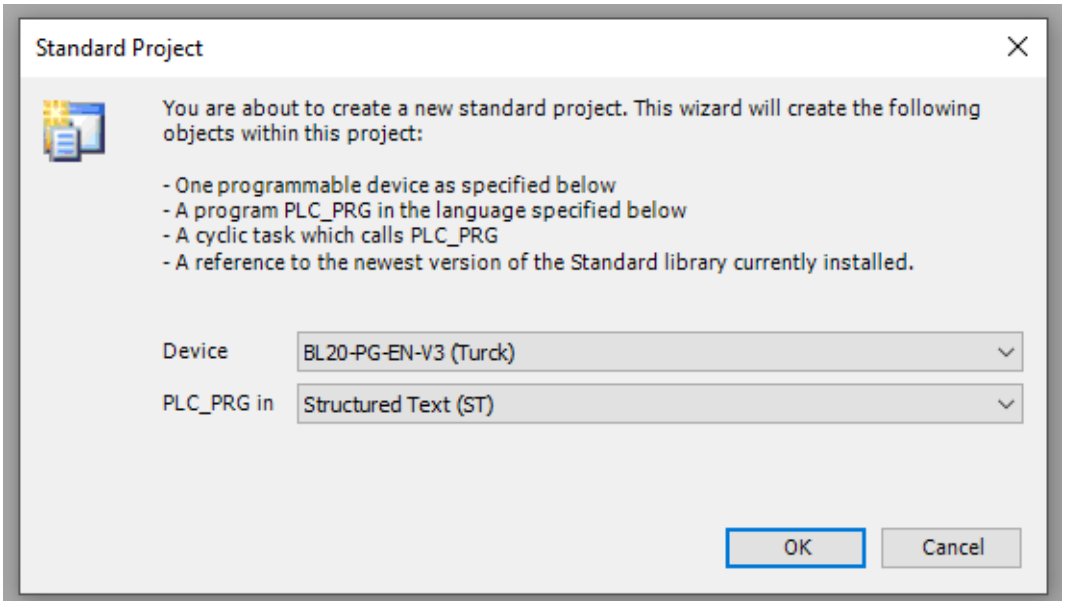


Fig. 28: Selecting the device

In addition to the PLC logic, the device contains the following elements:

- **Gateway APPL LED**
  - Can be used freely in the program
  - Uses two bits in the process output image of the device; the output data therefore begins with an offset of one byte in the default state.
- **Local_IO_BLxx**
  - Configuration of the I/O modules inserted locally on the BL…-PG-EN-V3
- **Ethernet interface**
  - Interface to the Modbus client or to the Ethernet devices

NOTE
It is not necessary to configure the Ethernet interface.

7.4 Connecting the devices to a Modbus client with CODESYS

Hardware used

This example uses the following hardware components:

- Gateway: BL20-PG-EN-V3
- Modules:
  - BL20-E-8AI-U/I-4PT/NI
  - BL20-E-16-DO-24VDC-0.5A-P
  - BL20-E-8DO-24VDC-0.5A-P
  - BL20-E-1CNT-24VDC
  - BL20-E-8DI-24VDC-P

Software used

This example uses the following software:

- CODESYS V3.5 SP18 Patch 2 + (64-bit) (available as a free download from turck.com)

Prerequisites

- The programming software has been opened.
- A new project has been created.
- The controller was added to the project.

7.4.1 Connecting the device to the PLC

The following components have to be added to CODESYS first, in order to connect the device to the PLC.

- Ethernet adapter
- Modbus TCP client (in CODESYS: Modbus TCP Master)
- Modbus TCP server (in CODESYS: Modbus TCP Slave)

Adding the Ethernet Adapter

- ▶ Right-click **Device** in the project tree **BL…-PG-EN-V3**.
- ▶ Select **Add Device**.
- ▶ Select **Ethernet Adapter**.
- ▶ Click **Insert device.**
- ⇨ The Ethernet Adapter is added to the project tree as **Ethernet (Ethernet)**.

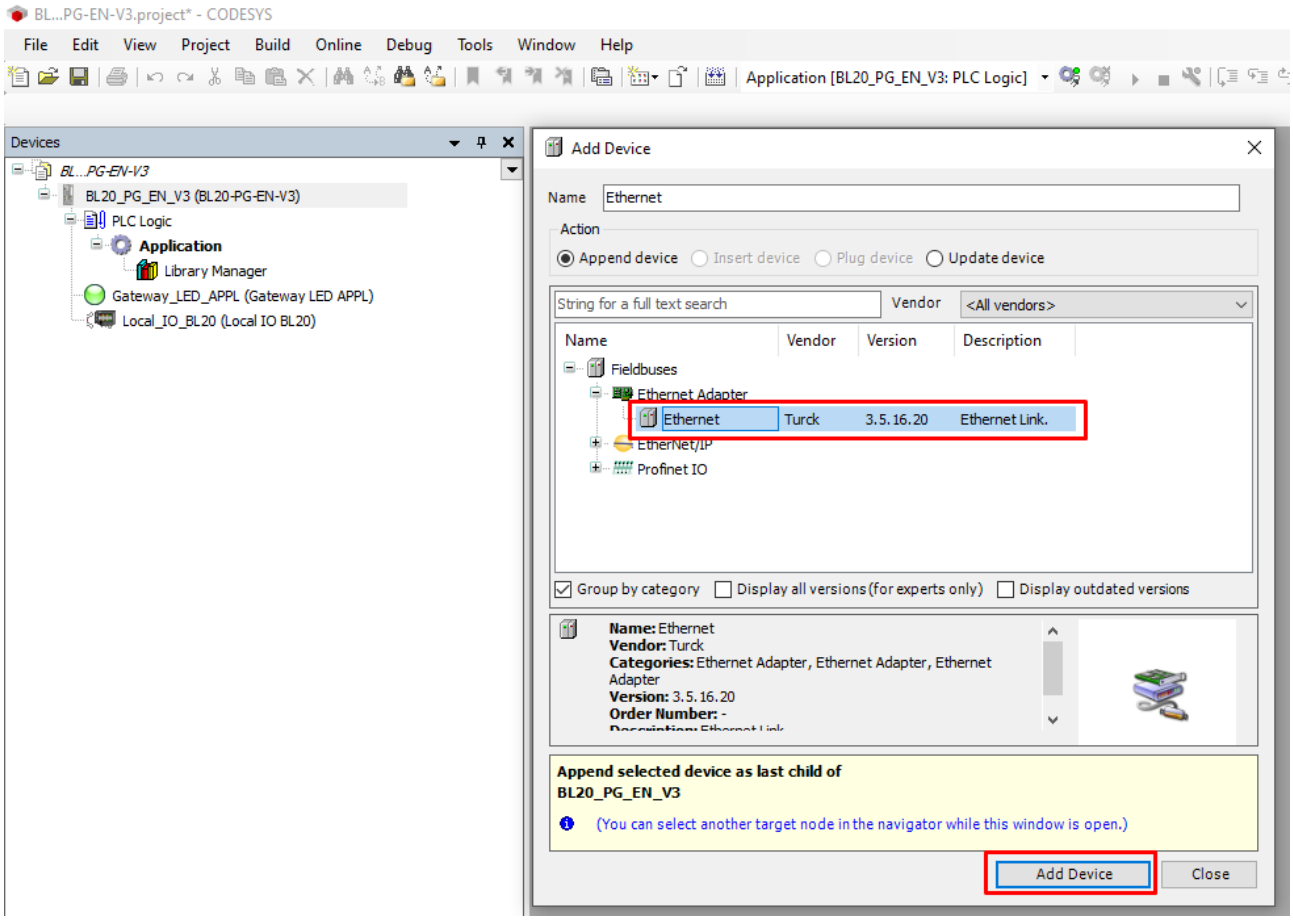


Fig. 29: Adding the Ethernet Adapter

Adding the Modbus TCP Master

- ▶ Right-click the **Ethernet (Ethernet)** in the project tree.
- ▶ Select **Add Device**.
- ▶ Double-click **Modbus TCP Master**.
- ⇨ The **Modbus_TCP_Master** is added to the project tree.

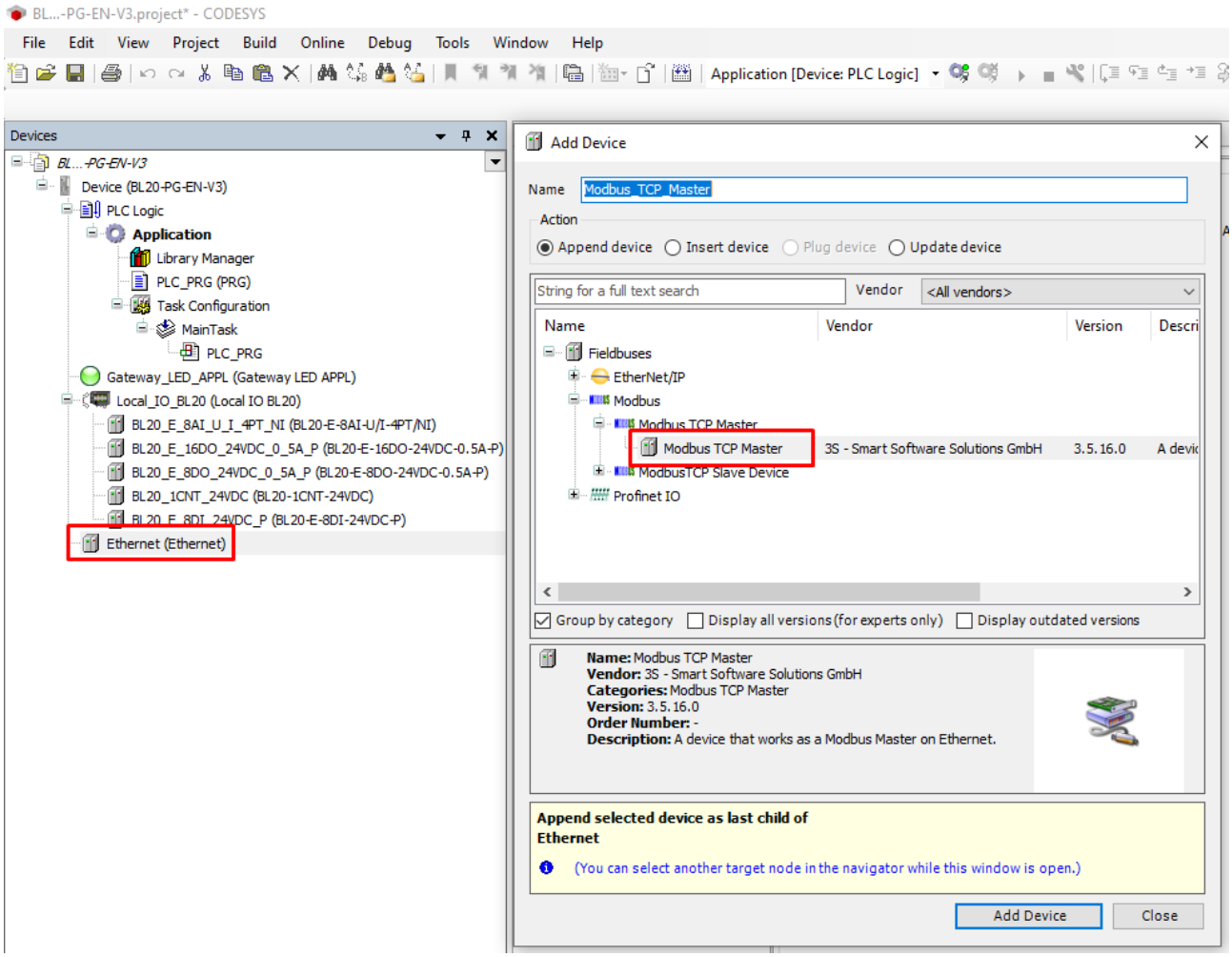


Fig. 30: Adding the Modbus TCP Master

Adding the Modbus TCP Server (Slave)

- ▶ Right-click the **Modbus TCP Master** in the project tree.
- ▶ Select **Add Device**.
- ▶ Double-click **Modbus TCP Slave**.
- ⇨ The **Modbus_TCP_Slave** is added to the project tree.

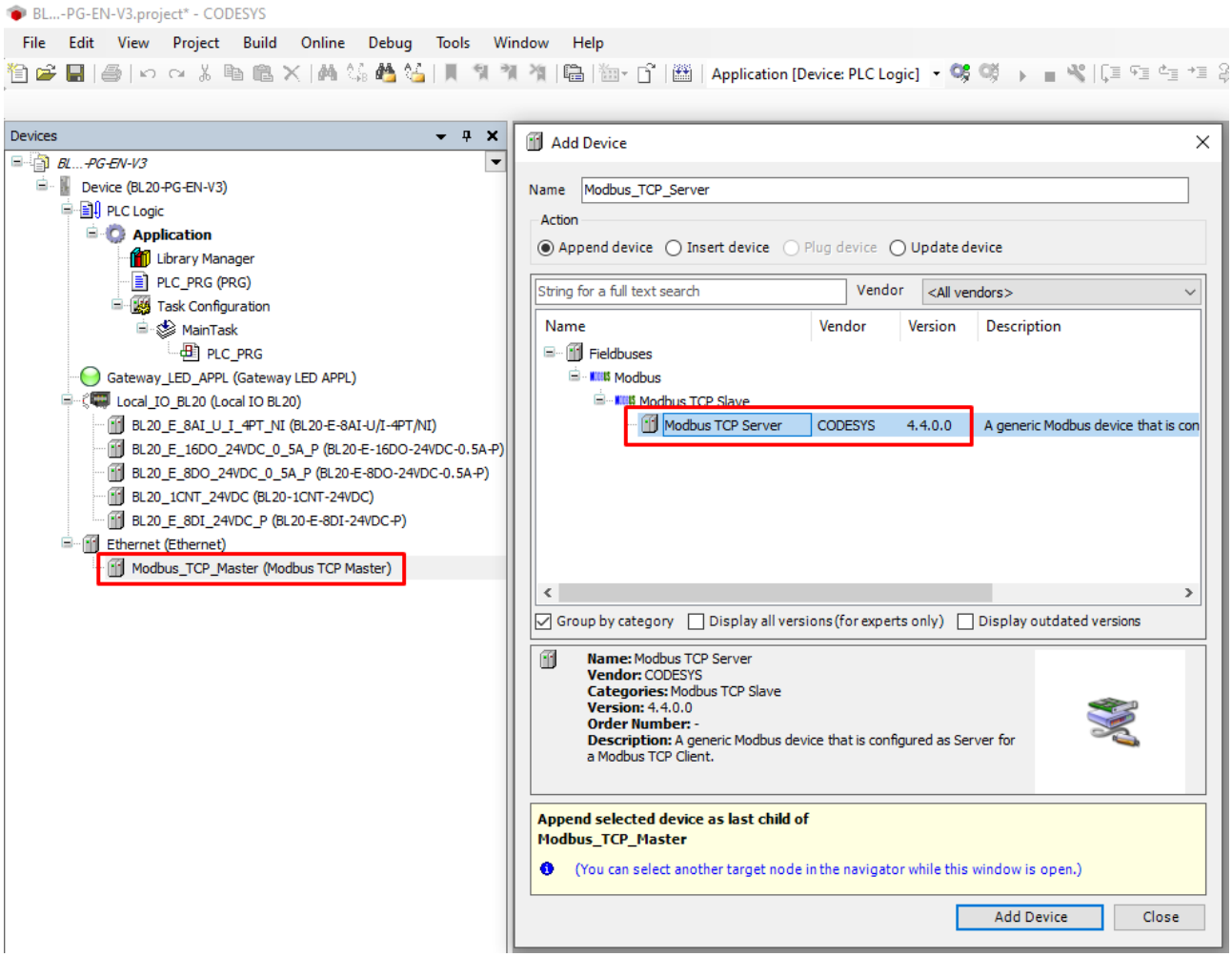


Fig. 31: Adding the Modbus TCP Slave

7.4.2 Configuring the Network Interface

- Click **Device → Scan network**.
- Select Modbus TCP Master (here: BL…-PG-EN-V3) and confirm with OK.

