Your Global Automation Partner



TBEN-L...-PLC-... Compact CODESYS V3 PLC

Instructions for Use

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1 About these Instructions

These operating instructions describe the structure, functions and the use of the product and will help you to operate the product as intended. Read these instructions carefully before using the product. This is to avoid possible damage to persons, property or the device. Retain the instructions for future use 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 a qualified personal and must be carefully read by anyone mounting, commissioning, operating, maintaining, dismantling or disposing of the device.

1.2 Explanation of symbols used

The following symbols are used in these instructions:

	DANGER DANGER indicates a dangerous situation with high risk of death or severe injury if not avoided.
	WARNING WARNING indicates a dangerous situation with medium risk of death or severe in- jury if not avoided.
	CAUTION CAUTION indicates a dangerous situation of medium risk which may result in minor or moderate injury if not avoided.
!	NOTICE NOTICE indicates a situation which may lead to property damage if not avoided.
i	NOTE NOTE indicates tips, recommendations and useful information on specific actions and facts. The notes simplify your work and help you to avoid additional work.
	CALL TO ACTION This symbol denotes actions that the user must carry out.
₽	RESULTS OF ACTION This symbol denotes relevant results of actions.

1.3 Other documents

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

- Data sheet
- Operating instructions
- EU Declaration 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 compact CODESYS V3 programmable PLCs:

- TBEN-L4-PLC-10
- TBEN-L4-PLC-11
- TBEN-L5-PLC-10
- TBEN-L5-PLC-11

2.2 Scope of delivery

- TBEN-L...-PLC-...
- Closure caps for 7/8" connectors
- Closure caps for M12 connectors
- Label clips
- Quick-Start Guide

2.3 Legal requirements

The device is subject to the following EC directives:

- 2014/30/EU (electromagnetic compatibility)
- 2011/65/EU (RoHS Directive)

2.4 Manufacturer and service

Hans Turck GmbH & Co. KG Witzlebenstraße 7 45472 Muelheim an der Ruhr Germany

Turck supports you with your projects, from initial analysis to the commissioning of your application. The Turck product database contains software tools for programming, configuration or commissioning, data sheets and CAD files in numerous export formats. You can access the product database at the following address: www.turck.en/products For further inquiries in Germany contact the Sales and Service Team on:

- Sales: +49 208 4952-380
- Technology: +49 208 4952-390

Outside Germany, please contact your local Turck representative.



3 For Your Safety

The product is designed according to state-of-the-art technology. However, residual risks still exist. Observe the following warnings and safety notices to prevent damage to persons and property. Turck accepts no liability for damage caused by failure to observe these warning and safety notices.

3.1 Intended use

These devices are designed solely for use in industrial areas.

The CODESYS V3 programmable TBEN-L...-PLC-... can be used as autonomous PLC or as decentral PLC in a network interconnection for a fast preprocessing of signals. The devices allow autonomous control of applications without higher-level control. The TBEN-L...-PLC-... can be used in different Ethernet networks or fieldbus systems as Master/Controller (Modbus TCP, Modbus RTU, PROFINET, EtherNet/IP[™], CANopen, SAE J1939) or Slave/Device (Modbus TCP, Modbus RTU, PROFINET, EtherNet/IP[™], CANopen) and can communicate with bus nodes or higher-level controllers.

The cloud functionality of the TBEN-L...-PLC-... enables the direct transfer of application data to the Turck Cloud via CODESYS variables for the purpose of data analysis or production monitoring. In Dual MAC mode, the TBEN-L...-PLC-... can be operated as a node in two different Ethernet networks.

The devices may 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.

3.2 General safety notes

- The device may only be assembled, installed, operated, parameterized and maintained by professionally-trained personnel.
- The device may only be used in accordance with applicable national and international regulations, standards and laws.
- The device only meets the EMC requirements for industrial areas and is not suitable for use in residential areas.
- The programmable devices can be used to control machines. Changes to system or network settings or to the control program can lead to non-defined states of the controlled machines. Changes may only be made if the controlled machine is in a safe stop state and the device is separated from the machine.
- Change the default password of the integrated web server after the first login. Turck recommends using a secure password.

4 Product Description

The device is designed in a fully encapsulated housing with degree of protection IP65/IP67/ IP69K. The Ethernet ports serve as interface for programming, configuration and Ethernet/ field bus communication. The Ethernet ports serve as interface for programming, configuration and Ethernet/ field bus communication. Two serial interfaces COM 0 and COM 1 are available for connecting serial RS232 or RS485 devices. CANopen or SAE J1939 devices can be connected to the TBEN-L...-PLC-... via the two CAN interfaces CANout and CANin. To connect digital sensors and actuators, the device has eight digital I/O channels that can be used as inputs or outputs without configuration. The USB device port is designed as a mini USB B socket and can be used as a service interface for the device DTMs and as a programming interface for CODESYS. The USB host port is designed as a USB2.0-A socket and is used to connect USB memory sticks for program backup, program recovery, firmware update and data synchronization.

4.1 Device overview



Fig. 1: TBEN-L4 –PLC-... – dimensions



Fig. 2: TBEN-L5 -PLC-... - dimensions



4.1.1 Block diagram





Fig. 3: Block diagrams TBEN-L...- PLC-...

4.1.2 Display Elements

The device has the following LED indicators:

- Power supply
- Group and bus errors
- Status
- Diagnostics

4.2 Properties and Features

- Integrated Cloud functionality (≥ V1.4.6.0): Transfer of CODESYS variables into the Cloud
- PROFINET IO and EtherNet/IP[™] Device, Modbus TCP, Modbus RTU and CANopen slave
- Master functionalities:
 - Modbus TCP /Modbus RTU master
 - PROFINET Controller
 - EtherNet/IP[™] Scanner
 - CANopen Manager
 - SAE J1939 Manager
- Ethernet and USB programming interface
- Programmable according to IEC 61131-3 with CODESYS V3 in:
 - IL = Instruction List
 - LD = Ladder Logic
 - FBD = Function Block Diagram
 - SFC = Sequential Function Chart
 - ST = Structured Text
- Integrated Gold CAP buffered Real Time Clock (RTC)
- USB Device port as programming and service interface
- USB Host port for connecting USB memory sticks for firmware-update, program backup, program restore, data synchronization
- Protocol converter for example from Ethernet to serial communication
- 7/8"-connector for power supply
 - TBEN-L4-PLC-...: 4-pole
 - TBEN-L5-PLC-...: 5-pole
- Two 4-pole M12-connectors for Ethernet
- 8 digital channels configurable as PNP inputs and/or outputs (2 A)
- Several LEDs for status indication
- Switch Mode (< V1.4.6.0): Integrated Ethernet switch, allows line topology
- Dual MAC Mode (≥ V1.4.6.0): 2 separate Ethernet ports for connecting different Ethernet networks
- Integrated Webserver
- Transmission rate 10 Mbps and 100 Mbps
- Fibre-glass reinforced housing
- Shock and vibration tested
- Fully potted module electronics
- Degree of protection IP65/IP67/IP69K



4.3 Operating principle

The CODESYS-3 controller TBEN- L PLC-... can be used to control smaller or modular machines or for signal preprocessing. The device can be used in various Ethernet networks or fieldbus systems as master/controller (Modbus TCP, Modbus RTU, PROFINET, EtherNet/IP[™], CANopen, SAE J1939) or slave/device (Modbus TCP, Modbus RTU, PROFINET, EtherNet/IP[™], CANopen) and communicates with bus nodes or higher-level controllers. As a protocol converter between two networks, the TBEN-L...-PLC-... can for example act as a CANopen manager of a machine module networked with CANopen and connect it to a system that is networked with PROFINET. In DUAL MAC mode, the controller transmits data from an internal machine network to the external Turck Cloud Portal as a participant in two separate Ethernet networks, for example.

4.4 Functions and operating modes

4.4.1 Switch Mode

In switch mode, the two Ethernet ports of the TBEN-L...-PLC-... are treated as one autocrossing switch with one IP address [> 25].



Devices with a firmware version lower than V1.4.6.0 can only be operated in switch mode.

4.4.2 Dual MAC Mode (firmware version higher than V1.4.6.0)

NOTE

In Dual MAC mode, the two Ethernet ports of the TBEN-L...-PLC-... are treated as separate Ethernet ports with own MAC and IP addresses. The TBEN-L...-PLC-... can therefore be a participant in two different Ethernet networks in dual MAC mode. The two IP addresses of the separate Ethernet ports must be located in different subnets [> 25] Example:

Port P1 (ETH1):

IP address: 192.168.1.xxx

- Subnet mask: 255.255.255.0
- Port P2 (ETH2):
- IP address: 192.168.2.xxx
- Subnet mask: 255.255.255.0



NOTE

To use the TBEN-L...-PLC-... in separate networks with combined master/slave functions (see Master/Slave [> 13]), the device must be operated in dual MAC mode.

4.4.3 Master/slave operation modes

The CODESYS 3 programmable TBEN-L...-PLC-... can be used as follows:

Protocol	Master/Controller/Scanner/ Manager	Slave/Device
Modbus TCP	Х	Х
Modbus RTU	Х	Х
PROFINET	Х	Х
EtherNet/IP™	Х	Х
CANopen	Х	х
SAE J1939	Х	-



NOTE

The functions PROFINET device and EtherNet/IP[™] slave are only available at Ethernet port P1 (in CODESYS at eth0).

Possible combinations Master/Slave

The following table is valid for combinations of one Master and one Slave.

	Modbus TCP Slave	PROFINET Device	EtherNet/IP™ Device	Modbus RTU Slave	CANopen Device
Modbus TCP Master	х	х	х	x	х
PROFINET Controller	х	X*	х	Х	х
EtherNet/IP [™] Scanner	х	х	X*	Х	х
Modbus RTU Master	x	х	x	X*	x
CANopen Manager	x	Х	x	Х	-
SAE J1939 Manager	x	x	x	x	-

* These functions cannot be used together on the same Ethernet port (Dual MAC Mode) or COM port. Each function must be configured separately on an Ethernet or COM port.

Possible combinations Master/Master

	Modbus TCP Master	PROFINET Controller	EtherNet/ IP™ Scanner	Modbus RTU Master	CANopen Manager	SAE J1939 Manager
Modbus TCP Master	-	х	х	х	х	х
PROFINET Control- ler	х	-	-	х	х	х
EtherNet/IP [™] Scan- ner	х	-	-	х	х	х
Modbus RTU Master	х	х	х	(1 Master per COM port)	x	х
CANopen Manager	х	х	х	х	-	-
SAE J1939 Manager	х	х	х	х	-	-

Possible combinations Slave/Slave

	Modbus TCP Slave	PROFINET Device	EtherNet/IP™ Device	Modbus RTU Slave	CANopen Device
Modbus TCP Slave	-	х	х	х	х
PROFINET Device	Х	-	х	х	х
EtherNet/IP™ Device	Х	х	-	х	х
Modbus RTU Slave	x	х	х	(1 Slave per COM port)	х
CANopen Device	Х	Х	х	х	-



Supported CODESYS libraries

3S libraries	Version
Network	SysSocket, 3.5.14.0 (system)
	SysTarget, 3.5.5.0 (system)
File access	SysFile, 3.5.9.0 (system)
	SysDir, 3.5.12.0 (system)
	SysTypes, 3.1.2.0 (system)
EtherNetIP [™] Services	EtherNetIP Services, 3.5.14.0
CommFB	CommFB, 3.5.14.0
Serial communication	SysTarget, 3.5.5.0 (system)
Time and date	SysTime, 3.5.9.0 (system)
	SysTimeRtc, 3.5.5.0 (system)
Miscelaneous	SysEvent, 3.5.5.0 (system)
	SysMem, 3.5.12.0 (system)
	Manitan
	version
Network	CAA Net Base Services, 3.5.14.0
File access	CAA File, 3.5.13.0
	CAA Types Extern, 3.5.13.0
CAN	CAA CiA 405, 3.5.14.0
Serial communication	CAA SerialCom, 3.5.10.0
Time and date	CAA Types Extern, 3.5.12.0
	CAA Real Time Clock Extern, 3.5.10.4

4.4.4 COM interfaces

The two serial interfaces COM0 and COM1 can be used flexibly as RS232 or RS485 interfaces and are used to connect RS232 or RS485 devices.

4.4.5 CAN interfaces

The CAN interfaces CANin and CANout are used to connect CANopen nodes when the TBEN-L...-PLC-... is operated as a CANopen device, CANopen manager or SAE J1939 manager.

4.4.6 Web server

The integrated web server is used for support during commissioning, maintenance and diagnostics. The web server offers the following functions, among others:

- Displaying device information (firmware version, hardware version, serial number, CODESYS runtime, etc.)
- Parameterizing network settings and device functions
 - Setting Ethernet interface
 - Assigning a PROFINET name
 - Activating the firewall for Ethernet port P2
 - Activating UDB host functions
 - Setting I/O channel parameters
 - etc.
- Displaying status information
 - Network status
 - USB memory status
 - CODESYS application status
 - etc.
- Displaying device and I/O channel diagnostics
- Cloud:
 - Configuring the Cloud access
 - Monitoring CODESYS variables
- Export and import of device configurations
- Executing the firmware update
- Executing a device restart and a network reset
- Resetting the device to factory settings

Safety in the web server

In the web server, a default-password is assigned to the Turck devices for the administrator access.

The default user for the web server is "admin", the default password is "password".

We strongly recommend to use an individual password, in order to avoid possible misuse by a third party!

This should be done in the context of the network security concept for the complete facility in which the modules are placed.

The password is transmitted in plain text.

4.5 Technical accessories

Accessories for mounting, connecting and parameterizing can be found in product database or the Accessories List for TBEN (D301367) under www.turck.com. The accessories are not part of the scope of delivery.



5 Mounting

The TBEN-L module can be screwed onto a flat mounting plate.

- Attach the module to the mounting surface with two M6 screws. The maximum tightening torque for the screws is 1.5 Nm
- Avoid mechanical stresses.
- Optional: Ground the device.



Fig. 4: Mounting the device on a mounting plate

5.1 Mounting the device outdoors

The device is UV-resistant according to DIN EN ISO 4892-2. Direct sunlight can cause material abrasion and color changes. The mechanical and electrical properties of the device are not affected.

• To avoid material abrasion and color changes: Protect the device from direct sunlight, e.g. by using protective shields.

5.2 Grounding the device

Equivalent wiring diagram and shielding concept 5.2.1

The equivalent circuit diagram and the shielding concept of the TBEN-L...-PLC-... is shown in the following figure:





Fig. 5: TBEN-L5-PLC-...- equivalent circuit dia- Fig. 6: TBEN-L4-PLC-...- equivalent circuit diagram and shielding concept

gram and shielding concept



5.2.2 Shielding of the fieldbus and I/O level

The fieldbus and I/O module level of the TBEN-L modules can be grounded separately.

Fig. 8: Grounding clip (1), grounding ring (2) and metal screw (3)

The grounding ring (2) provides the grounding for the module. The shielding of the I/O level is permanently connected to the module ground. Only by mounting the module is the module ground connected to the reference potential of the installation.

Grounding concept of the I/O modules (I/O level)

When mounted directly on a mounting plate, the module is connected to the reference potential of the installation via a metal screw (3) in the lower mounting hole. If no module grounding is required, the electrical connection to the reference potential is interrupted, e.g. with a plastic screw.

Grounding concept of the fieldbus level

The device is factory shipped with a grounding clip provided on the connectors for the fieldbus connection.

When mounted directly on a mounting plate the shielding of the fieldbus cables is routed directly to the module ground via the grounding clip and the metal screw in the lower mounting hole.

If direct grounding of the fieldbus shield is not required, the grounding clip must be removed. In this case, the fieldbus shield is connected to the module ground via an RC element.

5.2.3 Grounding the device – I/O level and fieldbus level

The ground of the fieldbus level can either be connected directly and routed via the grounding clip (1) or indirectly via an RC element with the ground of the I/O level. If the fieldbus connection is to be routed via an RC element, the grounding clip must be removed.

Fig. 9: Grounding clip (1)

Removing the grounding clip: Removing the direct grounding of the fieldbus level

Push the grounding clip forward with a flat slot-head screwdriver and remove.



Fig. 10: Use a flat slotted screwdriver to push the grounding clip forwards and remove it.

Mounting the grounding clip: Implementing the direct grounding of the fieldbus level

- Use a screwdriver to insert the grounding clip between the fieldbus connectors so that contact is made with the metal housing of the plug connectors.
- The shield of the fieldbus cables is connected to the grounding clip.