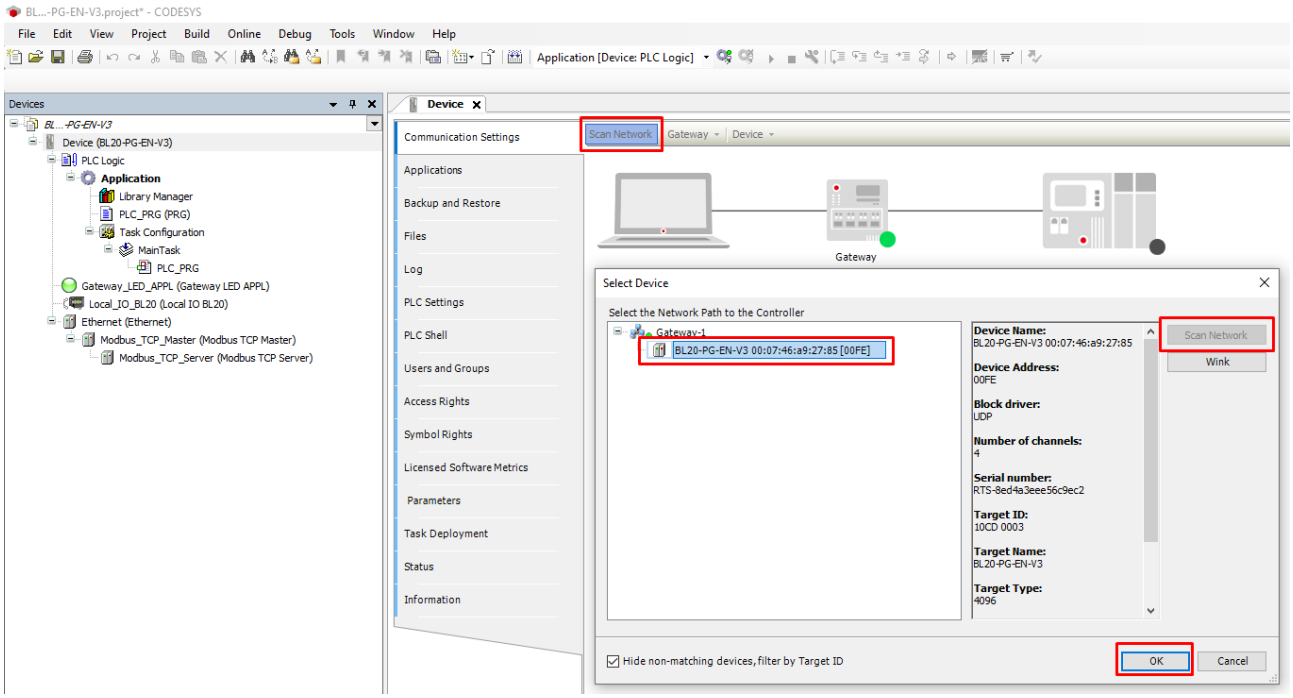


Fig. 32: Configuring the network interface

- Double-click **Ethernet**.
- Open the dialog box **Network Adapter** by clicking the **Browse…** button in the register tab **General**.
- Select the interface BL…-PG-EN-V3 (here: 192.168.1.254)

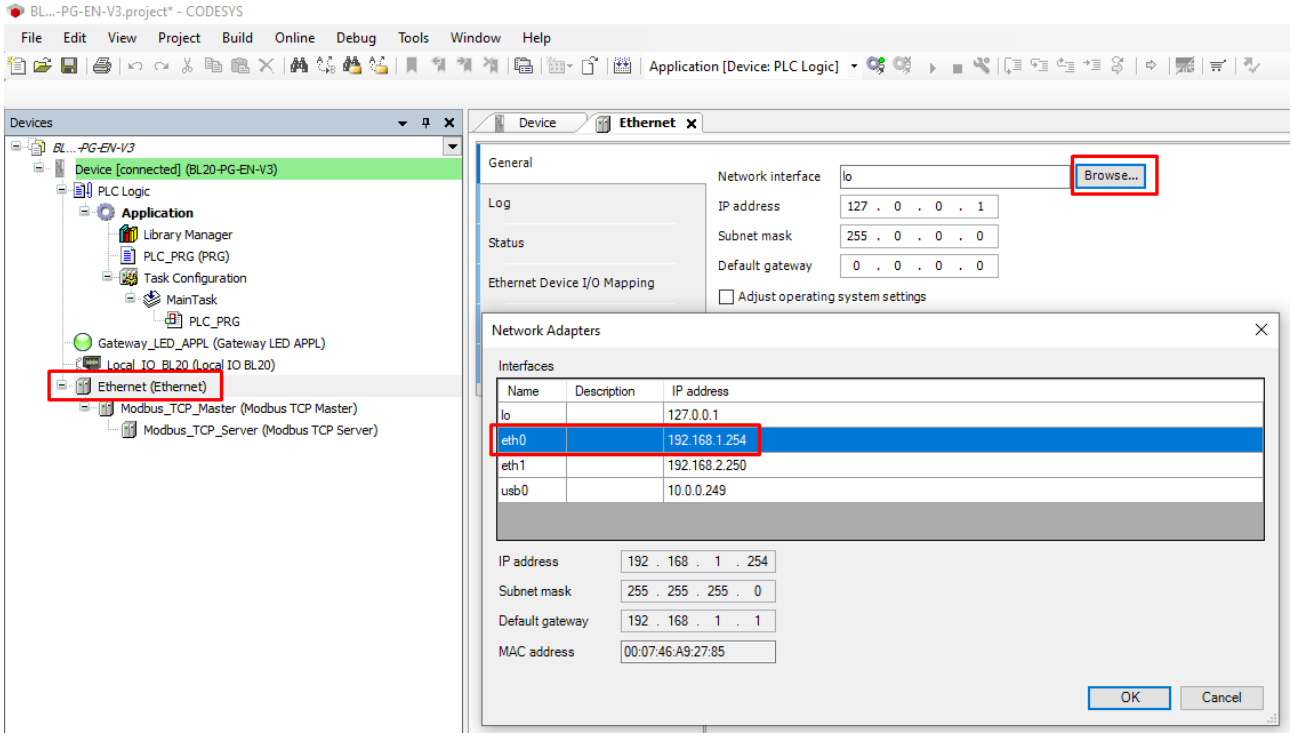


Fig. 33: Selecting the interface

7.4.3 Modbus TCP Server (Slave): setting the IP address

- Double click **Modbus TCP Server (Slave)**.
- Enter the **slave IP address** in the **General** register tab (here: 192.168.0.1).

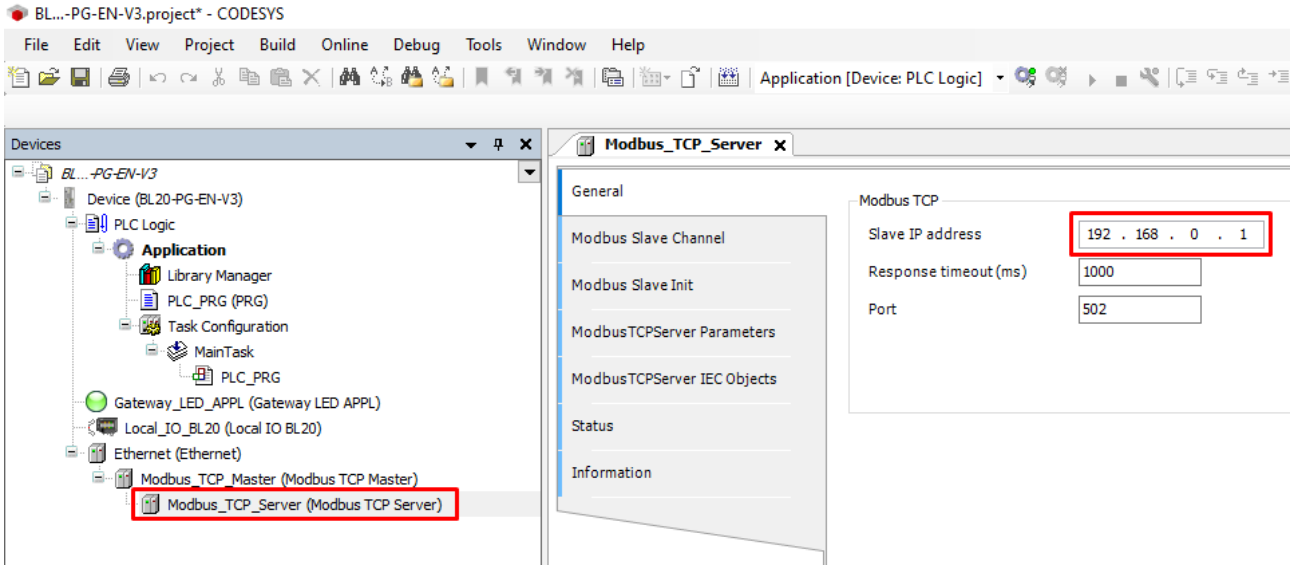


Fig. 34: Modbus TCP Slave: setting the IP address

7.4.4 Configuring the Modbus TCP slave device

Setting up the slave device

- Right-click **Ethernet**.
- Click **Add device**.
- Double-click to select **ModbusTCP Slave Device**.
- Double-click to open**ModbusTCP_Slave_Device**.
- Specify the number of input and holding registers to be exchanged with a higher-level Modbus TCP master.
- Check **Watchdog**.

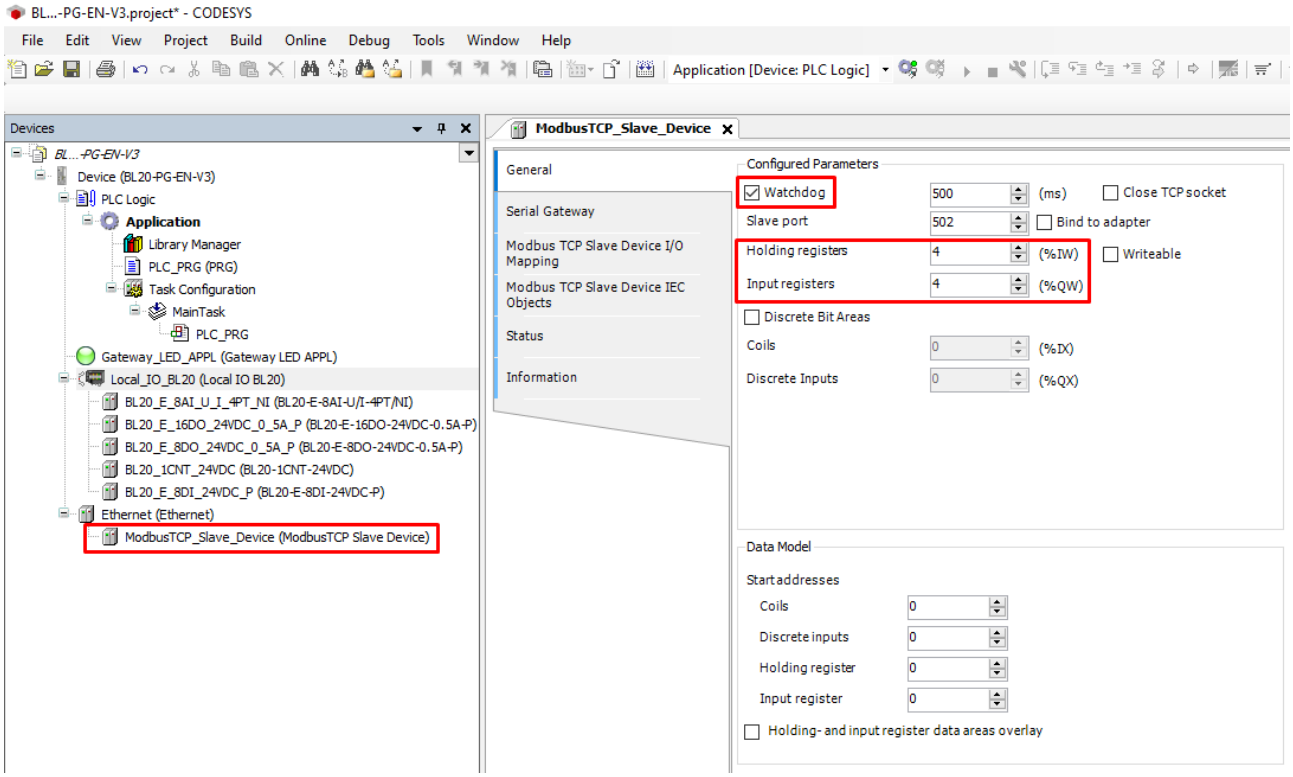


Fig. 35: Set up the modbus TCP slave device

- Specify assignments in the PLC program or in the I/O mapping of the PG-V3 or the local I/Os.

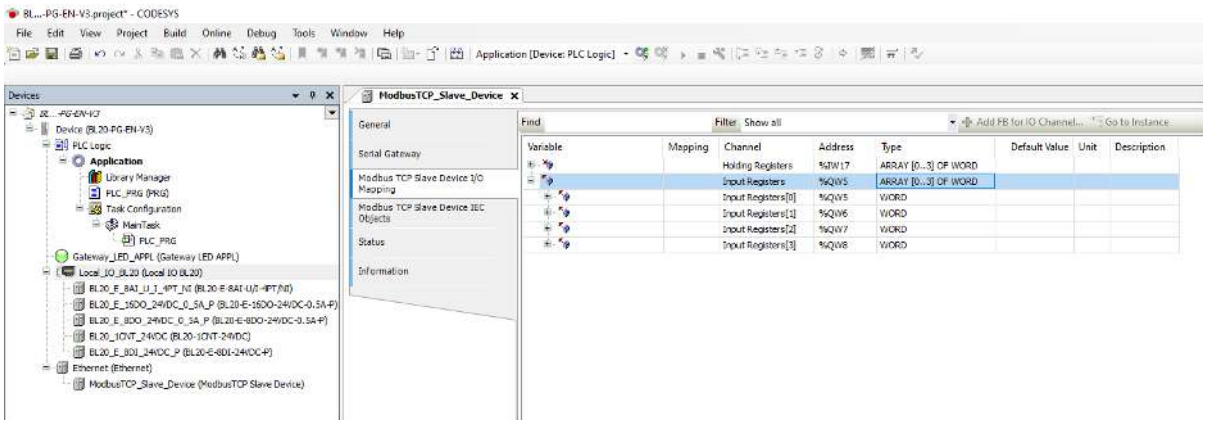


Fig. 36: Modbus slave device I/O mapping

7.5 Configuring the PROFINET device in CODESYS

- Right-click **Ethernet**.
- Click **Attach device** and select the Profinet_Device.
- Configure the length of the input and output data.

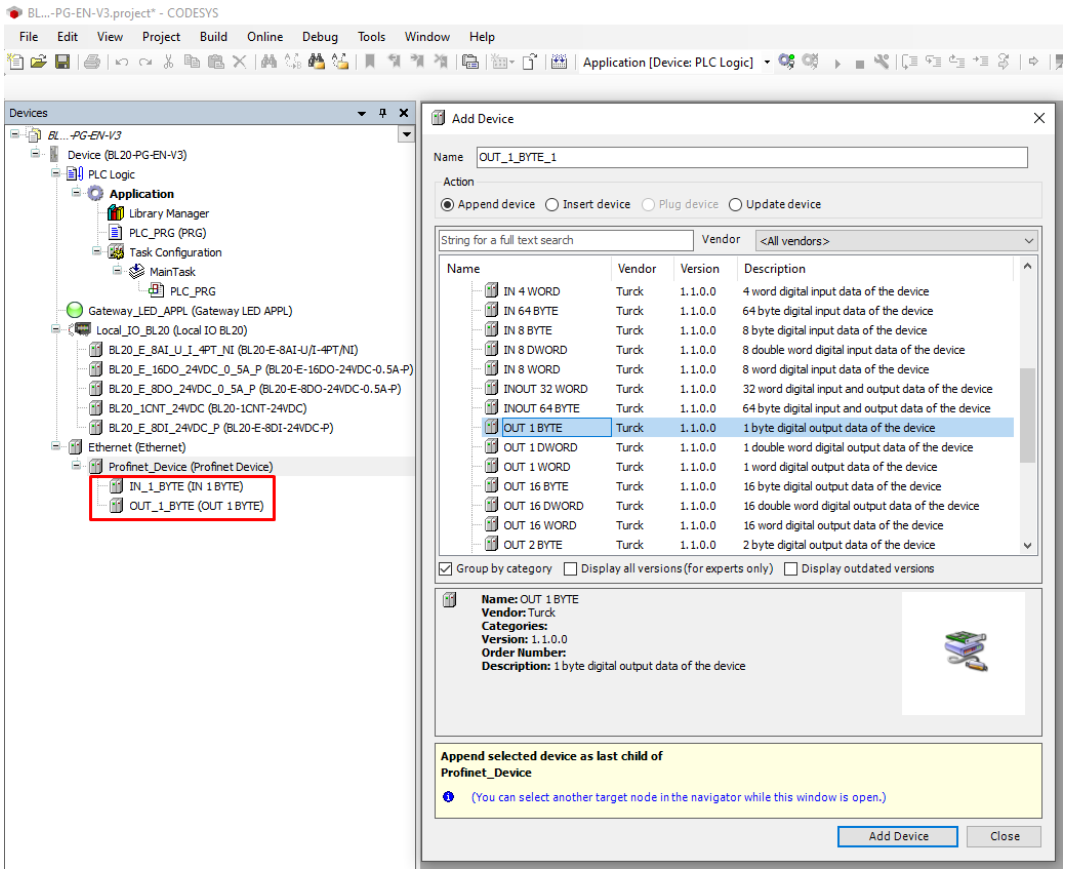


Fig. 37: Configure the PROFINET device

The input data in CODESYS must be configured as output data in the PROFINET controller configuration, and the output data in CODESYS must be configured as input data in the PROFINET controller configuration (see table).