Fig. 11: Mounting the grounding clip

Grounding the device – Mounting on mounting plate

- When mounting on a mounting plate: Fasten the TBEN-L module with an M6 metal screw through the lower mounting hole.
- ➡ The shield of the M12 flange for the I/O level is connected via the M6 metal screw with the reference potential of the installation.
- ⇒ With the grounding clip mounted: The shield of the fieldbus is connected to the reference potential of the installation via the module ground of the I/O level.



6 Connecting

6.1 Connecting the modules to Ethernet

For the connection to Ethernet, the device has two 4-pin D-coded M12 connectors. The maximum tightening torque is 0.6 Nm.

		<u>O</u>	<u>O</u>	<u>O</u>	
UF	Inil			0	
<u>łö.</u>		Ó	Õ	Ó	

Fig. 12: M12 Ethernet connector

• Connect the device to the field bus according to the pin assignment shown below.

Fig. 13: Pin assignment Ethernet connectors



NOTE

The behavior of the Ethernet Interfaces depends on the parameterization of the TBEN-L...-PLC-.... The connectors operate in switch mode as autocrossing switches with one IP address. In Dual MAC Mode, the Ethernet connectors are treated as separate Ethernet ports with two separate MAC and IP addresses. The TBEN-L...-PLC-... can thus be a node in two separate Ethernet networks in Dual MAC mode.

6.2 Connecting the power supply

For the connection to the power supply, the device has two 5-pin 7/8" connectors. The power supply connectors are designed as 4-pole (TBEN-L4-PLC) or 5-pole (TBEN-L5-PLC) 7/8" connectors. V1 and V2 are galvanically isolated. The maximum tightening torque is 0.8 Nm.

	0.00.00			0	0
A Ö Lu		\bigcirc	\bigcirc	\bigcirc	

Fig. 14: 7/8" connector for connecting the supply voltage (TBEN-L4-PLC-...)

U⊊ _{#1} In"	
HOLL	

Fig. 15: 7/8" connector for connecting the supply voltage (TBEN-L5-PLC-...)

• Connect the device to the power supply according to the pin assignment shown below.



Fig. 16: TBEN-L4-PLC-... – Pin assignment power supply connectors



Fig. 17: TBEN-L5-PLC-... – Pin assignment power supply connectors

Connector	Function
X1	Power feed
X2	Continuation of the power to the next node
V1	System voltage: Power supply 1 (incl. supply of electronics)
V2	Load voltage: Power supply 2



NOTE

The system voltage (V1) and the load voltage (V2) are fed in and monitored separately. In case of an undercut of the admissible voltage, the connectors are switchedoff according to the module's supply concept. In case of an undervoltage at V2, the LED PWR changes from green to red. In case of an undervoltage at V1, the LED PWR is turned off.



6.3 Connecting serial devices (COM0 and COM1)

For the connection of serial devices, the device has two serial interfaces. The interfaces are designed as 5-pin M12 connectors. The maximum tightening torque is 0.8 Nm.

Fig. 18: M12 connector for connecting serial devices

 Connect the serial devices to the serial interfaces according to the pin assignment shown below.

Fig. 19: COM port x in RS232 mode



Fig. 20: COM port x in RS485 mode

6.4 Connecting CAN devices (CANout and CANin)



Fig. 21: M12 connector for connecting CANopen nodes

For the connection of CANopen nodes, the device has two CANopen ports. The maximum tightening torque is 0.8 Nm.

• Connect the CANopen nodes according to the pin assignment shown below.

-(
2	1 = Shield $2 = V + (V1)$
1 (0 0 0) 3 5 4	3 = V - (V1) $4 = CAN_H$ $5 = CAN_L$
<i>C</i> 2	

Fig. 22: CANout

6.5 Connecting digital sensors and actuators

The device has four 5-pin M12 connectors for connecting digital sensors and actuators. The maximum tightening torque is 0.8 Nm.



Fig. 23: M12 connector for connecting digital sensors and actuators

• Connect the sensors and actuators to the device according to the figure shown below.



Fig. 24: Connectors for digital sensors and actuators - wiring diagram

6.6 Using the USB device port

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



Fig. 25: USB device port

RNDIS driver

The RNDIS driver for the USB device port is installed automatically during the DTM installation in PACTware[™]. After the DET installation, the USB device port is shown as additional Ethernet port in the DTM.



Use the interface BL Service Ethernet in the DTM for the connection to the device.

6.7 USB host port

The USB host port is designed as a CODESYS 2.0-A socket and is used to connect USB memory sticks for program backup, program recovery, firmware update and data synchronization.



Fig. 26: USB host port



7 Commissioning

7.1 Setting the Ethernet port mode (firmware version V1.4.6.0 or higher)

The Ethernet port mode is set via DIP switch no. 2 [DMM] under the cover at the device.



Fig. 27: Switch for setting the Ethernet port mode

It is not possible to change the Ethernet port mode during operation, since the change only becomes effective after a voltage reset.

Position DIP switch no. 2 DMM	Ethernet port mode	Meaning
0	Switch Mode	In switch mode, the two Ethernet ports of the TBEN-LPLC are treated as autocrossing switch with one IP and one MAC address. The IP address is set as described under "Setting the IP Address" [▶ 26].
1	Dual MAC Mode	In Dual MAC mode, the two Ethernet ports of the TBEN-LPLC are treated as Ethernet ports with separate IP and MAC addresses. The TBEN-LPLC can be a participant in two different Ether- net networks in Dual MAC mode. In Dual MAC Mode the IP address at Ethernet port P1 is set as de- scribed under "Setting the IP Address" [> 26]. The IP address of Ethernet port P2 is set via the web server or via a DHCP server in the network to which the TBEN-LPLC is connected via Ether- net port P2



NOTE

Devices with a firmware version lower than V1.4.6.0 can only be operated in switch mode.

7.1.1 Setting the Switch Mode

- Open the cover over the switches.
- Set DIP switch no. 2 [DMM] to 0.
- ⇒ Execute a power reset.
- ATTENTION! If the cover over the rotary coding switches is open, protection class IP67 or IP69K is not guaranteed. Damage to the device due to foreign material or liquids penetrating the device is possible. Tightly close the cover above the switches.

7.1.2 Setting the Dual MAC Mode

The dual MAC mode can be activated via DIP switch no. 2 [DMM].

- ✓ The device is connected via Ethernet port P1 (ETH1) to the PC on which the Turck Service Tool is installed.
- Open the cover over the switches.
- Set DIP switch no. 2 [DMM] to 1.
- ⇒ Execute a power reset.
- ⇒ The device logs on e.g. in the Turck Service Tool to Ethernet port P1 under the IP address previously used in Switch Mode. The IP address for the second Ethernet port P2 is set to 192.168.2.254 by default.
- ATTENTION! If the cover over the rotary coding switches is open, protection class IP67 or IP69K is not guaranteed. Damage to the device due to foreign material or liquids penetrating the device is possible. Tightly close the cover above the switches.



NOTE

The Turck Service Tool only detects the Ethernet port (P1 or P2) via which the TBEN-L...-PLC-... is connected to the PC on which the Turck Service Tool is installed.

7.2 Setting the IP address

IP address in Switch mode

In the Switch Mode, the TBEN-L...-PLC-... has one IP address.

IP address in Dual MAC mode

In Dual MAC Mode, each Ethernet port of the device has one IP address. The IP address for Ethernet port P1 can be set via two decimal rotary coding switches and DIP switches on the device, via the web server or via the Turck Service Tool. The IP address for Ethernet port P2 can only be set via the web server.

7.2.1 Setting the IP address via switches at the device

The IP address can be set via two decimal rotary coding switches and the DIP switch [Mode] on the device. The switches are located under a cover together with the USB ports and the SET button.



Fig. 28: Switches for setting the IP address

- Open the cover over the switches.
- Set the rotary coding switch to the desired position according to the table below.
- Set DIP switch [Mode] to the desired position according to the table below.
- Execute a power cycle at the device
- ATTENTION! If the cover over the rotary coding switches is open, protection class IP67 or IP69K is not guaranteed. Damage to the device due to foreign material or liquids penetrating the device is possible. Tightly close the cover above the switches.



Addressing options

The IP address of the devices can be set in different ways. The following addressing options can be selected via the switches on the device. Changes to the settings become active after a voltage reset.

Setting option	DIP switch "MODE"	Rotary coding switches	Description
Rotary mode	0	199	In rotary mode, the last byte of the IP address can be set manually at the gateway. The other network set- tings are stored in the non-volatile memory of the gateway and cannot be changed in rotary mode. Ad- dresses from 199 can be set.
	0	00	IP address: 192.168.1.100 Subnet mask: 255.255.255.0 Gateway: 192.168.1.1
DHCP mode	1	40	 In DHCP mode, the IP address is automatically assigned by a DHCP server in the network. The subnet mask assigned by the DHCP server and the default gateway address are stored non-volatile in the memory of the gateway DHCP supports three mechanisms for IP address allocation: Automatic address assignment: The DHCP server assigns a permanent IP address to the client. Dynamic address assignment: The IP address assigned by the server is only reserved for a certain period of time. After this time has elapsed or after the explicit release by a client, the IP address is reassigned. Manual address assignment: A network administrator assigns an IP address to the client. In this case, DHCP is only used to transmit the assigned IP address to the client. Default IP address: 192.168.1.254
PGM Mode	1	50	In PGM mode, the complete IP address is assigned manually via the Turck Service Tool, FDT/DTM or via a web server. In PGM mode, the set IP address and the subnet mask are stored in the memory of the gateway. All network settings (IP address, subnet mask, default gateway) are taken from the internal EEPROM of the module. Default IP address: 192.168.1.254
PGM DHCP mode	1	60	In PGM-DHCP mode, the gateway sends DHCP re- quests until it is assigned a fixed IP address. The DHCP client is automatically deactivated if an IP ad- dress is assigned to the gateway via the DTM or a web server. Default IP address: 192.168.1.254
F_Reset	1	90	 The F_Reset mode sets all device-settings back to the default values and deletes all data in the device's internal flash. The following values are reset or deleted: IP address: 192.168.1.254 Parameters
Restore	1	00	Enter the device name and the device's IP address.

7.2.2 Setting the IP address with Turck Service Tool

- Connect the device to a PC via the Ethernet interface.
- Open the Turck Service Tool.
- Click Search or press F5.

	Your Global Aut	omation Pa	rtner					•	TU	R	CK
Search	Change (F2)	Wink (F3) Action	ns (F4)	Doard Langua	ige Expert v	iew OFF Cla	ose				
No.	MAC address	Name	IP address	Netmask	Gateway	Mode	Device	Version	Adapter	BEEP	Protocol

Fig. 29: Turck Service Tool – start dialog

The Turck Service Tool shows the connected devices.

💳 Turc	k Service Tool, Vers	s. 3.1.0										-		×
Yc	ur Global Auto	omation	Partner							TU	JR	(C	K	ζ
Search	(F5) Change (F2) Wink (F3	Actions (F4)	Clipboard Lan	EN . guage Exp	Coert view ON	Start DHCP (F6	5) Config	EIP guration (F7)	ARGEE (F8)	BEEF	• (F9)	X Close	
No.	MAC address	Name	IP address	Netmask	Gateway	Mode	Device	Version	Adapter	ARGEE	BEEP	Protocol		
- 1	00:07:46:FF:A2:8C		<u>192.168.1.254</u>	255.255.255.0	192.168.1.1	PGM_DHCP	TBEN-L5-PLC-10	1.4.6.0	192.168.1.130	-	-	Turck	7	
Gefunde	n 1 Gerät.													

Fig. 30: Turck Service Tool – found devices

- Click on the desired device.
- Click **Change** or press [F2].

Your Global Automation Partner EIP	
Image: Wight of the second s	Your Global Aut
Inc. MAC address Name IP address Netmask ▲ Gateway Mode Device Version Adapter ARGEE BEEP Protocol ■ 1 00:07:46:FF:A2:8C 192:168.1.254 255:255:25.0 192:168.1.1 PGM_DHCP TBEN-L5-PLC:10 1.4.6.0 192:168.1.130 - - Turck	Ch (F5)
📕1 00.07.46.FF.A2:8C 192.168.1.254 255.255.0 192.168.1.1 PGM_DHCP TBEN-L5-PLC-10 1.4.6.0 192.168.1.130 Turck	MAC address
	1 00:07:46:FF:A2:8C
efunden 1 Gerät.	



NOTE Clicking the IP address of the device opens the web server.

• Change the IP address and the network mask if necessary.



• Assume the changes by clicking **Set in device**.

 Change devi 	_		×
Device name:			
IP configuration			
MAC address	IP add	ress	
00:07:46:FF:A2:8C	192.10	68.1.113	
Netmask	Gatew	ау	
255.255.255.0	192.1	68.1.1	
Set IP configuration	n temporal	ily	
Status messages:			
Set in device		Cancel	

Fig. 32: Turck Service Tool – Change device configuration

7.2.3 Setting the IP address via the web server

When the TBEN-L...-PLC-... is operated in Switch Mode, the IP address of the device can be set in the web server.

When the device is operating in Dual MAC Mode, the web server can be used to adjust the two IP addresses of the separate Ethernet ports (P1 and P2).



NOTE

To set the IP address via the web server, the device must be in PGM mode.

- Opening the web server
- Log-in to the web server as administrator. The default password for the web server is "password".
- Click MAIN \rightarrow Parameter \rightarrow Channel view \rightarrow Network.
- Change the IP address and subnet mask (if applicable) as well as the default gateway for the respective port.

Write the new IP address, subnet mask and default gateway into the device via SET IP ADDRESS.



Fig. 33: Setting the IP address via the web server



7.3 Put master/slave functions into operation in CODESYS

7.3.1 Installing the devices package

- ► Download CODESYS package TBEN-Lx-PLC Vx.x.x.package from www.turck.com.
- Install the package using the CODESYS via Tools \rightarrow Package Manager.

Install Uninstall Details Updates Search updates Download	Name License info No license required No license required	Sort by: late info version 4.6.0.0 available!	Installation date	Version	Refresh
Uninstall Details Updates Search updates Download	License info No license required No license required	late info e version 4.6.0.0 available!	Installation date 11.06.2019	Version	
Details Updates Search updates Download	No license required No license required	version 4.6.0.0 available!	11.06.2019		Name
Updates Search updates Download	No license required			4.5.0.0	CODESYS SoftMotion
Updates Search updates Download			28.08.2019	3.5.14.1	TBEN-Lx-PLC-1x
Search updates					
Download					
Download					
CODESYS Store					
Rating					
CODESYS Store					
0002010 00010					

Fig. 34: Package Manager in CODESYS

The device package for CODESYS contains all necessary files

- CODESYS Device Description
- CODESYS libraries
- GSDML-file
- EDS file
- etc.

7.3.2 Creating a standard project with TBEN-L...-PLC...

Create new standard	project with	TBEN-LPLC	. as CODESYS device.

Standard P	Project		×
	You are about objects within - One progran - A program P - A cyclic task - A reference	to create a new standard project. This wizard will create the following this project: mable device as specified below LC_PRG in the language specified below which calls PLC_PRG to the newest version of the Standard library currently installed.	
	<u>D</u> evice:	TBEN-Lx-PLC-1x (Turck)	\sim
	PLC_PRG in:	Structured Text (ST)	\sim
		OK Cancel	

Fig. 35: Selecting the TBEN-L...-PLC-... as CODESYS device

TBEN_LPLC.project* - CODESYS							- 0	×
Eile Edit View Project Build Online Debug	Tools <u>W</u> i	ndow _]	<u>H</u> elp Ì 🧐 🧐 →	∎ ∛ 〔≣ ਯ <u>⊒</u>	4⊒ +≣ 8	⇔	x = V	•
Devices – Ŧ X	🖉 LEDs	×						-
TBEN_LPLC Device (TEEN-Ly-PLC-1y)	Find			Filter Show	v all			• 4
Contect (Fight Existence Liky) Contect (Fi	Variable	Map	Channel LED 4 (green) LED 4 (red) LED 5 (green)	Address %QX8000.0 %QX8000.1 %QX8000.2	Type BIT BIT BIT	Unit	Description LED 4 (green) LED 4 (red) LED 5 (green)	
Symbol Configuration ■ ﷺ Task Configuration ■ ∰ MainTask ↓ ⊕ PLC_PRG	····· * Ø		LED 5 (red) LED 6 (green) LED 6 (red) LED 7 (green)	%QX8000.3 %QX8000.4 %QX8000.5 %QX8000.6	BIT BIT BIT BIT		LED 5 (red) LED 6 (green) LED 6 (red) LED 7 (green)	
	* *		APPL LED (green)	%QX8001.0	BIT Always up	odate var	APPL LED (green)	evice sett
・ ・ 開創 VAUX_Control (VAUX control) ・ 開創 Modulstatus (Module status) - る COM0 - る COM1 - る CANbus	Sus cycle Bus cycle	te new va options task	riable 🐐 =	= Map to existing le setting ~	g variable			
POUs	Messages -	Total 0 er	ror(s), 0 warning(s),	0 message(s)				- + ×
	Lā	st build:	🕽 0 🖲 0 🛛 Precomp	pile: 🗸 🛛 🤇	6	Project	:user: (nobody)	Ø

Fig. 36: CODESYS project



Additionally to the PLC logic, the project contains:

Five LEDs for free use in the program:

Each LED uses 2 bit in the process output data of the device. They are automatically mapped to the output bits %QX8000.0 to X8001.1.