The configured data widths must match.

CODESYS		PROFINET controller configuration
Input data	↔	Output data
Output data	↔	Input data

The data contained in the input and output data is defined via assignments in the PLC program or in the I/O mapping of the BL…-PG-EN-V3 or the local I/Os.

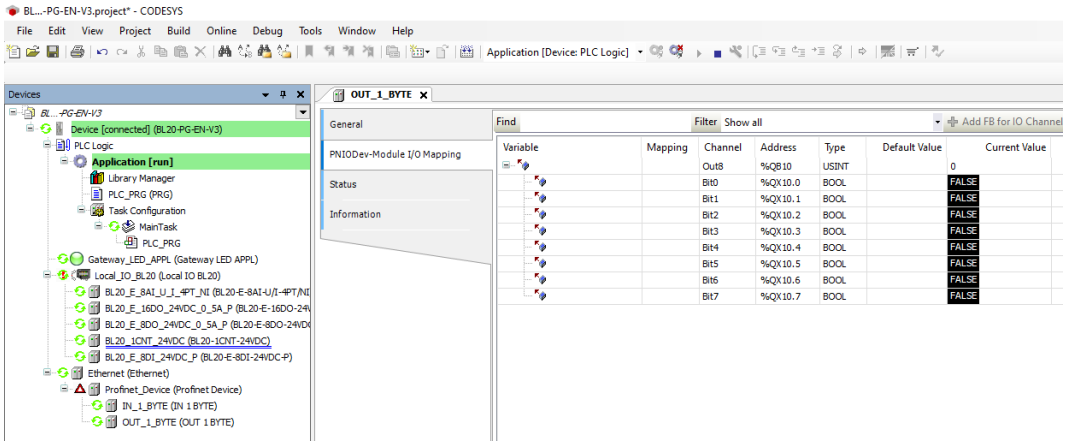


Fig. 38: PROFINET device I/O mapping

NOTE
The PROFINET device reports an fault until a connection to the PROFINET controller is established.

7.6 Connecting the devices to an EtherNet/IP scanner in CODESYS

- Right-click **Ethernet**.
- Click **Attach device** and select **Ethernet_IP_Slave**.
- Configure the length of the input and output data.

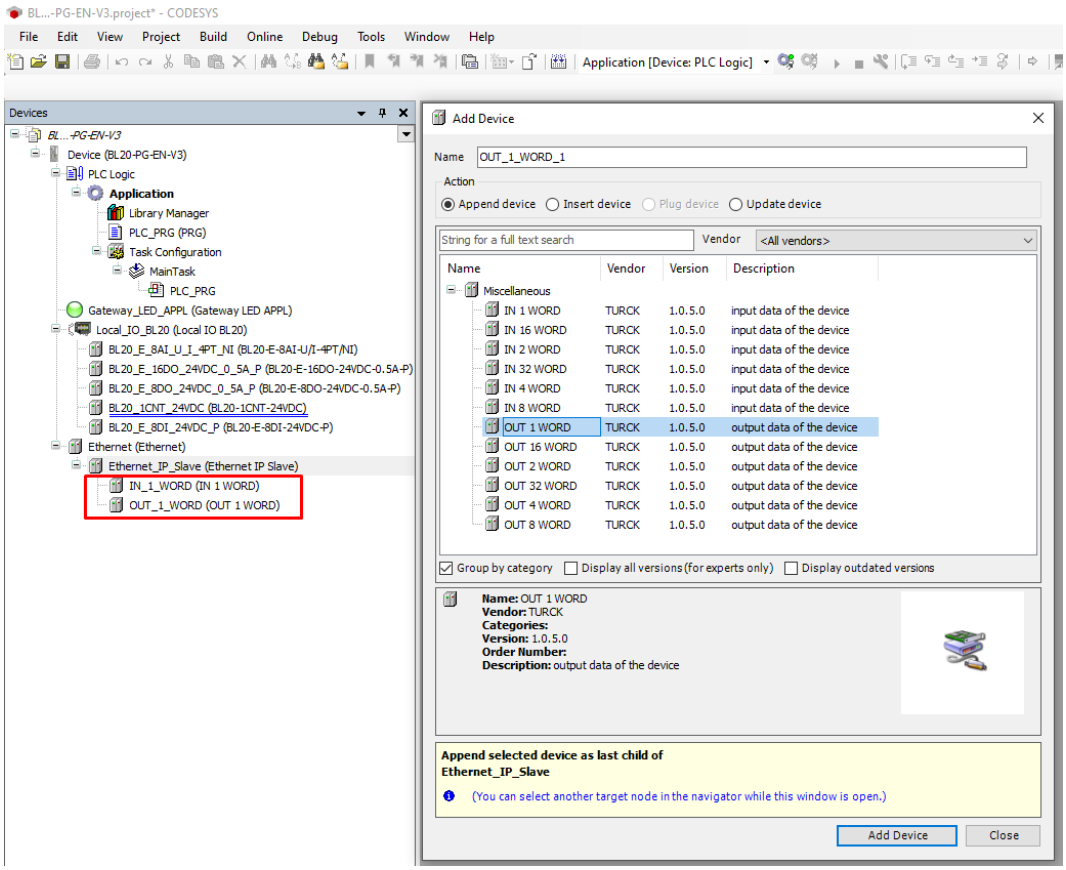


Fig. 39: Configuring an EtherNet/IP device

The data contained in the input and output data is defined via assignments in the PLC program or in the I/O mapping of the BL…-PG-EN-V3 or the local I/Os.

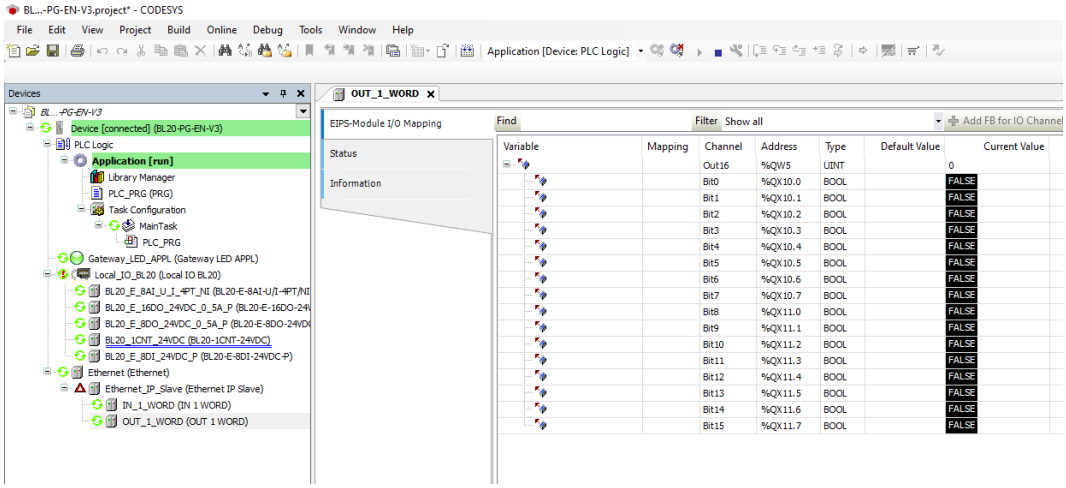


Fig. 40: EtherNet/IP device data mapping

7.7 Configuring EtherNet/IP device in EtherNet/IP control

The following example sets out the configuration of the EtherNet/IP device in "RSLogix5000" V20.01 of Rockwell Automation.

An EDS file is required for configuration. The file is available free of charge at www.turck.com.

The EtherNet/IP device is configured as a standard EtherNet/IP device (Communications Adapter) in RSLogix.

Hardware in the example:

- Controller: Logix 5572 (Allen Bradley)
- EtherNet/IP bridge 1756EN2TR (Allen Bradley)
- BL20-PG-EN-V3, FW 1.0.5.0

Installing an EDS file

▶ Install the EDS file (TURCK CDS3.eds).

⇨ The device appears as "CDS 3 EtherNet/IP Slave" in the device catalog of RSLogix.

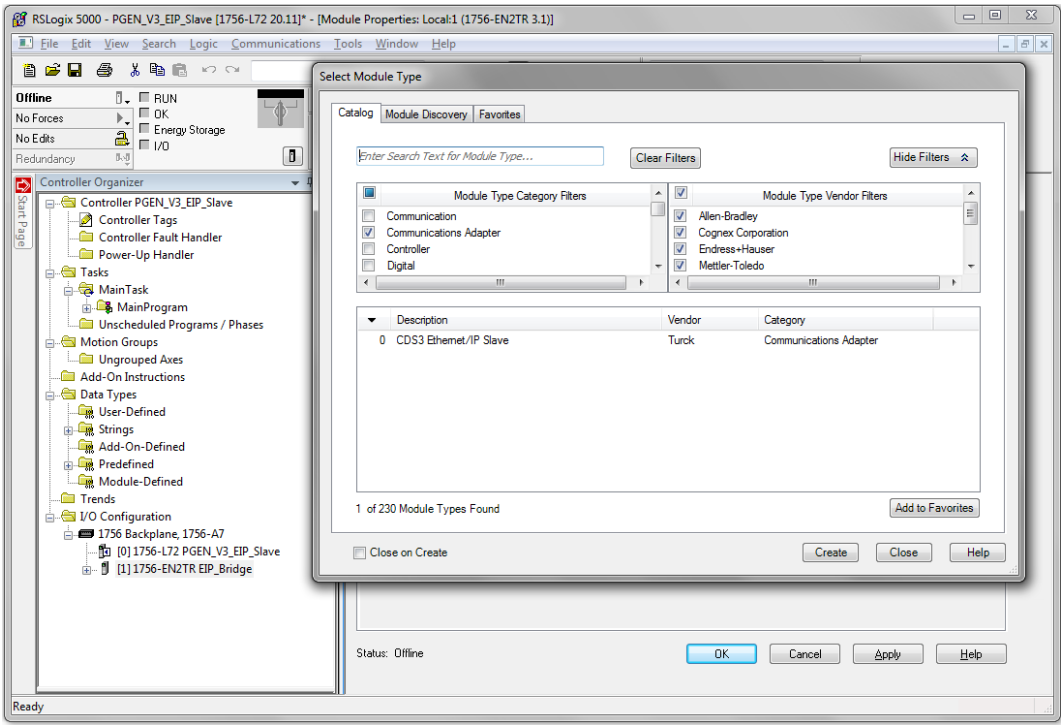


Fig. 41: "CDS 3 EtherNet/IP Device" in the device catalog of RSLogix5000

Configuring the device

- Enter the device name and IP address of the device.

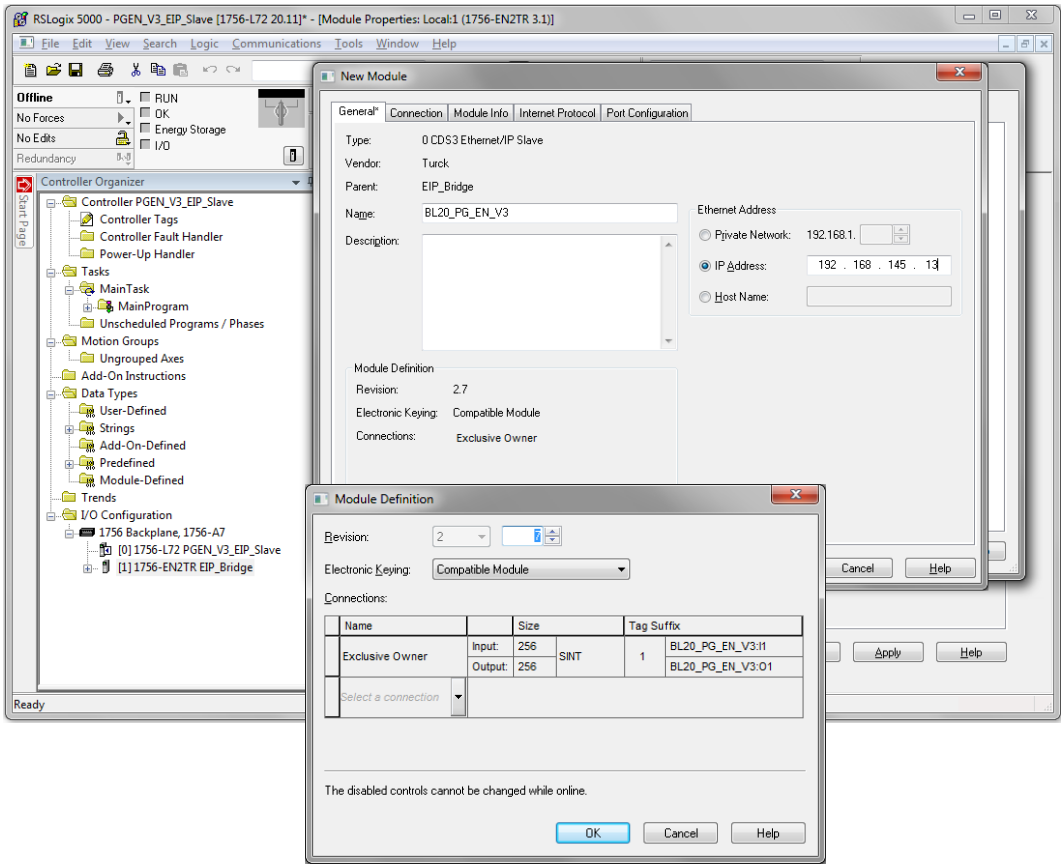


Fig. 42: Settings on the "CDS 3 EtherNet/IP Device"

Configuring the input and output data

The device is automatically created with a data width of 256 bytes of input data and 256 bytes of output data.

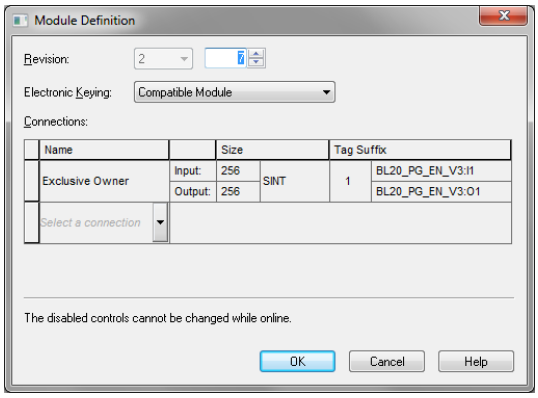


Fig. 43: EtherNet/IP connection "CDS 3 EtherNet/IP device"

It is therefore not necessary to configure the input and output data to be exchanged with the CODESYS device. The controller tags are automatically created.

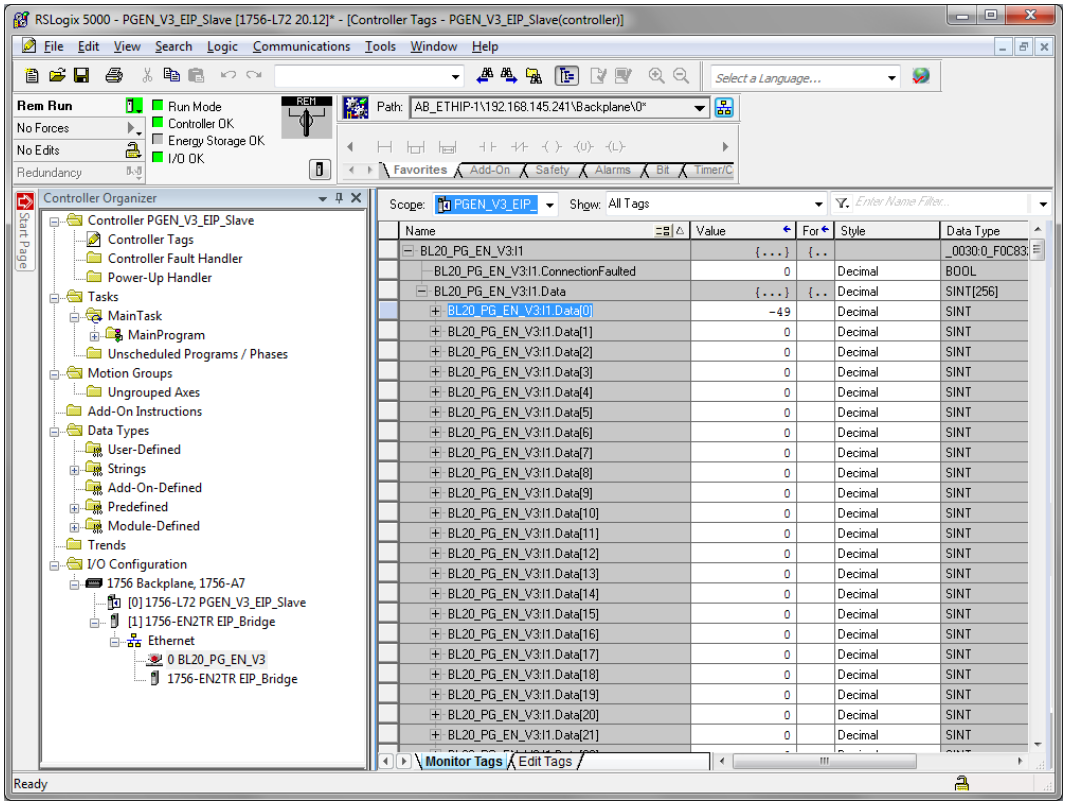


Fig. 44: Automatically generated controller tags of the "CDS 3 EtherNet/IP Device"

7.8 Configuring the PROFINET device in the PROFINET master

The following example describes the configuration of the PROFINET device in TIA Portal V13 from Siemens.