- Local_IO
 - Configuration of the device's local I/Os and the VAUX functionality.
 - Diagnostics of the local I/Os and module status
- Two serial interfaces (COM0 and COM1)

Connection of RS232 and RS485 devices

One CAN interface (CANbus)

Using the device as CANopen device, CANopen manager or as SAE J1939 manager

7.3.3 Configuring the Network

Double clicking the entry **Device (TBEN-Lx-PLC-1x)** opens the **Device** tab.

Scan the network for TBEN-L...-PLC-10 via the Scan network... button and select the device.

TBEN_LPLC.project* - CODESYS			– 🗆 ×
<u>File E</u> dit <u>V</u> iew <u>P</u> roject <u>B</u> uild <u>O</u> nline <u>D</u> ebug	<u>T</u> ools <u>W</u> indow <u>H</u> elp		₹
🎦 🛩 🖬 🏉 い つ み 🗈 🏗 🗙 🖊 🌿 🕌 🕍 黒 🤋	🌂 🎢 🛱 🛅 🖬 🗳 🧐	- = 🤻 Ç= f= t= t= 🖇 🗢 🧱 🚍	17/
Devices – 🗜 🗙	🜔 LEDs 🛛 🕕 Device 🗙		•
TBEN_LPLC	Communication Settings	Scan network Gateway - Device -	^
Device (TBEN-Lx-PLC-1x)	communication settings		
E PLC Logic	Applications	Scan network	
□-@ Application îii Library Manager	Backup and Restore		• •
PLC_PRG (PRG) Symbol Configuration	Files		
i≡ 🗱 Task Configuration i⊒-∰ MainTask	Log		Gateway
PLC_PRG EDs (LEDs)	PLC Settings	Gateway IP-Addres	1 is:
- II Local_IO (Local IO)	PLC Shell	localhost	
Diagnosen (Diagnostics)	Users and Groups	1217	
→ ■ ① VAUX_Control (VAUX control) ■ ■ ② Modulstatus (Module status)	Access Rights		
- ъ сомо - ъ сом1	Symbol Rights		
CANbus	Parameters		×
	Messages - Total 0 error(s), 0 warning(s), 0 message(s)	- ₽ X
	Last build: 🗿 0 🕚 0 Preci	ompile: 🗸 🗳 Project user:	(nobody)

Fig. 37: Scanning the network

Select Device	×
Select Device Select the network path to the controller: Gateway-1 TBEN-L5-PLC-10 00:07:46:1d:71:20 [0301.8064]	X Device Name: TBEN-L5-PLC-10 00:07:46:1d:71:20 Device Address: 0301.B064 Block driver: UDP Number of channels: 4 Serial number: 900216(1D3120)
	0007461D7120 Target ID: 10CD 0101 Target Name: TBEN-L5-PLC-10 Target Type: v

Fig. 38: Selecting the TBEN-L...-PLC-... as device



7.3.4 Configuring the Ethernet interfaces



NOTE

Devices with a firmware version of V1.4.6.0 or higher provide the Dual MAC Mode function [> 26]. In devices with Dual MAC mode, the Ethernet ports P1 (ETH1) and P2 (ETH2) are designed as separate ports. Therefore two Ethernet interfaces can be configured in CODESYS.

• Append the Ethernet interface via **Add device** to the device.

TBEN_LPLC.project* - CODESYS	- 0 X
File Edit View Project Build Online Debug Tools V	Vindow Help
[월 👉 🖬] 송 아 아 있 唱 🛍 X 44 % 🐴 🐴 제 계 계 계 -	□ 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Devices 👻 🔻 🛪	Add Device X
TBEN_LPLC	
Bellerer (TBEN-Lx-PLC-1x)	Name: Ethernet
Copy	Action:
Hibrary N 🛍 Paste	<u>Append device</u> <u>Insert device</u> <u>Plug device</u> <u>Update device</u>
	String for a fulltext search Vendor: <all vendors=""> ~</all>
Task Co	Name Vendor Version Description
Main Add Colject	E- 🗊 Fieldbuses
Add Device	🖶 💵 Ethernet Adapter
LEDs (LEDs)	Ethernet Turck 3.5.14.10 Ethernet Link.
Edit Object	B
Edit Object With	Profinet IO
High VAUX Con Edit IO mapping	
Modulstatu Import mappings from CSV	
S COM0 Export mappings to CSV	
S COM1 Conline Config Mode	
CANbus Reset origin device [Device]	Group by category Display all versions (for experts only) Display outdated versions
Simulation	Mame: Ethernet
	Vendor: Turck Categories: Ethernet Adapter, Ethernet Adapter, Ethernet Adapter Version: 3.5.14.10 Order Number: - Description: Ethernet Link.
	Append selected device as last child of Device (You can select another target node in the navigator while this window is open.)
Contraction of the second	Add Device Close

Fig. 39: Adding the Ethernet interface

Interface reference (firmware version V 1.4.6.0 or higher)

Ethernet interface in CODESYS	Designation		
	Module	CODESYS	LED at the module
1	P1	eht0	ETH1
2	P2	eth1	ETH2

- Configure the Ethernet interface
- Select eth0 or eth1 under Network adapters.
- ⇒ The IP address is set automatically.

 ▼ TBEN_LPLC.project* - CODESYS <u>Eile Edit View Project Build Online</u> [™] ■ ■ ■ □ □ □ × ■ ■ × ■ ▲ ↓ 	- □ × Debug Iools Window Help ↓ ■ 1 ■ 1 ■ 1 ■ 1 ■ 1 ■ 1 ■ 1 ■ 1 ■ 1 ■
Devices	Ethernet X Device General Interface: eth0 Status IP Address 192 . 168 . 1 . 100 Ethernet Device I/O Mapping Subnet Mask 255 . 255 . 255 . 0 Default Gateway 102 168 1 . 1 Inferfaces: X Inf Interfaces: X Inf 192.168.1.00 eth1 192.168.3.43 usb0 10.0.0249 IP Address IP Address IP Address 192 . 168 . 1 . 100 Subnet Mask 255 . 255 . 0 Default Gateway 192 . 168 . 1 . 1 MAC Address 00.07.46:ID.7I:20 OK Cancel
Devices POUs	< <p>Messages - Total 1 error(s), 0 warning(s), 0 message(s) Last build: 0 0 0 Precompile: 0 Project user: (nobody)</p>

Fig. 40: Configuring the Ethernet interface

- ⇒ The Ethernet interface is added to the project tree.
- TBEN-L...-PLC-... in Switch Mode [▶ 25]:
- IP address of eth0 = IP address of TBEN-L...-PLC-...
- TBEN-L...-PLC-... i Dual MAC Mode [> 26]:
 - IP address of eth0 = IP address of Ethernet port P1
 - IP address of eth1 = IP address of Ethernet port P2


7.3.5 Commissioning TBEN-L...-PLC-... as Modbus TCP Master

Properties		
max. number of TCP slaves	64	
Min. cycle time	2 ms	
Max. number of slaves at 2 ms	8	

Configuring the Modbus TCP Master

- ✓ The Ethernet interface is configured.
- ✓ The Modbus TCP Master from 3S Smart Software Solutions GmbH is used.
- Add Modbus TCP Master



Fig. 41: Add Modbus TCP Master

► Activate the function "auto-reconnect" at the Master to assure that CODESYS automatically confirms communication errors and tries to continue with executing Modbus commands instead of interrupting the Modbus communication. Otherwise the error has to be reset using a slave function block.

TBEN_LPLC.project* - CODESYS	_	×
File Edit View Project Build Online Debug	ools Window Help	
1 🖆 🖬 🞒 🗠 ∝ 🌡 🖻 🖻 🗙 🖊 🌿 🐇 🎽 👘 🦷	게 걔 [읍 [웹+ 압 [웹] (얘 얘 → = ♥ [길 앱 앱 앱 성 [↔]悪] ≓ [잣	
Devices – 🖛 🗙 🔎	Modbus_TCP_Master X	-
TBEN_LPLC	Modbus-TCP	
Device (TBEN-Lx-PLC-1x)	MODBUS	
■ I PLC Logic	Response Timeout (ms) 1000	
🖹 🔘 Application	Socket Timeout (ms) 10 🖨	
Library Manager		
PLC_PRG (PRG)	✓ Auto-reconnect	
Symbol Configuration		
Task Configuration		
⊟-ॐ MainTask		
LEDS (LEDS)		
tig ∭ DXP (DXP)		
Mill Modulstatus (Module status)		
> COM1		
à CANbus		
Ethernet (Ethernet)		
Modbus_TCP_Master (Modbus TCP Master)		
	<	>
Povices Polls	1essages - Total 0 error(s), 0 warning(s), 0 message(s)	д×
	Last huild O.O. On Decembral de C.C.	 G

Fig. 42: Configuring the Modbus TCP Master



Configuring the external Modbus TCP Slave

Add an external Modbus TCP Slave using the Add device function.



Fig. 43: Configuring the external Modbus TCP Slave

- Add slave channels for the communication with the Modbus slave.
- Observe the process data offsets of the slave. In the following example the slave's process output data start with register 0x0800.

ices 🗸 🕂 🖌 Modbus_TC	Master Modbus_TCP_Slave X
TBEN_LPLC General Device (TBEN-Lx-PLC-1x) Modbus Slave Ch. PLC Logic Modbus Slave Ch. Device (TBEN-Lx-PLC-1x) Modbus Slave Ch. PLC Logic Modbus Slave Init Device (TBEN-Lx-PLC-1x) Modbus Slave Ch. DLC_PRG (PRG) Modbus Slave Init Modbus TCPSlave Modbus TCPSlave Modbus (LCal IO) Modbus Control (VAUX control) Modbus Module status) COM0 COM0 COM1 COM1 CANbus Modbus_TCP_Slave (Modbus TCP M Modbus_TCP_Slave (Modbus TCP	Name Access Type Trigger READ Offset Length Error Handling nel ModbusChannel X arameters Channel X channel Vite Single Register (Function Code 6) V Comment Comment V READ Register Offset V Offset V V Ukungth 1 Error Handling Keep last Value WRITE Register Offset V Offset V V V Ukungth 1 Error Handling V WRITE Register Offset V V Offset V V V Ukungth 1 V V Offset V V V Ukungth 1 V V V
	<u>QK</u> <u>Cancel</u>

Fig. 44: Adding Modbus slave channels



7.3.6 Commissioning TBEN-L...-PLC-... as Modbus TCP Slave

Properties		
Max. number of input registers	1024	
Max. number of holding registers	1020	

Configuring the Modbus TCP Slave

The Modbus_TCP_Slave_Device from Turck is used.

✓ The Ethernet interface is configured.

- Add the Modbus_TCP_Slave_Device to the Ethernet interface using the "Add Device" function and configure it.
- Therefore define the number of in- and output registers (input and holding registers) which have to be exchanged with the higher-level Modbus TCP-master.

Devices – 4 ×	Ethernet Modbus_T	CP_Slave_Device ×
 TBEN_LPLC Device (TBEN-Lx-PLC-1x) PLC Logic Application Library Manager PLC_PRG (PRG) Symbol Configuration Task Configuration Task Configuration Task Configuration Library MainTask PLC_PRG LEDs (LEDs) Local_IO (Local IO) Local_IO (Local IO) Diagnosen (Diagnostics) VAUX_Control (VAUX control) Modulstatus (Module status) COM1 CANbus Ethernet (Ethernet) Modbus_TCP_Slave_Device (Modbus 	General Modbus TCP Slave Device I/O Modbus TCP Slave Device IEC Objects Information	Configured Parameters ✓ Watchdog: 2000 ♀ (ms) Slave Port: 502 ♀ Unit ID: Holding Registers (%IW): 4 Input Registers (%QW): 4 ✓ ✓ Data Model Start Addresses: Coils: 0 Discrete Inputs: 0 Holding Register: 0 Input Register: 0 ✓ Holding- and Input-Register Data Areas overlay
< >> >> 2 Devices POUs	< Messages - Total 0 error(s), 0 warning	ng(s), 0 message(s)

Fig. 45: Configuring the Modbus TCP Slave

Which data will be mapped into the input and holding registers, depends on assignments in the PLC program or in the I/O mapping of the TBEN-L...-PLC-....

Devices - + +	(Device T Ethernet	Ma	odbus_TCP_S	ave_Device	×		-
B TBEN_LPLC	Find			Filter Show	v all		- 🖶 Add FB	for IC
	Varia	ble	Mapping	Channel	Address	Type	Current Value	Pr
				Inputs	%IW4	ARRAY [03]		
Library Manager	<u> </u>			Outputs	%OW1	ARRAY [03]		
	ė.	Application.PLC_PR	~	Outputs[0]	%QW1	WORD	301	
Symbol Configuration		**		Bit0	%QX2.0	BOOL	TRUE	
Task Configuration				Bit1	%QX2.1	BOOL	FALSE	
🗏 比 MainTask		^K ø		Bit2	%QX2.2	BOOL	TRUE	
- Dec Prg		···· **		Bit3	%QX2.3	BOOL	TRUE	
EDs (LEDs)		····· [*] *		Bit4	%QX2.4	BOOL	FALSE	
Elecal_IO (Local IO)		····· **		Bit5	%QX2.5	BOOL	TRUE	
- 😪 🖬 🗊 DXP (DXP)		····· 🍫		Bit6	%QX2.6	BOOL	FALSE	
		····· **		Bit7	%QX2.7	BOOL	FALSE	
		····· **		Bit8	%QX3.0	BOOL	TRUE	
		^K ø		Bit9	%QX3.1	BOOL	FALSE	
		* @		Bit10	%QX3.2	BOOL	FALSE	
		* @		Bit11	%QX3.3	BOOL	FALSE	
- 😔 🚡 CANbus		····· [*] *		Bit12	%QX3.4	BOOL	FALSE	
😑 😏 🗊 Ethernet (Ethernet)		[*] *		Bit13	%QX3.5	BOOL	FALSE	
😔 🕤 Modbus_TCP_Slave_Device (Modbus TCP Slave Device)	/ic <	5		Rit14	%0X2.6	ROOI	EALSE	
			Re	eset mapping	Always u	odate variables: U	se parent device setting	
	K =	Create new variable	~~ = ∳°	Map to existing) variable			
	Bus	Use par	ent bus <mark>cyc</mark> le	setting \sim				
<								

Fig. 46: Data mapping: Modbus TCPslave Device

7.3.7 Commissioning TBEN-L...-PLC-... as Modbus RTU Master

Properties		
Max. number of slaves	32	
Min. cycle time	5 ms	
Max. number of slaves at 5 ms	8	



The serial Modbus Master from 3S - Smart Software Solutions GmbH is used.

- Add the serial **Modbus Master**, **COM Port** to the COM interface.
- ► Activate function Auto-restart communication at the Master to assure that CODESYS automatically confirms communication errors. and tries to continue with executing Modbus commands instead of interrupting the Modbus communication. Otherwise the error has to be reset using a slave function block.

TBEN_LPLC.project* - CODESYS			_	
<u>F</u> ile <u>E</u> dit <u>V</u> iew <u>P</u> roject <u>B</u> uild <u>O</u> nline	<u>D</u> ebug <u>T</u> ools <u>W</u> indow <u>H</u> elp			
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Devices 👻 🕈 🗙	Modbus_Master_COM_Port ×			•
<i>TBEN_LPLC</i> ▼ ^ Device (TBEN-Lx-PLC-1x)	General	Modbus-RTU/ASCII		
PLC Logic	ModbusGenericSerialMaster I/O Mapping	Transmission Mode		п
- The second sec	ModbusGenericSerialMaster IEC Objects	Response Timeout (ms)	1000	
Symbol Configuration	Status	Auto-restart Communication	n	
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LEDs (LEDs)				
	<			>
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Fig. 47: Add Modbus RTU Master

Configuring the external Modbus RTU Slave

- Add the external Modbus RTUslave Modbus Slave, COM Port to the Modbus Master, COM Port using the Add Device function and configure it. In this example the Turck multiprotocol device TBEN-S2-2COM-4DXP is used as Modbus Slave.
- Add Modbus Slave Channels for the communication with the Slave. Observe the process data offsets of the slave. In the example the slave's process output data start with register 0x0800.