The PROFINET CODESYS device is configured as a standard PROFINET device in TIA portal.

The GSDML file of the device is required for configuration. The file is available free of charge on www.turck.com.

Hardware in the example:

- Control: S7 CPU315-2 PN/DP, 315-2EH13-0AB0
- BL20-PG-EN-V3, FW 1.0.5.0

Installing a GSDML file

▶ Install the GSDML file of the device in the PROFINET configuration software.
⇨ The device appears as a "CDS 3 PN Device" in the hardware catalog.

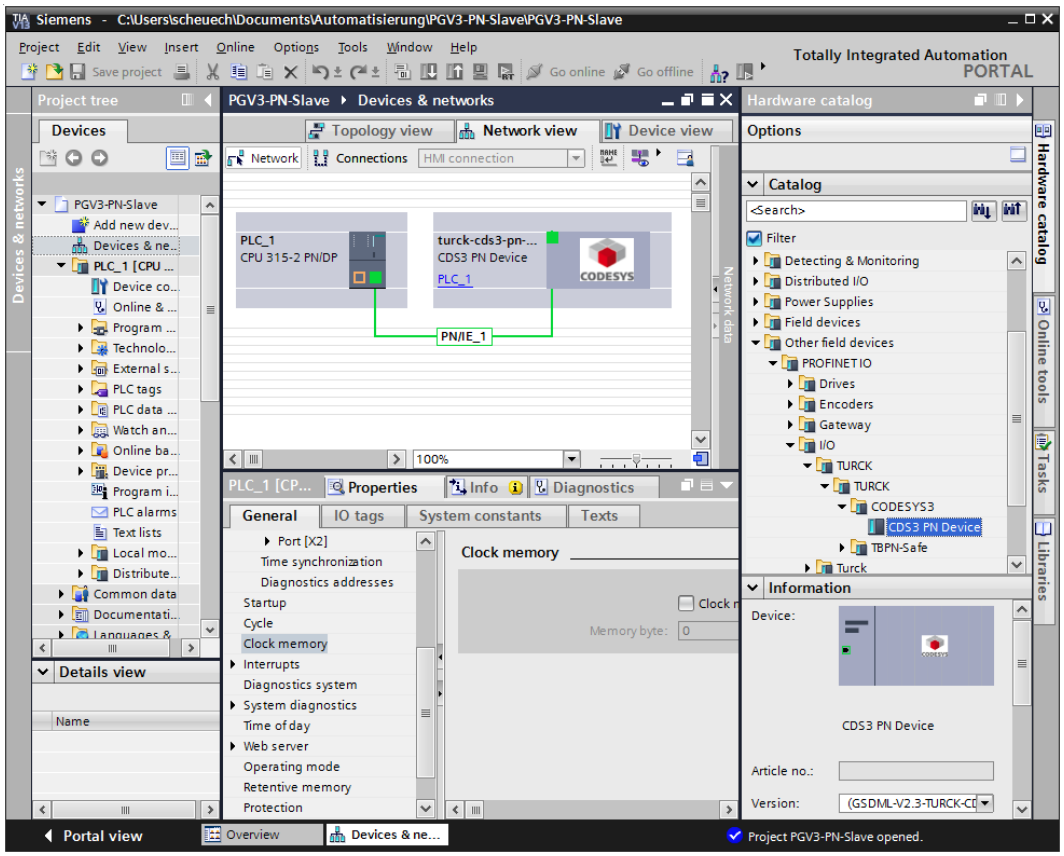


Fig. 45: PROFINET device in TIA Portal

Configuring the PROFINET parameters

Like any other PROFINET device, the PROFINET interface must also be specified in the project for the "CDS3 PN device".

- Set the IP address.
- Assign a PROFINET device name or enter the existing one.

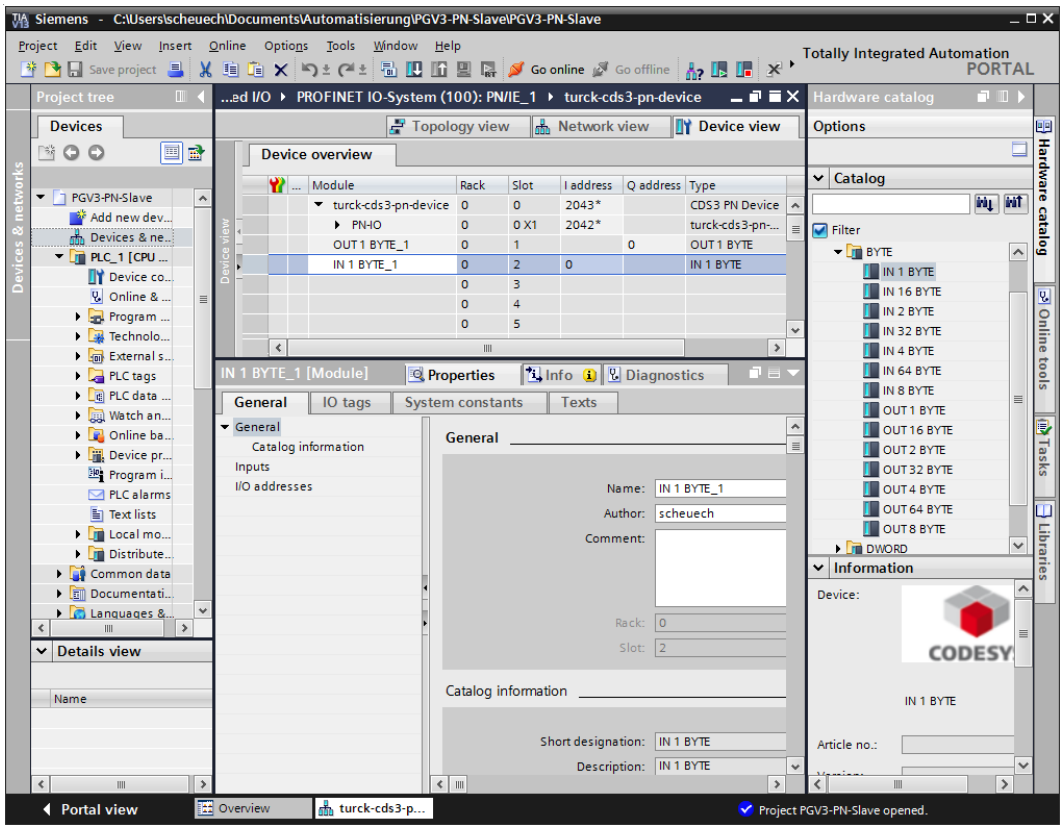


Fig. 46: PROFINET interface settings (CDS3 PN device)

Configuring input data and output data

NOTE
The data in TIA portal must be configured against the order of configuration in CODESYS. Input data in TIA portal is output data in CODESYS, and vice versa. The configured data widths must match.

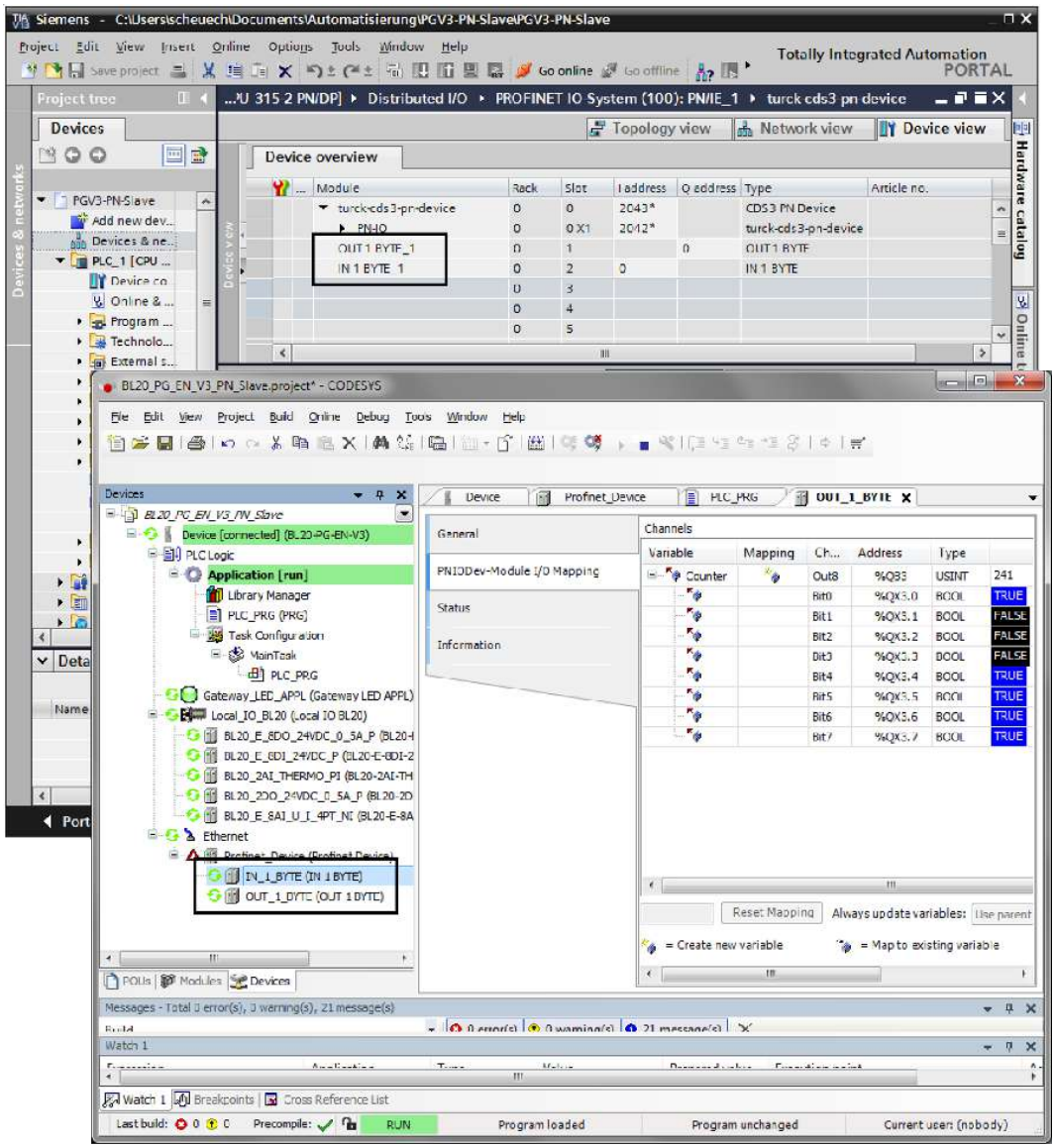


Fig. 47: Configuration of the input and output data in TIA portal/CODESYS

7.9 Configuring the EtherNet/IP device in CODESYS

- Use the "Attach device" function to add the EtherNet/IP slave to the Ethernet interface.
- Configure the length of the input and output data to be exchanged with the higher-level controller.

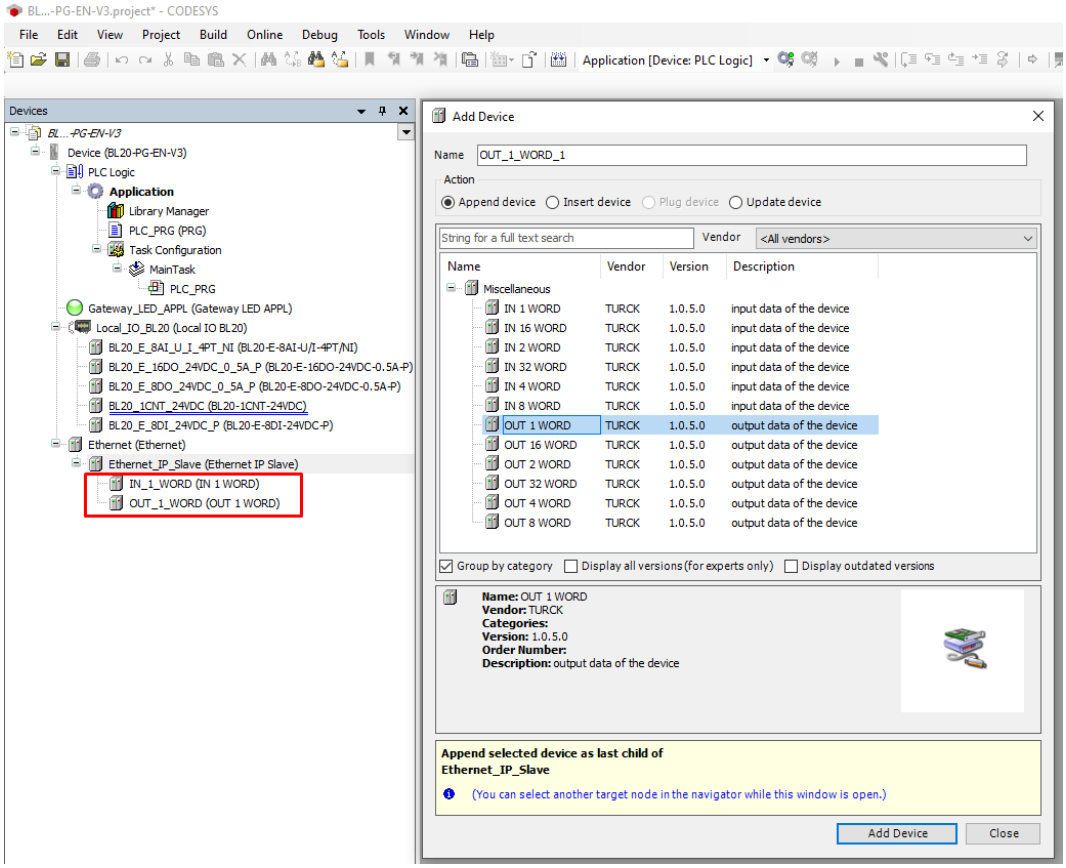


Fig. 48: Configuring an EtherNet/IP slave

The data contained in the input and output data is defined via assignments in the PLC program or in the I/O mapping of the PG-V3 or the local I/Os.

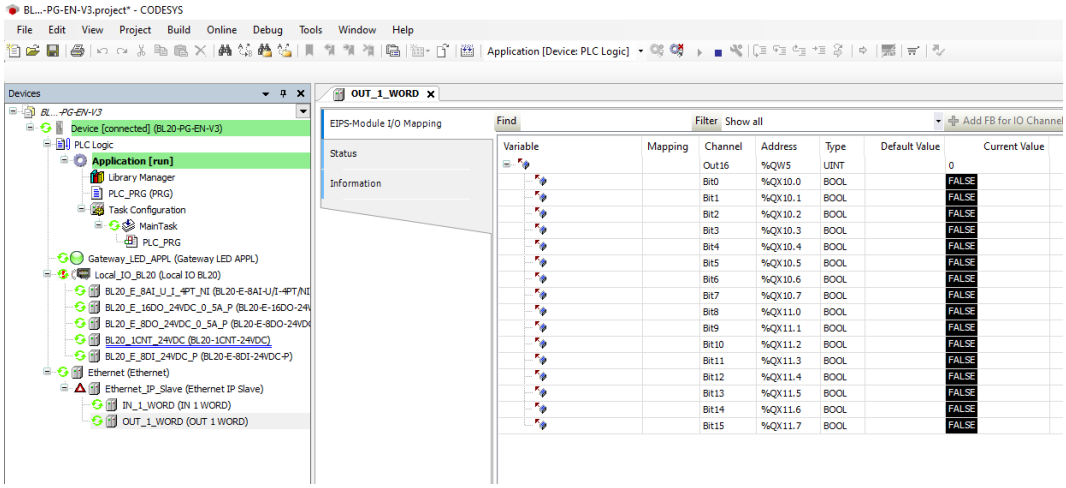


Fig. 49: EtherNet/IP slave data mapping

7.10 Configuring EtherNet/IP device in EtherNet/IP control

The following example sets out the configuration of the EtherNet/IP device in "RSLogix5000" V20.01 of Rockwell Automation.