TBEN_LPLC.project* - CODESYS				- 🗆 ×	
File Edit View Project Build Online	Debug Tools	Window Help		7	7
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Device (TBEN-Lx-PLC-1x)	General	Channel	Output MR Slave	h Error I	Ha
Library Manager	Moubus Slave C	Name			
PLC_PRG (PRG)	Modbus Slave I	Access Type	Write Single Register (Function Code 6)	~	
Symbol Configuration	ModbusGenerics Objects	Trigger	Cyclic	-	
⊜ 🔮 MainTask □ 🖽 PLC_PRG	Status	READ Register			
LEDs (LEDs)	Information	Offset		~	
Local_IO (Local IO)		Length	1		
VAUX_Control (VAUX control)		Error Handling	Keep last Value \vee		
Modulstatus (Module status)		WRITE Register			
Madhus Master COM Port (Modh		Offset	0x0800	~	
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Fig. 48: Configuring the external Modbus RTU Slave



7.3.8 Commissioning TBEN-L...-PLC-... as Modbus RTU Device

Properties		
Max. number of input registers	500	
Max. number of holding registers	500	

Configuring the Modbus RTU Device

- The Modbus_Serial_Device from 3S Smart Software Solutions GmbH is used.
- Add the Modbus_Serial_Device to the Ethernet port using the Add Device function and configure it.
- Therefore define the number of in- and output registers (input and holding registers) which have to be exchanged with the higher-level Modbus TCP-master.

TBEN_LPLC.project* - CODESYS	_	
File Edit View Project Build Online	Debug Tools Window Help	
		,
Daviana	Andhus Farial Davisa X	
		-
	General	
Device (TBEN-LX-PLC-1X)	Unit ID: 1	
PLC Logic	Modbus Serial Device I/O Mapping	
	watchody.	
Library Manager	Modbus Serial Device IEC Objects Holding Registers (%IW): 4	
PLC_PRG (PRG)	Information	
Symbol Configuration	Input Registers (%QW): 4	
Task Configuration		
🗏 🕸 MainTask		
PLC_PRG	Start Addresses:	
LEDs (LEDs)	Coils:	
Local_IO (Local IO)		
🖬 🗊 DXP (DXP)	Discrete Inputs: 0	
🖬 🗊 Diagnosen (Diagnostics)	Holding Register: 0	
WAUX_Control (VAUX control)		
🖬 🗊 Modulstatus (Module status)	Input Register: 0	
■ L COM0		
Modbus_Serial_Device (Modbus S		
COM1		
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Sevices POUs	<	>
	Last build: 📀 0 🕐 0 Precompile: 🗸 Project user: (nob	ody) 🔇

Fig. 49: Configuring the Modbus_Serial_Device

Which data will be mapped into the input and holding registers, depends on assignments in the PLC program or in the I/O mapping of the TBEN-L...-PLC-....



Fig. 50: Data mapping: Modbus_Serial_Device



7.3.9 Commissioning TBEN-L...-PLC-... as PROFINET Controller



NOTE

The Getting Started document "PROFINET-Controller/-Device – Commissioning in CODESYS 3" is available under www.turck.com and contains a detailed description of the Commissioning of TBEN-L...-PLC-... as PROFINET-Controller/-Device.

Properties		
Max. number of devices	64	
Min. cycle time	1 ms	
Max. number of devices at 1 ms	8	

Configuring the PROFINET Controller

- ✓ The Ethernet interface is configured.
- ✓ The PN Controller from 3S Smart Software Solutions GmbH is used.
- Add the PN Controller to the Ethernet interface using the Add Device function.



Fig. 51: Adding the PN Controller



Configure the PN Controller.

Fig. 52: Configuring the PN Controller.



NOTE

The Device addresses under **Default Slave IP Parameter** and the Ethernet interface of the TBEN-L...-PLC-... have to be in the same subnet.



Configuring an external PROFINET Device

Add an external PROFINET Device to the PN Controller using the Add Device function and configure it. In this example the Turck multiprotocol device TBEN-S1-4DIP-4DOP is used as PROFINET Device.

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Devices – 🕈 🗙	PN_Controller 💮 Etherne	t // TBEN_S1_4	ADIP_4DOP ×	•
Profinet_IOTask 💌 🔨		F	1	
- 🕒 LEDs (LEDs)	General	Station Name t	urck-tben-s1-4dip-4dop	
Local_IO (Local IO)	Options	Station Status		
DXP (DXP)				
Diagnosen (Diagnostics)	IOxS			
Weduletatus (Medule status)	PNIO I/O Mapping	IP Parameter		
		IP Address	192 . 168 . 1 . 110	
L COM1	PNIO IEC Objects	Subnet Mask	255 . 255 . 255 . 0	
- a CANbus	Status	Default Gateway	0 0 0 0	
Ethernet (Ethernet)				
PN_Controller (PN-Controller)	Information	Communication		
B TBEN_S1_4DIP_4DOP (TBEN-S		Send Clock (ms)	1 v Wat	chdog (ms)
Basic (4DIP-4DOP)				
		Reduction Ratio	1 VLA	N ID
		Phase	- ~	
Ext Func Digital 1				
K Ext_Func_Digital_2		RT Class	RT Class 1	\sim
K Ext_Func_Digital_3		Settings		
Ext_Func_Digital_7		Set all default	values Pood all	values
K Module_status		- Set all default		Values
< >		Parameters	Value	Datatype Allowed
Sevices POUs	<			>
Messages - Total 0 error(s), 0 warning(s), 17 message	(s)			→ ∓ X
	Last build: 🛽 0	9 Precompile:	Project user : (r	iobody) 🔮 🛓

Fig. 53: Configuring an external PROFINET Device



NOTE

The IP addresses of the PROFINET Devices and the PN Controller have to be in the same subnet.

7.3.10 Commissioning TBEN-L...-PLC-... as PROFINET Device

Configuring the PROFINET Device



In Dual MAC mode, the PROFINET Device function is only available on Ethernet port P1 (eth0 in CODESYS).

- ✓ The Ethernet interface eth0 is configured.
- ✓ The Profinet_Device from Turck is used.
- Add the Profinet_Device to Ethernet using the Add Device function.
- Configure the in- and output data lengths which have to be exchanged with the higherlevel PROFINET Master.



Fig. 54: Configuring the PROFINET Device





NOTE

The CODESYS input data have to be configured as output data in the PROFINET Controller configuration, the output data in CODESYS have to be configured as input data. The data thus have to be configured in reverse order in the PROFINET Controller configuration.

Which data will be mapped into the configured input and output data, depends on assignments in the PLC program or in I/O mapping of the TBEN-L...-PLC-....

Configuring the PROFINET Device in the PROFINET Controller

The following example describes the configuration of the PROFINET device with the Siemens programming software tool SIMATIC STEP7 Professional V13 (TIA Portal). The PROFINET CODESYS device is configured as standard PROFINET Device in TIA Portal. **Installing the GSDML file**

- Install the device's GSDML-file (GSDML-V2.3-TURCK-CDS3_PN_Device-...-xml) in the PROFINET configuration software. It can be downloaded fromwww.turck.com.
- ⇒ The device is added to the hardware catalog **CDS 3 PN Device**.