The EtherNet/IP device is configured as a standard EtherNet/IP device (Communications Adapter) in RSLogix.

Hardware in the example:

- Controller: Logix 5572 (Allen Bradley)
- EtherNet/IP bridge 1756EN2TR (Allen Bradley)
- BL20-PG-EN-V3, FW 1.0.5.0

Installing an EDS file

▶ Install the EDS file (TURCK CDS3.eds) of the device in the configuration software. It is available from www.turck.com.

⇨ The device appears as "CDS 3 EtherNet/IP Slave" in the device catalog of RSLogix.

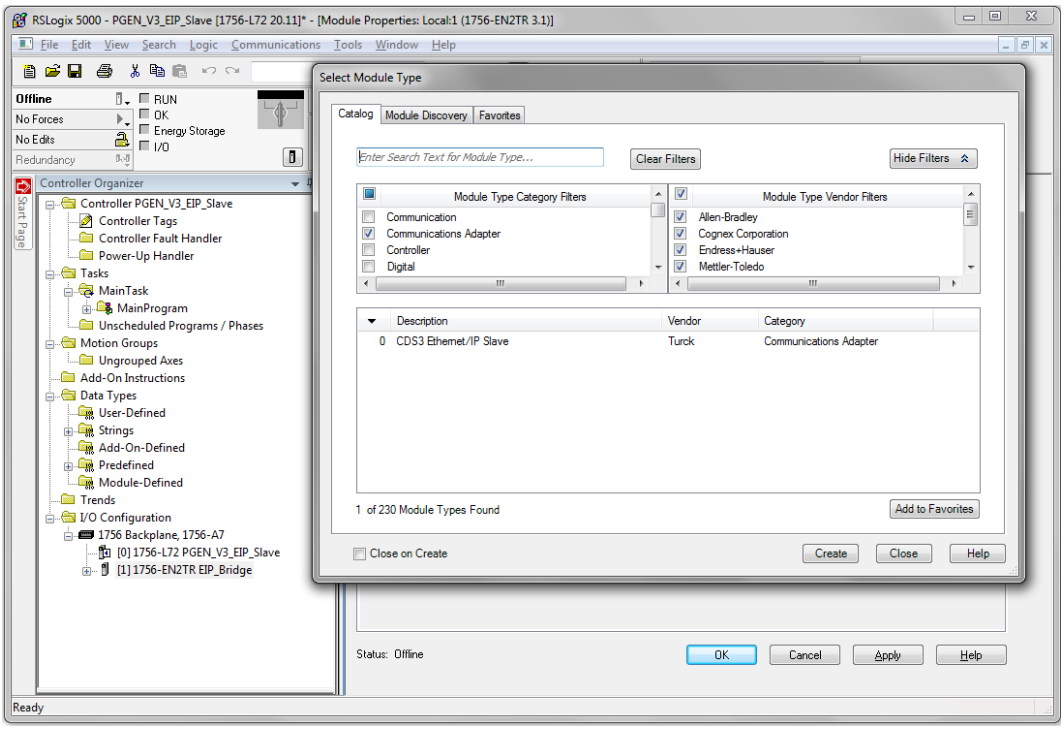


Fig. 50: CDS 3 EtherNet/IP device in device catalog of RSLogix5000

Configuring the device

- Enter the device name and the IP address of the device.

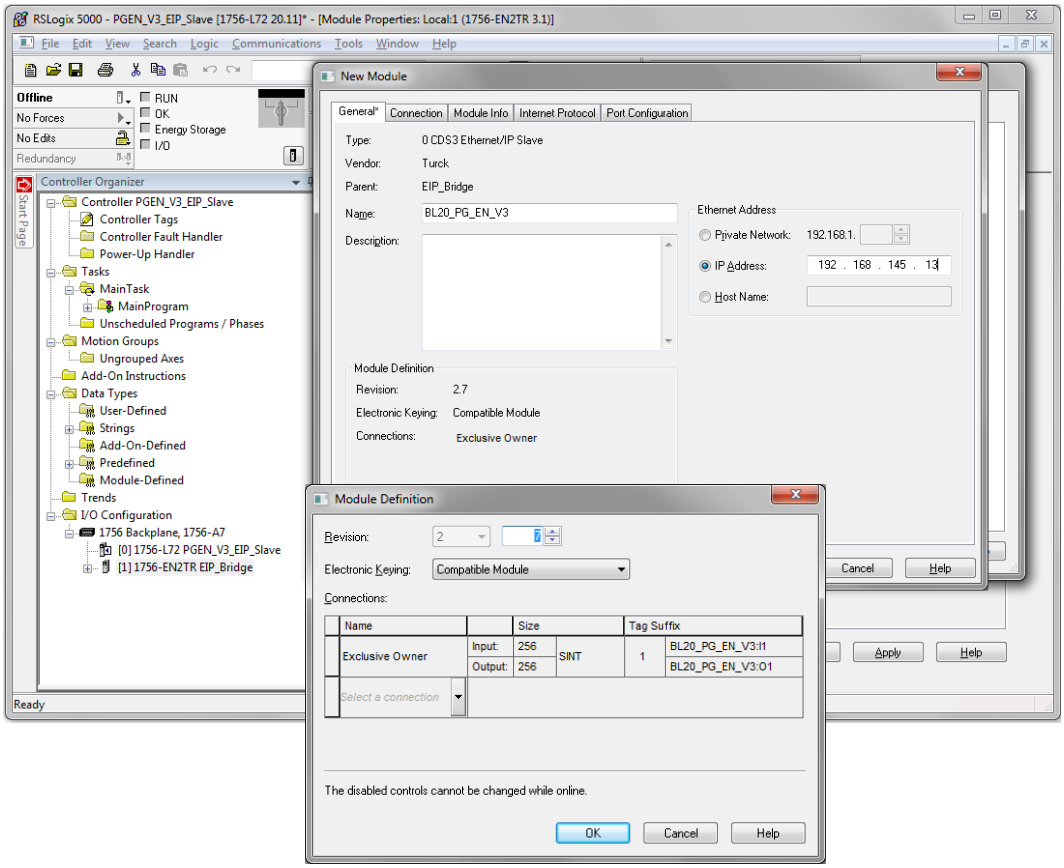


Fig. 51: Settings on the "CDS 3 EtherNet/IP device"

Configuring the input and output data

The device is automatically created with a data width of 256 bytes of input data and 256 bytes of output data.

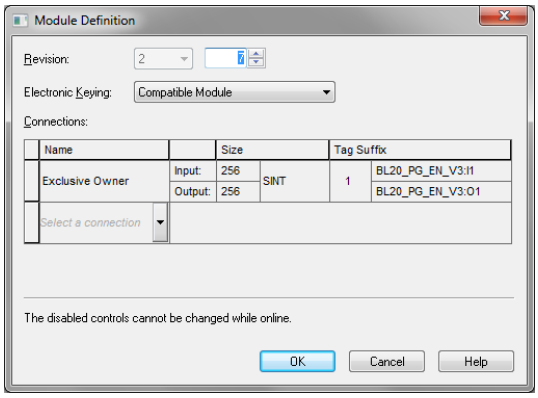


Fig. 52: EtherNet/IP connection "CDS 3 EtherNet/IP device"

It is therefore not necessary to configure the input and output data to be exchanged with the CODESYS device. The controller tags are automatically created.

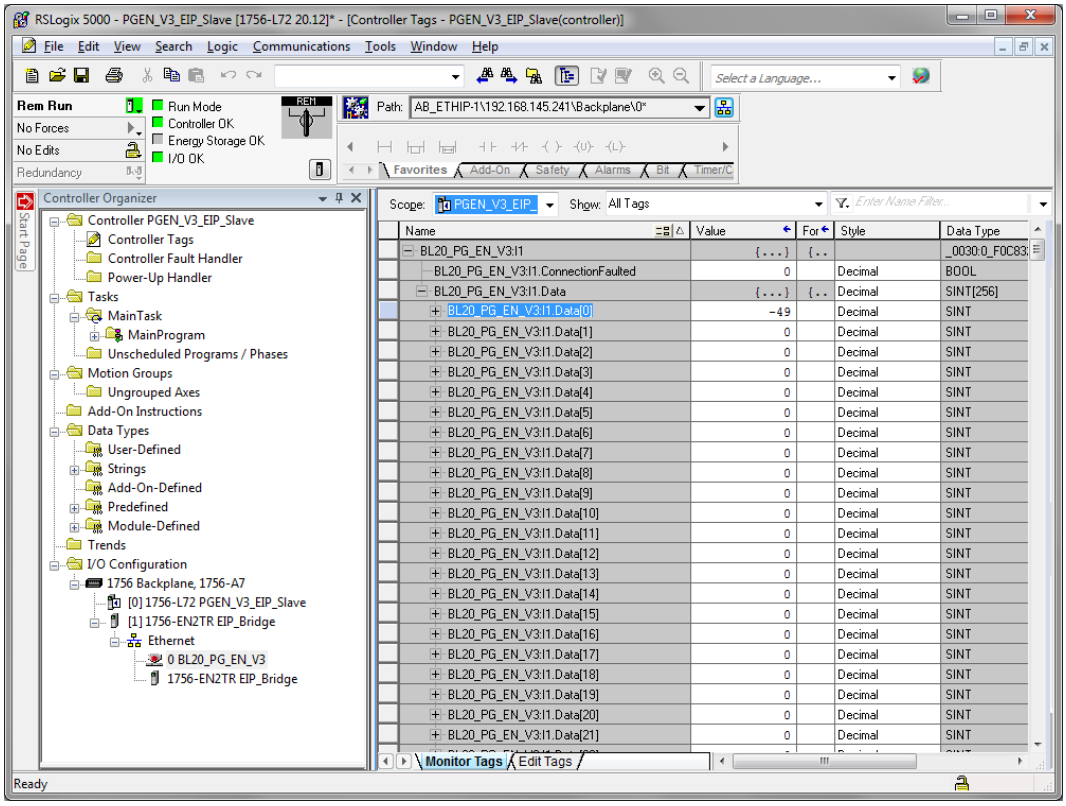


Fig. 53: Automatically generated controller tags of the "CDS 3 EtherNet/IP device"

8 Setting

8.1 USB Host Port

Functions of the USB host interface

The USB host port is used to connect USB storage devices for backing up, restoring, transferring CODESYS applications and updating the device firmware.

The USB host function can be disabled via the TURCK Automation Suite (TAS), the web server or the CODESYS program (bit 14 of the device parameter object).

8.1.1 Performing functions

- Read access

  Read access does not require any user action. The CODESYS program continues.

  - BACKUP_1: Save the CODESYS application to the storage medium
  - BACKUP_2: Save the CODESYS application and other device data to the storage medium
  - USB_DATA: Save CODESYS formulas and/or log files to the storage medium
- Write access

  Write access requires user intervention (press and hold the SET button for at least three seconds).

  The CODESYS program is stopped.

  - RESTORE_1: Loads the CODESYS application to the device from the storage medium
  - RESTORE_2: Loads the CODESYS application and other device data to the device from the storage medium
  - USB_DATA_WRITE: Loads CODESYS formulas and/or log files to the device from the storage medium
  - FW_UPDATE

Overview of Functions

NOTICE
Use of formulas in CODESYS
Corrupt data when manipulating data in the USB_Data directory
▶ When using formulas, only make 1:1 copies with Backup_2/Restore_2.

Function	Folder name	Description	CODESYS program	Automatic device restart
Read access				
Backup 1	BACKUP_1	Save the CODESYS application to the storage medium from the device. The following files are stored on the storage medium: ■ All *.app and *.crc files ■ PlcLogic folder Existing files with the same name are overwritten. All other files remain unchanged.	RUN	NO
Backup 2	BACKUP_2	Save the CODESYS application and the device data to the storage medium from the device. The following files are stored on the storage medium: ■ All *.app and *.crc files ■ PlcLogic folder ■ USB_data folder ■ IP address ■ PROFINET device name ■ Retain data (retain.bin) Existing files with the same name are overwritten. All other files remain unchanged.	RUN	NO
Read user data	USB_DATA	Save the "USB_Data" folder to the storage medium from the device. The following files are stored on the storage medium: ■ CODESYS formulas and/or log files existing files with the same name are overwritten. All other files remain unchanged.	RUN	NO
Write access				
Restore 1	RESTORE_1	Loads the CODESYS application to the device from the storage medium. The following files are loaded to the device from the storage medium: ■ |--PlcLogic ■ |--Application ■ All *.app and *.crc files The folder must contain only one application file (*.app). All previous applications on the device will be deleted without further warning. The device automatically reboots after the storage medium is removed from the device.	STOP	YES

Function	Folder name	Description	CODESYS program	Automatic device restart
Restore 2	RESTORE_2	Loads the CODESYS application and device data to the device from the storage medium. The following files are loaded from the storage medium: ■ All *.app and *.crc files ■ PlcLogic folder ■ USB_data folder ■ IP address ■ PROFINET device name ■ Retain data (retain.bin) The folder must contain only one application file (*.app). All previous applications except the retain data on the device will be deleted without further warning. The retain data is only replaced if the storage medium contains a newer file. The device automatically reboots after the storage medium is removed from the device.	STOP	YES
Firmware update	FW_UPDATE	Update the device firmware. The IP address, the PROFINET device name and the CODESYS application are not overwritten. File name: BLxx-PG-EN_1234567_Vx.y.z.0.bin The device automatically reboots after the storage medium is removed from the device.	STOP	YES
Write user data	USB_DATA_WRITE	Loads the "USB_Data" folder to the device from the storage medium. Existing files on the device with the same name are overwritten. All other files remain unchanged.	STOP	YES

BACKUP_1/BACKUP_2

▶ Insert the USB storage medium into the device.
⇨ The RUN LED flashes green at 4 Hz.
⇨ The backup is carried out.
⇨ The RUN LED flashes orange at 1 Hz.
⇨ The backup is complete.
▶ Remove the storage media.

USB_DATA

▶ Insert the USB storage medium into the device.
⇨ The RUN LED flashes green at 2 Hz.
⇨ The data is saved on the storage medium.
⇨ The RUN LED flashes orange at 1 Hz.
⇨ Saving is complete.
▶ Remove the storage media.

RESTORE_1/RESTORE_2

- ▶ Insert the USB storage medium into the device.
  - ⇨ The RUN LED flashes green at 0.5 Hz.
- ▶ Hold down the Set button for at least three seconds within 30 seconds.
  - ⇨ The RUN LED flashes in the sequence **2 × green — pause (1 Hz) — 2 × green — pause (1 Hz) — …**
  - ⇨ Loading the data into the device is in progress.
- ⇨ The RUN LED flashes orange at 1 Hz. Loading data is complete.
- ▶ Remove the storage media.
- ⇨ The device is rebooting.

FW_UPDATE

- ▶ Insert the USB storage medium into the device.
  - ⇨ The RUN LED flashes green at 0.5 Hz.
- ▶ Hold down the Set button for at least three seconds within 30 seconds.
  - ⇨ The RUN LED flashes in the sequence **3 × green — pause (1 Hz) — 3 × green — pause (1 Hz) — …**
  - ⇨ Loading the data into the device is in progress.
- ⇨ The RUN LED flashes orange at 1 Hz. The firmware update is complete.
- ▶ Remove the storage media.
- ⇨ The device is rebooting.

USB_DATA_WRITE

- ▶ Insert the USB storage medium into the device.
  - ⇨ The RUN LED flashes green at 0.5 Hz.
- ▶ Hold down the Set button for at least three seconds within 30 seconds.
  - ⇨ The RUN LED flashes green at 2 Hz. The data is saved on the device.
- ⇨ The RUN LED flashes orange at 1 Hz. Saving is complete.
- ▶ Remove the storage media.
- ⇨ The device is rebooting.

8.1.2 Behavior of the RUN LED in the event of an error

Error	Description	LED behavior
Timeout	■ The SET button is not actuated within 30 seconds of inserting the storage medium.	Red/green, flashing (1 Hz)
Invalid folder	■ The storage medium contains a folder with an invalid name. ■ The storage medium contains several folders with valid names.	
Empty folder	■ The storage medium contains a valid but empty folder.	
USB deactivated	■ The USB host feature has been deactivated by the web server or CODESYS program.	Red/green flashing (0.5 Hz)

8.1.3 Compatible storage media

Compatible USB devices

Specification	
Format	FAT, FAT32
Max. size	Limited by FAT32 specifications ≤ 4 GB for a single file ≤ 32 GB

- The USB host port is suitable for connecting USB memory sticks (USB 2.0 and USB 3.0).
- Depending on the power consumption of the USB memory sticks, compatibility problems may occur in individual cases.
- It is not possible to connect USB devices such as external hard disks, keyboards, PC mouse, etc.

8.2 Resetting to factory settings (F_Reset)

Reset device

- ▶ Set the DIP switch mode to **ON**.
- ▶ Set the rotary coding switch to 90.

This mode resets all device settings to the default values and deletes all data in the device's internal flash memory.

The switch position is not an operating mode.

- ▶ After resetting the device to the default values, set another operating mode.

The following properties are reset to the default settings or deleted during F_Reset:

		Default value	Comment
IP address subnet mask	Reset	192.168.1.254/ 255.255.255.0	The device can be reached via TAS, the web server and the DTM under this IP address, but the address is not stored in the device.
PROFINET device name	Reset	-	
CODESYS program	deleted	-	
Parameters (PG-V3)	Reset	See parameter [▶ 60]	
I/O module parameters	No		

Resetting to factory settings via DCP-based services (TAS/web server or TIA portal/Step7) does not delete the CODESYS program.

8.3 Real-time clock (RTC)

Properties of the RTC:

Buffering	Via Gold CAP
Charging time for 95 % charging	Min. 10 minutes
Buffer time at	
23 °C	4 weeks
– 60 °C	168 hours
– 70 °C	36 hours

For example, the real time clock is set in the device via the CODESYS library "CAA Real Time Clock Extern".

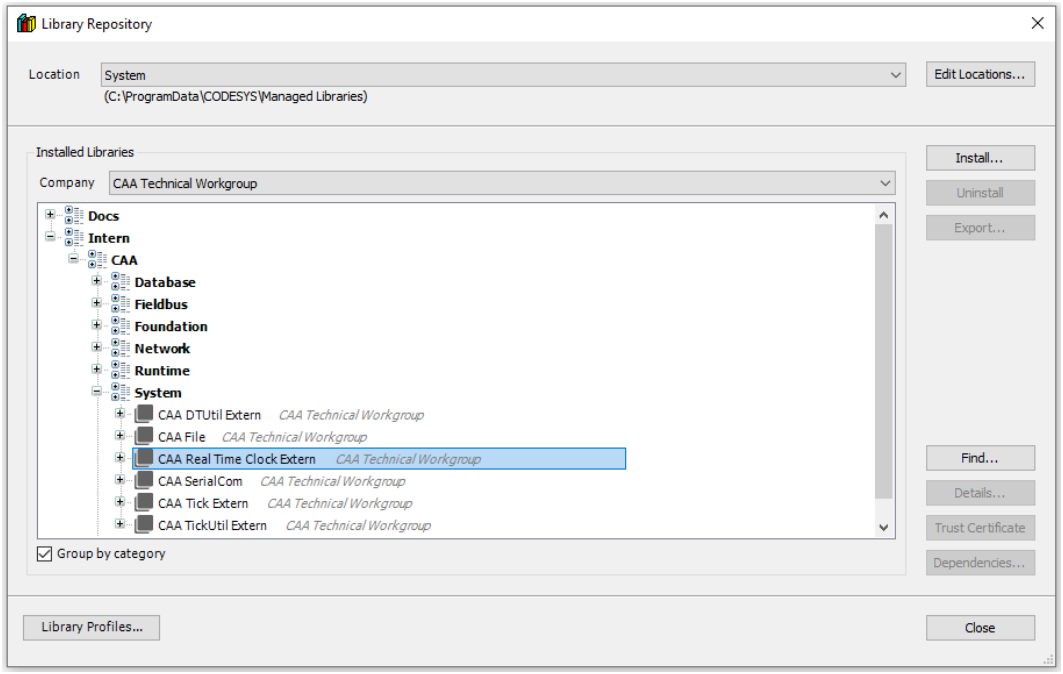


Fig. 54: CAA Real Time Clock Extern in CODESYS

8.4 Parameterizing and configuring the device via the web server

The integrated web server can be used to set the devices and send commands to the devices. In order to be able to open the web server with a PC, the device and the PC must be in the same IP network.

Opening the web server

The web server can be opened by entering the device IP address in a web browser or by using the TURCK Automation Suite (TAS).

Status information and network settings are displayed on the home page.

Editing settings in the web server

A login is required in order to edit settings via the web server. The default password is "password".

NOTE
To ensure greater security, TURCK recommends changing the password after the first login.

- ▶ Enter the password in the Login field on the start page of the web server.
- ▶ Click **Login**.

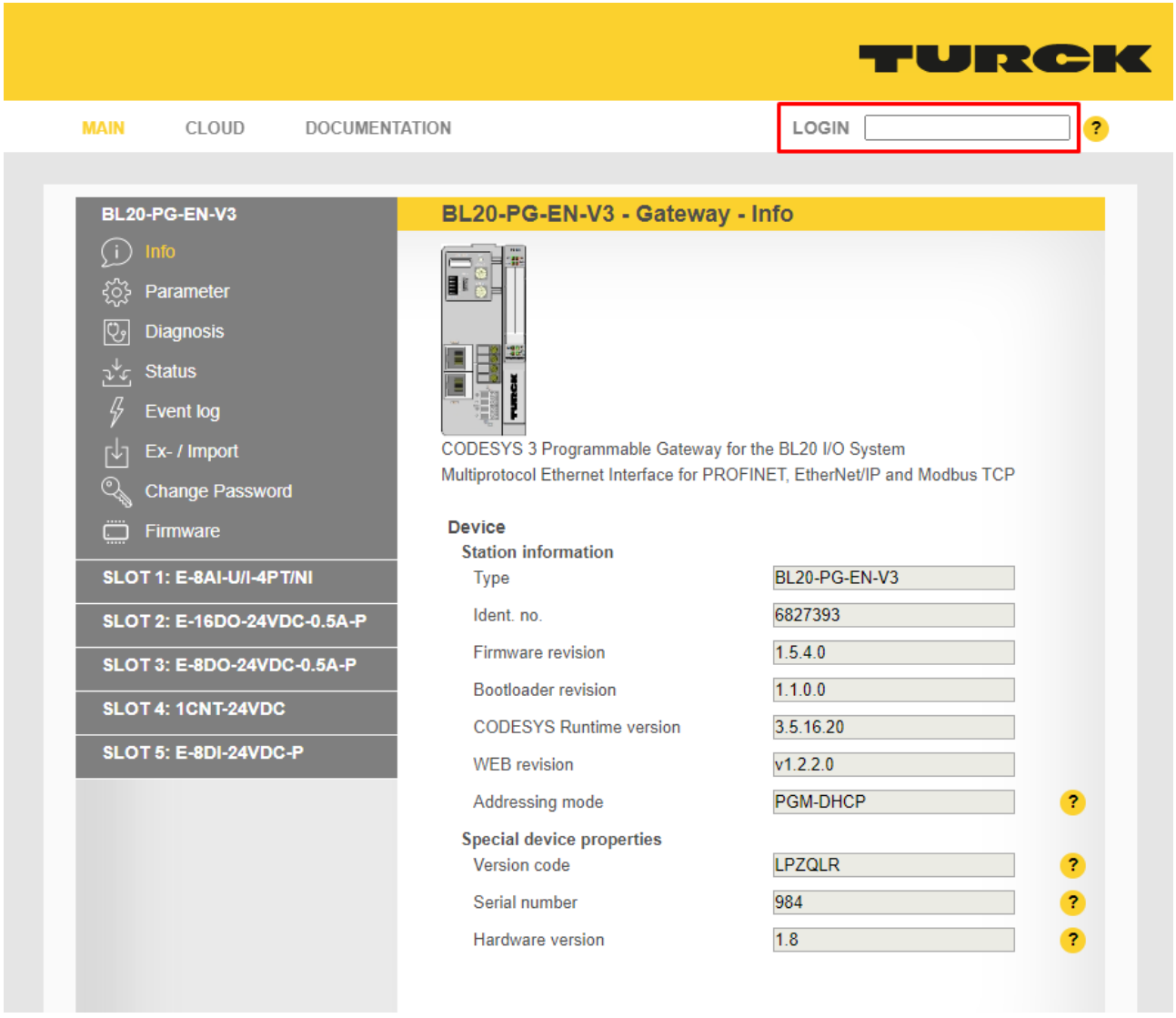


Fig. 55: Web server login

After login, write access to input and output data, network status, diagnostics, parameter data, etc. is possible.

8.5 Parameter

The BL…-PG-EN-V3 has the following parameters:

NOTE
Parameter changes are only applied after a device restart.

Parameter name	Value	Description
Deactivate WEB server	**No**	
	Yes	Deactivate the web server in the device.
Deactivate USB host support	**No**	
	Yes	Deactivates USB host support for the device. The USB host functions can no longer be executed.
Ethernet port 1/2	Autonegotiation	Sets the Ethernet port to autonegotiation or to a fixed value for the transmission speed or transmission mode.
	10 Mbps, half-duplex	
	10 Mbps, full-duplex	
	100 Mbps, half-duplex	
	100 Mbps, full-duplex	

Default values are shown in **bold**.

8.6 Diagnostics

The system diagnostics can be called up using the instance name of the "LocaL_IO_BLxx" object. No function blocks or libraries are required for this.

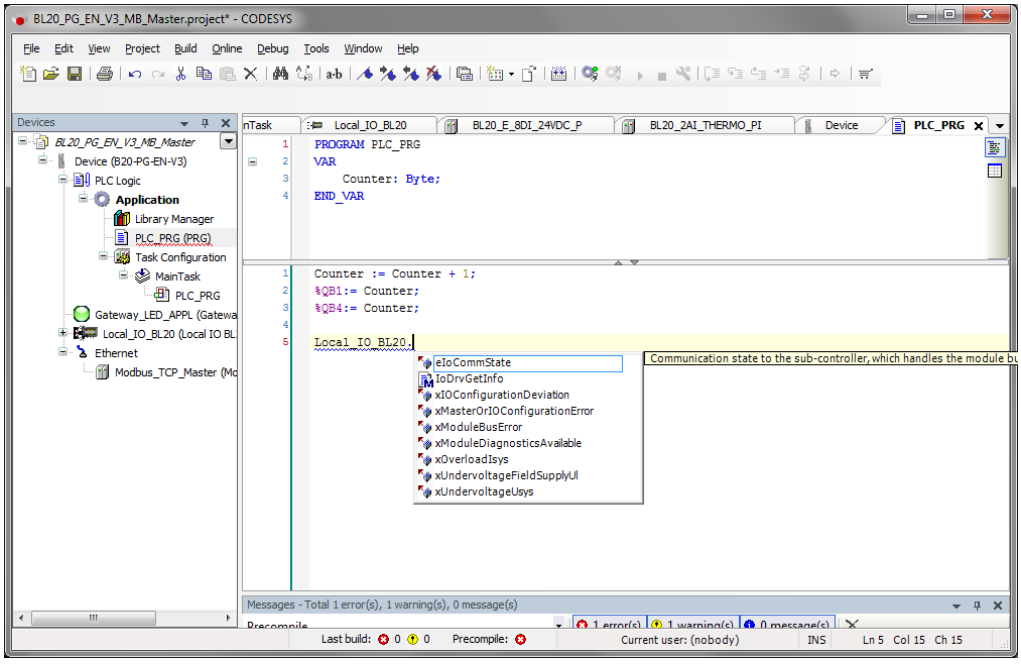


Fig. 56: Diagnostics via instance call

Diagnostics	Meaning	Troubleshooting
Module diagnostics available "xModuleDiagnosticsAvailable"	At least one module bus node is sending diagnostic data.	▶ Check diagnostic messages.
I/O configuration deviation "xIOConfigurationDeviation"	I/O module list has been changed in an adaptable manner, e.g. module removed.	The current and configured module list do not match but the data exchange proceeds as normal. ▶ Check the station for removed or new, unconfigured modules. ▶ Check the power supply to the system at the gateway.
Module bus error "xModuleBusError"	Communication with the module bus nodes on the module bus is not possible.	▶ At least one electronic module must be plugged in to be able to communicate with the gateway.
I/O configuration error "xMasterOrIOConfigurationError"	The real module list has been modified incompatible. Process data can no longer be exchanged with the module bus nodes.	▶ Compare the configuration of the BL… station with the real constellation. ▶ Check the structure of the BL… station for faulty or incorrectly inserted electronic modules.
Undervoltage U_{sys} "xUndervoltageUsys"	Load or system voltage is not within the permissible range.	▶ Check the power supply to the system at the gateway.
Undervoltage U_L "xUndervoltageFieldSupply_Ul"		
Overload I_{sys} "xOverloadIsys"	System supply overload	

8.6.1 I/O diagnostics

The diagnostics of the local I/O modules are available as process data in the I/O mapping of the I/O modules in CODESYS.

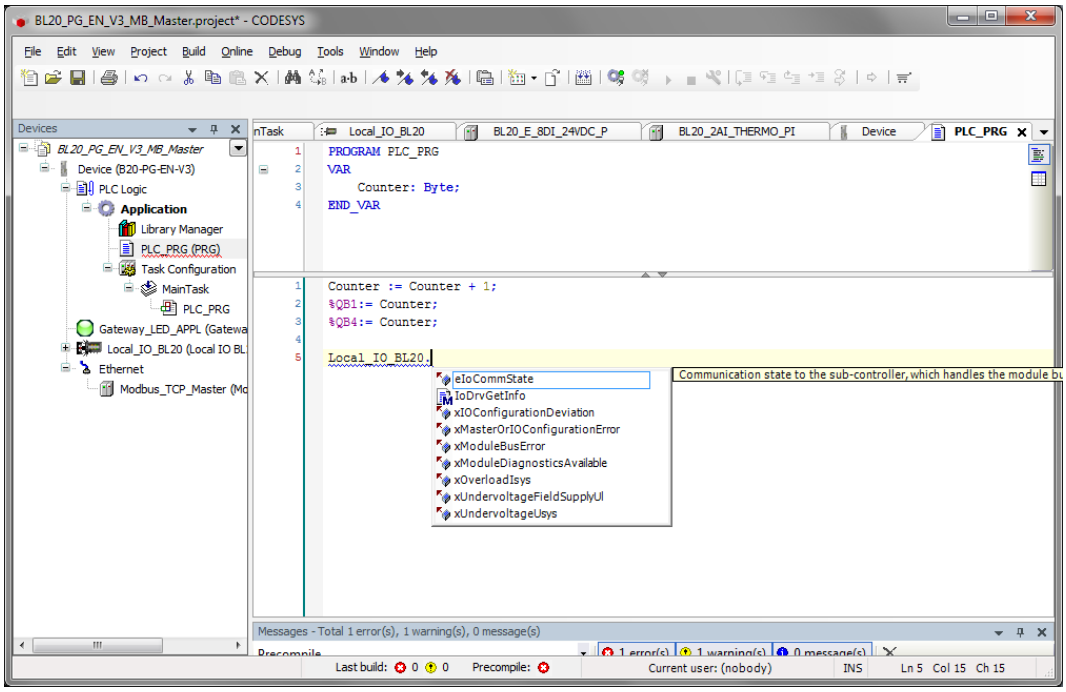


Fig. 57: Diagnostics of the I/O modules in the process image

9 Operation

9.1 LEDs

Each BL…-PG-V3 gateway has the following LED indicators:

- PLC status (RUN LED)
- Application-specific LED APPL (freely programmable via CODESYS)
- Power supply (LED VI/VO, BL67 only)
- Collective faults (LED ERR)
- Bus error (BUS LED)
- Two LEDs each for Ethernet communication LNK1 and LNK2

9.1.1 LEDs BL20-PG-EN-V3

GW LED	Meaning
Off	No power supply to the gateway. **Troubleshooting:** ▶ Check the system power supply at the gateway.
Green	Firmware active, gateway ready for operation
Red flashing	Wink command was received.

IOs LED	Meaning
Off	No power supply to the gateway. **Troubleshooting:** ▶ Check the system power supply at the gateway.
Green	Communication in progress. The configured constellation of the module bus nodes corresponds to the actual configuration.
Green flashing, 1 Hz	Station in force mode of the DTM. **Troubleshooting:** ▶ Deactivate the Force mode of the DTM.
Red	Gateway not operational **Possible causes:** - Too many modules at the gateway - Short circuit in connected module - Gateway defective **Troubleshooting:** ▶ Check the system power supply and wiring at the gateway. ▶ Dismantle excess modules. ▶ Replace the gateway if necessary.
Red flashing, 1 Hz	Non-adaptable change in the real constellation of the module bus participants. **Troubleshooting:** ▶ Compare the configuration of the station with the real constellation. ▶ Check the structure of the BL… station for faulty or incorrectly inserted electronic modules.

IOs LED	Meaning
Red flashing, 4 Hz	No communication via the module bus. **Troubleshooting:** ▶ At least one electronic module must be plugged in to be able to communicate with the gateway.
Alternate green and red flashing	The current and configured module list do not match but the data exchange proceeds as normal. **Troubleshooting:** ▶ Check the station for disconnected modules or newly inserted modules. ▶ Check the system power supply at the gateway.
Red flashing, twice, 1 Hz	Internal communication disrupted

APPL LED	Meaning
Green or red	This LED is controlled from the CODESYS program and can be programmed freely.

RUN LED	Meaning
Off	No power supply to the gateway.
Green	PLC program in progress
Green flashing	Firmware update in progress
Red	PLC program stopped
Red flashing	No PLC program loaded
Red flashing, 1 Hz	F_Reset in progress

BUS LED	Meaning
Off	No power supply to the gateway. **Troubleshooting:** ▶ Check the system power supply at the gateway.
Red	Displays the logical connection to a Scanner or Controller or Client. If several devices or servers are configured on the PG, the LED indicates the status of the first device/server configured in CODESYS.
Green flashing	Device is operational
Red	Gateway reports an error: ■ IP address conflict ■ Gateway in RESTORE mode ■ F_Reset activated **Troubleshooting:** ▶ Check the assigned IP addresses in the network. ▶ Check the DIP switch position.
Alternate green and red flashing	■ Autonegotiation and/or ■ DHCP/BootP search for settings, waiting for addressing **Troubleshooting:** Gateway is waiting for an IP address to be assigned. ▶ Waiting for the addressing process.

LNK… LED	Meaning
Off	No link
Yellow	Link established, 10 Mbps
Yellow flashing	Ethernet traffic, 10 Mbps
Green	Link established, 100 Mbps
Green flashing	Ethernet traffic, 100 Mbps

ERR LED	Meaning
Off	Station running, no diagnostic data
Red	Diagnostic message from one of the I/O modules or from the gateway.

9.1.2 LEDs BL67-PG-EN-V3

IOs LED	Meaning
Off	No power supply to the gateway. **Troubleshooting:** ▶ Check the system power supply at the gateway.
Green	Communication in progress. The configured constellation of the module bus nodes corresponds to the actual configuration.
Green flashing, 1 Hz	Station in force mode of the DTM. **Troubleshooting:** ▶ Deactivate the Force mode of the DTM.
Red	Gateway not operational **Possible causes:** ■ Too many modules at the gateway ■ Short circuit in connected module ■ Gateway defective **Troubleshooting:** ▶ Check the system power supply and wiring at the gateway. ▶ Dismantle excess modules. ▶ Replace the gateway if necessary.
Red flashing, 1 Hz	Non-adaptable change in the real constellation of the module bus participants. **Troubleshooting:** ▶ Compare the configuration of the station with the real constellation. ▶ Check the structure of the BL… station for faulty or incorrectly inserted electronic modules.
Red flashing, 4 Hz	No communication via the module bus. **Troubleshooting:** ▶ At least one electronic module must be plugged in to be able to communicate with the gateway.
Alternate green and red flashing	The current and configured module list do not match but the data exchange proceeds as normal. **Troubleshooting:** ▶ Check the station for disconnected modules or newly inserted modules. ▶ Check the system power supply at the gateway.
Red flashing, twice, 1 Hz	Internal communication disrupted

GW LED	Meaning
Off	No power supply to the gateway. **Troubleshooting:** ▶ Check the system power supply at the gateway.
Green	Firmware active, gateway ready for operation
Red flashing	Wink command was received.

RUN LED	Meaning
Off	No power supply to the gateway.
Green	PLC program in progress
Green flashing	Firmware update in progress
Red	PLC program stopped
Red flashing	No PLC program loaded
Red flashing, 1 Hz	F_Reset in progress

V_I/V_O LED	Meaning
Off	Power supply too low **Troubleshooting:** ▶ Check the system power supply at the gateway.
Green	V_I and V_O in the nominal range
Green flashing, 1 Hz	Undervoltage V_i; system in progress. **Troubleshooting:** ▶ Check the system power supply at the gateway.
Green flashing, 4 Hz	Undervoltage V_O; system in progress. **Troubleshooting:** ▶ Check the system power supply at the gateway.
Orange and red	Sensor supply current (I_{SENS}) too high **Troubleshooting:** ▶ Check the system power supply at the gateway.

APPL LED	Meaning
Green or red	This LED is controlled from the CODESYS program and can be programmed freely.

ERR LED	Meaning
Off	Station running, no diagnostic data
Red	Diagnostic message from one of the I/O modules or from the gateway.

BUS LED	Meaning
Off	No power supply to the gateway. **Troubleshooting:** ▶ Check the system power supply at the gateway.
Red	Displays the logical connection to a Scanner or Controller or Client. If several devices or servers are configured on the PG, the LED indicates the status of the first device/server configured in CODESYS.
Green flashing	Device is operational
Red	Gateway reports an error: ■ IP address conflict ■ Gateway in RESTORE mode ■ F_Reset activated **Troubleshooting:** ▶ Check the assigned IP addresses in the network. ▶ Check the DIP switch position.
Alternate green and red flashing	■ Autonegotiation and/or ■ DHCP/BootP search for settings, waiting for addressing **Troubleshooting:** Gateway is waiting for an IP address to be assigned. ▶ Waiting for the addressing process.

LNK... LED	Meaning
Off	No link
Yellow	Link established, 10 Mbps
Yellow flashing	Ethernet traffic, 10 Mbps
Green	Link established, 100 Mbps
Green flashing	Ethernet traffic, 100 Mbps

9.2 CODESYS functions

The CODESYS 3 programmable multiprotocol gateways BL20-PG-EN-V3 and BL67-PG-EN-V3 can be used as follows:

Protocol	Client, Controller, Scanner		Server, Device	
Modbus TCP	Yes	[▶ 32]	Yes	[▶ 37]
PROFINET	No		Yes	[▶ 39]
EtherNet/IP	No		Yes	[▶ 42]

3S libraries	
Network	■ SysSocket, 3.5.6.0 (System)
File access	■ SysFile, 3.5.6.0 (System) ■ SysFileAsync, 3.5.5.0 (System) ■ SysDir, 3.5.6.0 (System)
Time and date	■ SysTime, 3.5.5.0 (System) ■ SysTimeCore, 3.5.5.0 (System) ■ SysTimer, 3.5.5.0 (System) ■ SysTimeRtc, 3.5.5.0 (System)
Other	■ SysEvent, 3.5.5.0 (System) ■ SysMem, 3.5.5.0 (System)

CAA libraries	
Network	■ CAA Net Base Services, 3.5.6.0
File access	■ CAA File, 3.5.6.0
Time and date	■ CAA DTUtil Extern, 3.5.5.0 ■ CAA Real Time Clock Extern, 3.5.5.40 ■ CAA Tick Extern, 3.5.5.0 ■ CAA TickUtil Extern, 3.5.5.0 ■ CAA Timer Extern, 3.5.5.0
Other	■ CAA Mathematics, 3.5.1.0 ■ CAA Memory, 3.5.5.0

10 Maintenance

Ensure regularly that the plug connections and cables are in good condition.

The devices are maintenance-free, clean dry if required.

10.1 Updating the firmware via TAS

NOTICE
Interruption of the power supply during the firmware update
Risk of device damage due to faulty firmware update

- Do not interrupt the power supply during the firmware update.
- During the firmware update do not reset the power supply.
- Do not interrupt the Ethernet connection during the firmware update.

NOTE
The firmware update function in TAS is locked when the controller connection is active. The device must first be disconnected from the controller before performing the update.

Starting a firmware update for a device

- Open TAS.
- Open the network view and scan the network.
- Select the device.
- Click **Firmware update**.

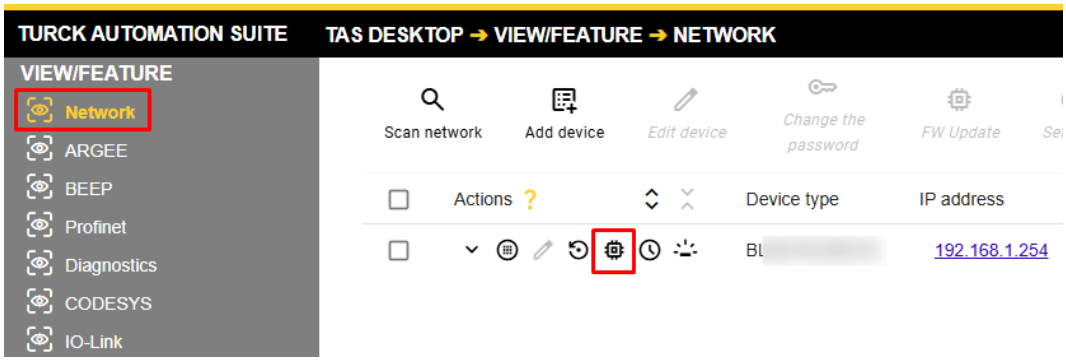


Fig. 58: Firmware update network view

- In the following dialog: Click **Select file** and open the directory of the firmware file.
- Select the new firmware file and load it via **Open**.
- Click **Start** to start the firmware update.

▶ Enter the device password and click **Login**

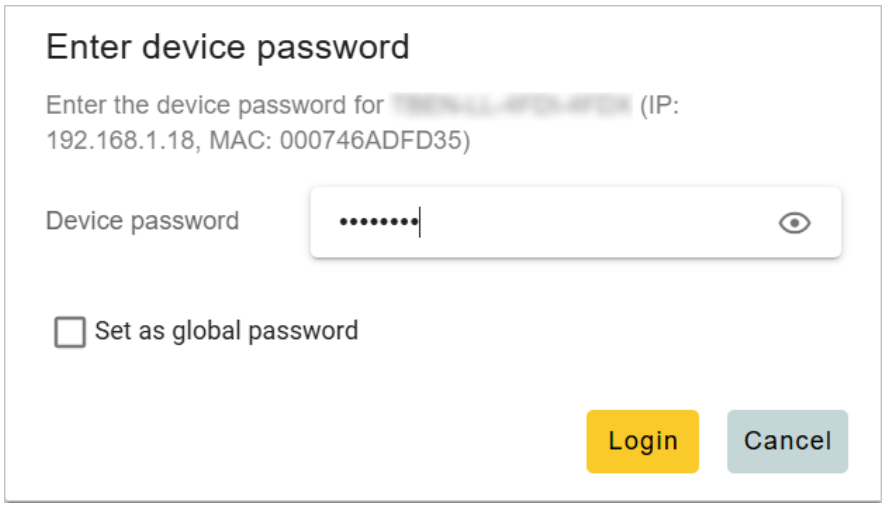


Fig. 59: Entering the device password

⇨ The progress of the firmware update is displayed.

NOTE
TAS makes it possible to set a global password with which all devices can be unlocked. This requires that all selected devices have the same device password and are in the same TCP network.

As an alternative to selecting a single device, it is also possible to select multiple devices. To do so, all devices to be updated must correspond to the same device type and be in the same TCP network.

This enables a firmware update to be performed for multiple devices at once.

Starting a firmware update for multiple devices

- Select all desired devices in the network view using the checkbox.
- Click **FW update** in the header.

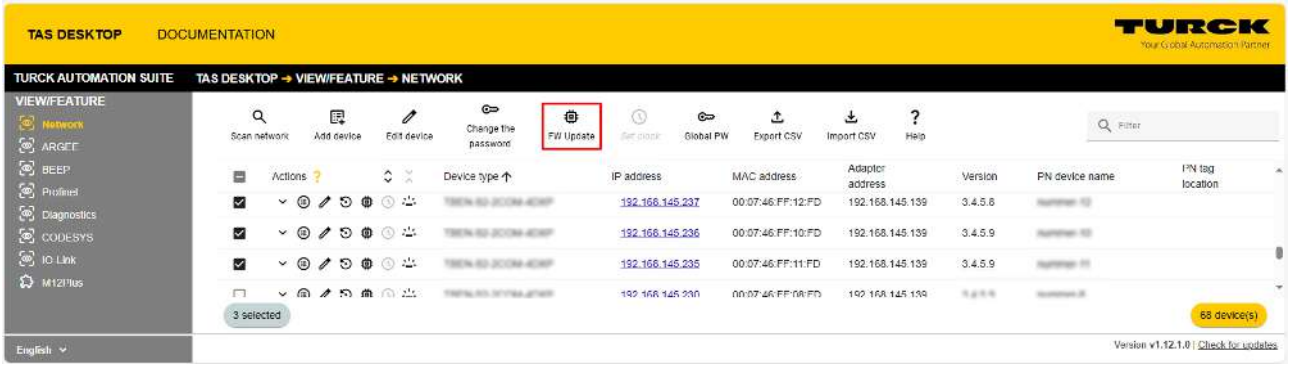


Fig. 60: Firmware update network view multiple devices

- In the following dialog: Click **Select file** and open the directory of the firmware file.
- Select the new firmware file and load it via **Open**.
- Click **Start** to start the firmware update.
- If a global password has not yet been defined: Enter the password and activate the **Set as global password** option.
  Note: If a global password has not yet been defined and the **Set as global password** option is not activated, the password is requested individually for each device.
- Click **Login**.

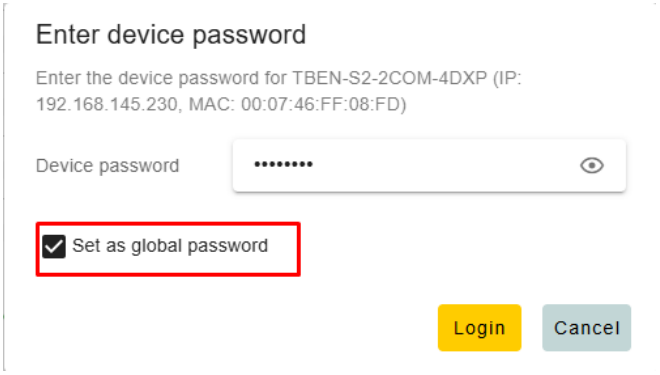


Fig. 61: Entering the device password and setting it as global password

⇨ The progress of the firmware update is displayed.

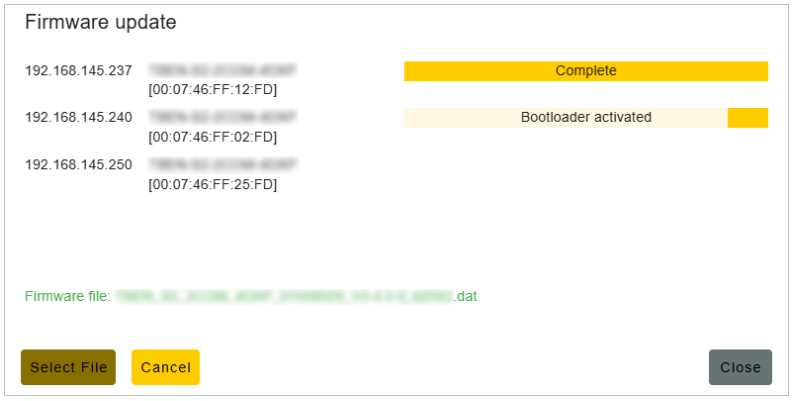


Fig. 62: Firmware update, progress

10.2 Updating the firmware via web server

NOTICE
Interruption of the power supply during the firmware update
Risk of device damage due to faulty firmware update
- ▶ Do not interrupt the power supply during the firmware update.
- ▶ During the firmware update do not reset the power supply.
- ▶ Do not interrupt the Ethernet connection during the firmware update.

- ▶ Open the web server.
- ▶ Log on to the device as administrator. The default password for the web server is “password”.
- ▶ Click **Firmware** → **SELECT FIRMWARE FILE**.
- ▶ Select the new firmware file and load it via **Open**.

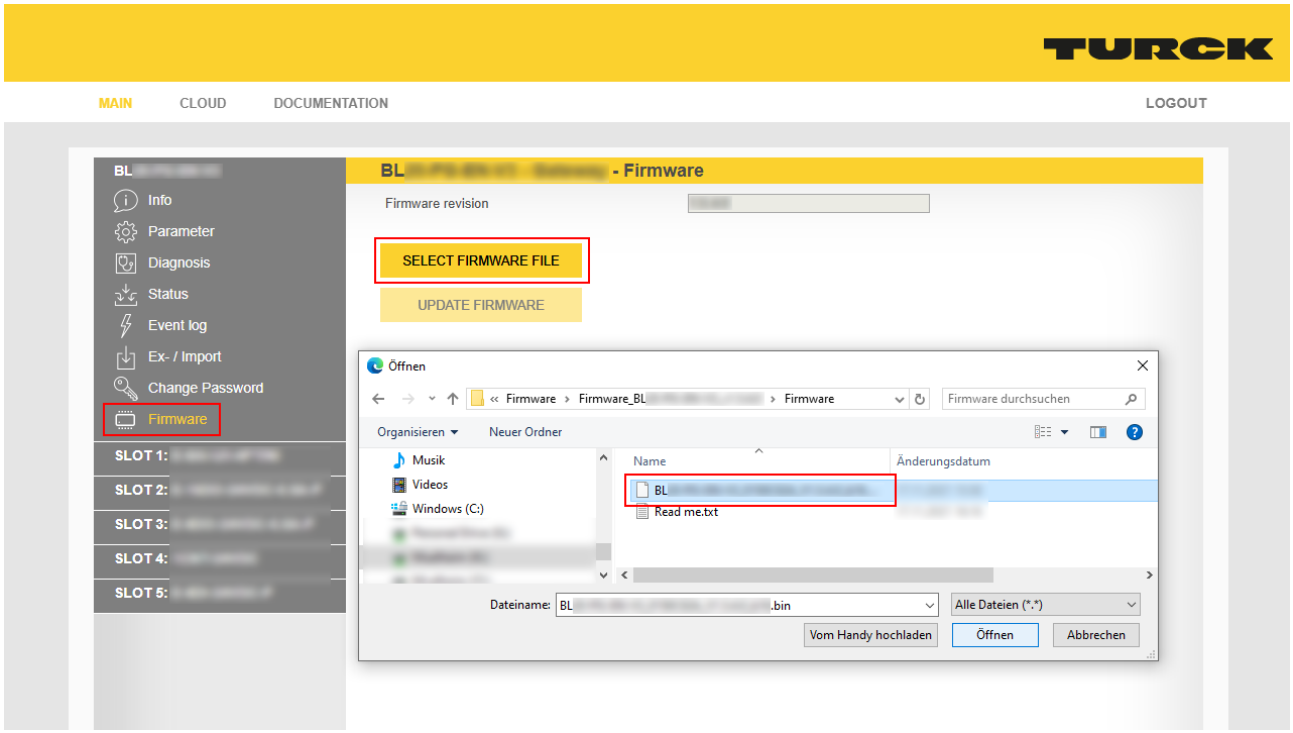


Fig. 63: Web server – selecting the firmware file

▶ Click **Update Firmware** and start the update.

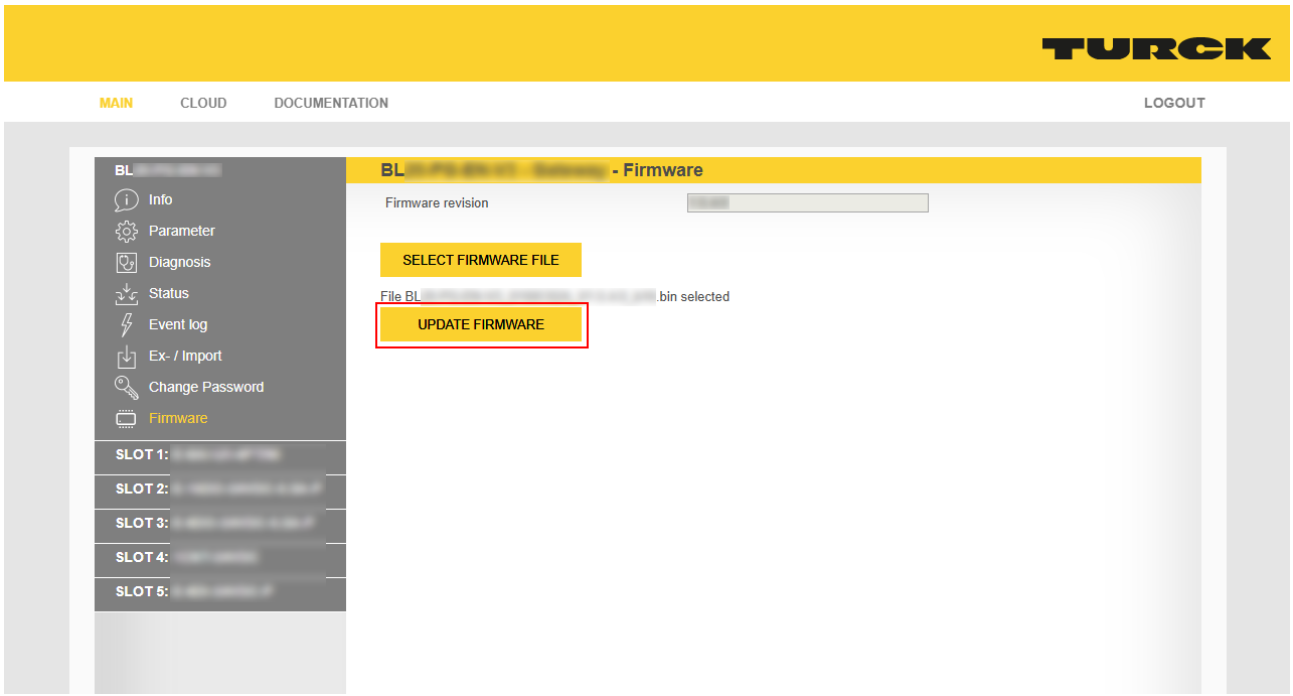


Fig. 64: Web server – starting the firmware update

➪ The progress of the firmware update is displayed.

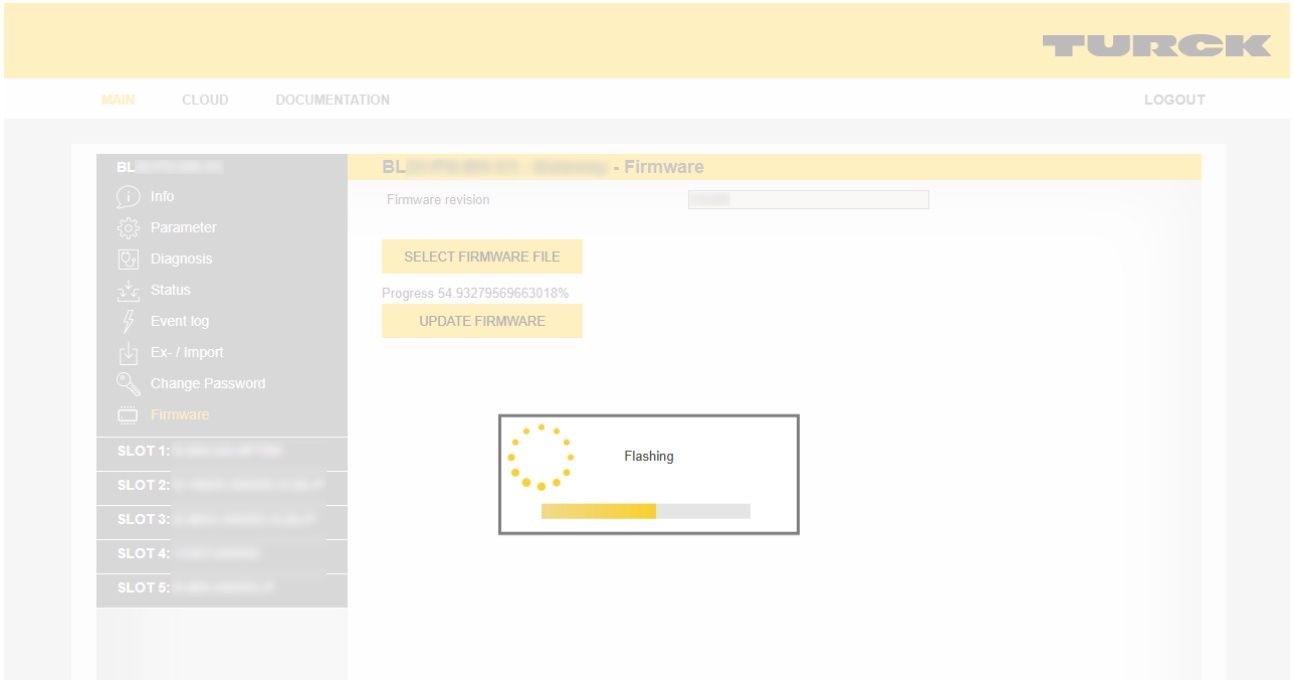


Fig. 65: Web server – firmware update running

▶ Restart the device after the update process has been completed.

11 Repair

The device is not intended for repair by the user. The device must be decommissioned if it is faulty. Observe our return acceptance conditions when returning the device to TURCK.

11.1 Returning devices

If a device has to be returned, bear in mind that only devices with a decontamination declaration will be accepted. This is available for download at
https://www.turck.de/en/return-service-6079.php
and must be completely filled in, and affixed securely and weather-proof to the outside of the packaging.

12 Decommissioning

12.1 Dismounting the BL20 station from the DIN rail

Dismount the BL20 station step by step in the following sequence:

WARNING
Dangerous electric voltage at modules with 120/230 VAC
Acute danger to life due to electric shock!

- ▶ Switch off the power supply.
- ▶ Secure the power supply against being switched on again.
- ▶ Ensure that the unit is de-energized.

- ▶ Switch off voltage at gateway and supply modules.
- ▶ Disconnect the connection to the fieldbus.
- ▶ Pull the electronics modules out of the base modules.
- ▶ Disconnect the wiring.
- ▶ Loosen the screws in the end brackets and remove end brackets from the DIN rail.
- ▶ Loosen the base modules and ECO modules from the right and remove them from the DIN rail. If a module in the middle of a station is to be removed, all modules mounted to the right of it must first be removed from the DIN rail.
- ▶ If necessary, remove cross-connectors beforehand (base modules for relay modules).
- ▶ Loosen the gateway from the DIN rail and remove it from the DIN rail.

12.2 Removing the BL67 station from the DIN rail

NOTE
TURCK recommends that the BL67 station be removed from the DIN rail before the modules are removed from the network.

CAUTION
Electrical voltage (24 V)
Risk of injury from electric shock.
- ▶ Switch off all applied power supplies.

- ▶ Switch off the power at the gateway and supply modules.
- ▶ Disconnect the fieldbus connection.
- ▶ Loosen the screws in the electronic modules.
- ▶ Pull out the electronic modules from the base modules.
- ▶ Loosen the wiring.
- ▶ Loosen the screws in the end plate and remove them from the DIN rail.
- ▶ Loosen the screws in the base modules.
- ▶ Remove the basic modules on the right from the network and remove them from the DIN rail. If a module in the middle of a station is to be dismantled, all modules mounted to the right of it must first be removed from the DIN rail.
- ▶ Release the gateway from the DIN rail and remove it from the DIN rail.

12.3 Removing the BL67 station from the mounting plate

- ▶ Loosen the screws of the BL67 station on the mounting plate.

13 Disposal

The devices must be disposed of properly and do not belong in the domestic waste.

14 Technical data

14.1 BL20-PG-EN-V3

ID	6827393
Power supply	
Power supply	24 VDC
System power supply	24 VDC / 5 VDC
Field supply	24 VDC
Admissible range	18…30 VDC
Nominal current from module bus	≤ 200 mA
Max. field supply current	8 A
Max. system supply current	1.3 A
Connection technology	screw terminals
Fieldbus	
Transmission rate	10/100 Mbps, half/full duplex, autonegotiation, autocrossing
Addressing	Rotary switch, PGM, DHCP
Connection technology	RJ45 female connector
PLC data	
Programming	CODESYS 3
released for CODESYS version	V 3.5.16.30 or later
Program language	IEC 61131-3 (IL, LD, FBD, SFC, ST)
OPC	Yes
OPC UA	Yes
Application tasks	5
Programming interface	Ethernet, USB
Processor	ARM, 32 bit
Cycle time	1 ms for 1000 IL commands (without I/O cycle)
Real-time clock (RTC)	Yes
Program memory	20 MB
Memory	60 MB
Input data	4 kBytes
Output data	4 kBytes
Non-volatile memory	16 kB
Web server	
Default IP address	192.168.1.254
Service interface	Mini USB
Modbus TCP	
Addressing	Static IP, BOOTP, DHC
Supported function codes	FC1, FC2, FC3, FC4, FC5, FC6, FC15, FC16, FC23
Number of input data (PAE)	Max. 1024 registers
Input register start address	0 (0x0000 hex)
Number of output data (PAA)	Max. 1024 registers

ID	6827393
Output register start address	0 (0x0000 hex)
EtherNet/IP	
Addressing	Acc. to EtherNet/IP specification
Number of input data (PAE)	248 INT
Number of output data (PAA)	248 INT
PROFINET	
Addressing	DCP
Conformance class	B (RT)
MinCycleTime	1 ms
Diagnostics	Acc. to PROFINET alarm handling
Topology detection	Supported
Automatic addressing	Supported
Number of input data (PAE)	Max. 512 bytes
Number of output data (PAA)	Max. 512 bytes
Ambient conditions	
Operating temperature	-20…+60 °C
Storage temperature	-25…+70 °C
Relative humidity	15 to 95 % (internal), Level RH-2, no condensation (when stored at 45 °C)
Vibration testing	Acc. to EN 61131
Shock testing	Acc. to IEC 68-2-27
Drop and topple	acc. to IEC 68-2-31 and free fall to IEC 68-2-32
Electromagnetic compatibility	Acc. to IEC 61131-2
Type of protection	IP20
General information	
Dimensions (W × L × H)	50.6 × 114.8 × 74.4 mm
Approvals	CE, cULus (UL File No. E197630)

14.2 BL67-PG-EN-V3

ID	6827394
Power supply	
Power supply	24 VDC
System power supply	24 VDC / 5 VDC
Field supply	24 VDC
Admissible range	18…30 VDC
Nominal current from module bus	≤ 100 mA
max. sensor supply I_{sens}	4 A, electronically limited current supply
Max. load current I_o	10 A
Max. field supply current	10 A
Max. system supply current	1.2 A
Connection technology	5-pin 7/8" male connector
Fieldbus	
Transmission rate	10/100 Mbps, half/full duplex, autonegotiation, autocrossing
Addressing	Rotary switch, PGM, DHCP
Connection technology	2 × M12, 4-pin, D-coded
PLC data	
Programming	CODESYS 3
released for CODESYS version	V 3.5.16.30 or later
Program language	IEC 61131-3 (IL, LD, FBD, SFC, ST)
OPC	Yes
OPC UA	Yes
Application tasks	5
Programming interface	Ethernet, USB
Processor	ARM, 32 bit
Cycle time	1 ms for 1000 IL commands (without I/O cycle)
Real-time clock	Yes
Program memory	20 MB
Memory	60 MB
Input data	4 kBytes
Output data	4 kBytes
Non-volatile memory	16 kB
Web server	
Default IP address	192.168.1.254
Service interface	Mini USB
Modbus TCP	
Addressing	Static IP, BOOTP, DHC
Supported function codes	FC1, FC2, FC3, FC4, FC5, FC6, FC15, FC16, FC23
Number of input data (PAE)	Max. 1024 registers
Input register start address	0 (0x0000 hex)
Number of output data (PAA)	Max. 1024 registers

ID	6827394
Output register start address	0 (0x0000 hex)
EtherNet/IP	
Addressing	Acc. to EtherNet/IP specification
Number of input data (PAE)	248 INT
Number of output data (PAA)	248 INT
PROFINET	
Addressing	DCP
Conformance class	B (RT)
MinCycleTime	1 ms
Diagnostics	Acc. to PROFINET alarm handling
Topology detection	Supported
Automatic addressing	Supported
Number of input data (PAE)	Max. 512 bytes
Number of output data (PAA)	Max. 512 bytes
Ambient conditions	
Operating temperature	-40…+70 °C
Function restriction	
> 55 °C	Derating: Max. field supply current = 5 A
Storage temperature	-40…+85 °C
Relative humidity	15 to 95 % (internal), Level RH-2, no condensation (when stored at 45 °C)
Vibration testing	Acc. to EN 61131
Up to 5 g (at 10…150 Hz)	For mounting on DIN rail, undrilled according to EN 60715, with end brackets
Up to 20 g (at 10…150 Hz)	For mounting on base plate or machinery At least every second module has to be mounted with two screws each.
Shock testing	Acc. to IEC 68-2-27
Drop and topple	Acc. to IEC 68-2-31 and free fall acc. to IEC 68-2-32
Electromagnetic compatibility	Acc. to IEC 61131-2
Type of protection	IP67
DIN rail mounting	Yes, offset
Direct mounting	Two mounting holes, 6 mm Ø
General information	
Dimensions (W × L × H)	74 × 145 × 77.5 mm
Approvals	CE, cULus (UL File No. E484727)

15 TURCK branches — contact data

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Austria	Turck GmbH Graumanngasse 7/A5-1, A-1150 Vienna www.turck.at
Belgium	Turck Multiprox N. V. Lion d'Orweg 12, B-9300 Aalst www.multiprox.be
Brazil	Turck do Brasil Automação Ltda. Rua Anjo Custódio Nr. 42, Jardim Anália Franco, CEP 03358-040 São Paulo www.turck.com.br
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