M Siemens - C:/Users\scheuech\AppData\Local\Siemens\TBEN-PLC_PN_Device\TBEN-PLC_PN_Device <u>Project Edit View Insert Online Options Iools Window H</u>elp Totally Integrated Automation h? 🖪 🖪 🗙 PORTAL 📑 🛅 🖫 Save project 💄 🐰 🏥 🖆 🗙 🍤 🖢 (产 🛨 🖥 🖳 🖬 🖳 🕼 🖉 Go online 🖉 Go offline TBEN-PLC_PN_Device > Devices & networks _ **=** = × 🛃 Topology view 🛛 🚠 Network view Device view Options Devices 🔽 🔛 🔜 🗉 🖂 Hardware catalog 🔲 🛃 💦 Network 👖 Connections 🛛 HMI connection ^ ✓ Catalog ▼ TBEN-PLC_PN_... itig itit <Search> 📫 Add new de. turck-cds3-pn-🔽 Filter PLC_1 📥 Devices & n. CPU 1515-2 PN CDS3 PN Device 🕨 🛅 Phoenix Contact GmbH ^ PLC_1 [CPU... CODESYS PLC_1 🛅 TURCK 🙀 Common d... 🗖 TURCK 🛅 Documenta.. ų, BL Compact 🕨 🐻 Languages .. Online tools PN/IE 1 BL20 🔚 Online access PN/IE_2 🕨 🧊 BL67 🕨 🤖 Card Reader/U.. 🕶 🛅 CODESYS3 CDS3 PN I ➤ Details view 🕨 🛅 FEN20 📑 Tasks TBEN-A 🕨 🛅 TBEN-L Name 🕨 🛅 TBEN-S 🕨 🫅 TBPN-Safe 🕨 📺 Turck m Ident Systems Libraries Image: Information ~ Device F ۲ CDS3 PN Device < > 100% Article no. 🔍 Properties 🗓 Info 👔 🗓 Diagnostics Portal view 👥 Overview 📥 Devices & ne. Y Setting

Fig. 55: Configuring the PROFINET Device in TIA Portal

Configuring the PROFINET parameters

Like for all other PROFINET Device the PROFINET-interface has to be configured for the CDS3 PN-Device in the project.

Set necessary IP-settings and assign PROFINET device name or use the device name which has already been assigned to the device.



Fig. 56: Settings PROFINET-interface (CDS3 PN Device)

Configuring the in- and output data

 Configure the in- and output data, which have to be exchanged with the CODESYSdevice.



NOTE

The configuration of the data in TIA Portal has to be done in reverse order compared to the configuration in CODESYS. Input data in TIA Portal are output-data in CODESYS, and vice versa. The configured data widths must match.





Fig. 57: Configuration of in- and output data in TIA Portal/CODESYS

7.3.11 Commissioning TBEN-L...-PLC-... in parallel as PROFINET controller and device

If the device is used simultaneously as both a PROFINET controller and a PROFINET device, a second Ethernet interface must be added to the device. The assignment of the Ethernet ports in CODESYS is as follows:

Ethernet port	Function
eth0	PROFINET Device
eth1	PROFINET Controller

Configuring the PROFINET Controller

- ✓ The Ethernet interface eth1 is configured as described under "Configuring the Ethernet interfaces" [▶ 35].
- ✓ The PN Controller from 3S Smart Software Solutions GmbH is used.
- Add the PN Controller to the Ethernet interface **eth1** using the **Add Device** function.

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Fig. 58: Adding the PN Controller to eth1





Configure the PN Controller.

Fig. 59: Configuring the PN Controller.



The Device addresses under **Default Slave IP Parameter** and the Ethernet interface of the TBEN-L...-PLC-... have to be in the same subnet.

Configuring the PROFINET Device

- Configure PROFINET device at interface eth0 as described under "Commissioning TBEN-L...-PLC-... as PROFINET Device" [▶ 50].
- 7.3.12 Commissioning TBEN-L...-PLC-... as EtherNet/IP[™] Scanner

Properties	
Max. number of devices	64
Input data	Max. 8 KB
Output data	Max. 8 KB
Max. number of devices at 10 ms	8

Configuring the Ethernet/IP[™] Scanner

✓ The Ethernet interface is configured.

- ✓ The EtherNet/IP Scanner from 3S Smart Software Solutions GmbH is used.
- Add the EtherNet/IP[™] Scanner to Ethernet using the Add Device function and configure it.

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Application	General		
Library Manager		Options	
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Symbol Configuration	EtherNet/ID Scapper IEC Objects		Ethenvet/IP
ENIPScannerIOTask	EtherNet/IP Scanner IEC Objects		
EtherNet_IP_Scanner.IC	Status		
ServiceTask			
EtherNet_IP_Scanner.S	Information		
🖃 🕸 MainTask			
PLC_PRG			
EDs (LEDs)			
Local_IO (Local IO)			
₩ DXP (DXP)			
Diagnosen (Diagnostics)			
VAUX_CONTROL (VAUX control)			
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à CANbus			
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EtherNet_IP_Scanner (EtherNet/IP			
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Fig. 60: EtherNet/IP[™] ccanner



Configuring an external EtherNet/IP™ device

Add an external EtherNet/IP[™] device to the EtherNet/IP[™] Scanner using the Add Device function and configure it.

In this example the Turck multiprotocol device TBEN-L5-8IOL is used as EtherNet/IP[™] device.

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LEDs (LEDs)	EtherNet/IP IEC Objects	Strict Identity Check	
= 💮 Local_IO (Local IO)	Status	Check Device Type 12	
Biagosson (Diagnostics)	Information	Check Vendor Code 48	
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Modulstatus (Module status)		Check Major Revision 2	
COM0		Check Minor Revision 7	
CANbus		Postoro defaultivaluos	
Ethernet (Ethernet)		Restore default values	
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Fig. 61: External EtherNet/IP[™] device

7.3.13 Commissioning TBEN-L...-PLC-... as EtherNet/IP[™] Slave (Device)



NOTE In Dual MAC mode, the PROFINET Device function is only available on Ethernet port P1 (eth0 in CODESYS).

Properties		
max. number of I/O data	496 byte IN	
	492 byte IN	

Configuring an EtherNet/IP[™] device

- ✓ The Ethernet interface eth0 is configured.
- ✓ The Ethernet IP Slave from Turck is used.
- ► Add the EtherNet/IPTM device to the Ethernet interface using the Add Device function.
- Configure the in- and output data lengths which have to be exchanged with the higherlevel PLC.

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Ethernet (Ethernet)							
Ethernet_IP_Slave (Ethernet IP Slave)							
IN_1_WORD (IN 1 WORD)							
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Fig. 62: Configuring an EtherNet/IP[™] device



Which data will be mapped into the configured input and output data, depends on assignments in the PLC program or in the I/O mapping of the TBEN-L...-PLC-....

TBEN_LPLC.project* - CODESYS								- 🗆	×
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TBEN_LPLC	Find		Filter Sho	ow all			- +	Add FB for	IO char
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PLC Logic		Mapping	Channel	Address	lype	Curre	ent Value	Prepared	Value
Application [run]	Application.PLC_PRG.c		Out16	%QW1	UINT	156			
Library Manager			BITU	%QX2.0	BOOL	FALSE			
PLC_PRG (PRG)			BITI	%QX2.1	BOOL				
Symbol Configuration	×.		BITZ	%QX2.2	BOOL	TRUE			
Task Configuration	K.		DILO	900X2.3	BOOL	TRUE			
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			Bit8	%0Y2.0	BOOL	EALSE			
			Bit9	%0X2.1	BOOL	FAI 7 Byte 0			
			Bit10	%0X3.2	BOOL	FALSE	-		
Module status)			Bit11	%0X3.3	BOOL	FALSE			
	* >		Bit12	%0X3.4	BOOL	FALSE			
	* @		Bit13	%QX3.5	BOOL	FALSE			
CANbus			Bit14	%QX3.6	BOOL	FALSE			
Ethernet (Ethernet)	· · · · · · · · · · · · · · · · · · ·		Bit15	%QX3.7	BOOL	FALSE			
🖹 😳 🚮 Ethernet_IP_Slave (Ethernet IP Slave	<								
- 😌 📆 IN_1_WORD (IN 1 WORD)									
• OUT_1_WORD (OUT 1 WORD)	output data of the device	Reset m	apping	Always upda	ate variable	s: Use parent	device setti	ing	
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Device user: Anonymous Last build: 😳 0 🕐 0 Precompile: 🗸 📭 RUN Program loaded Program unchanged Project user: (nobody)									

Fig. 63: EtherNet/IP[™] Slave data mapping

Configuring the EtherNet/IP[™] device in EtherNet/IP[™] Scanner

The following example describes the configuration of the EtherNet/IP[™] device in Rockwell RSLogix5000 V20.01.

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

Hardware in the example:

- Controller: Logix 5572[™] (Allen Bradley)
- EtherNet/IP[™]-Bridge 1756EN2TR (Allen Bradley)
- TBEN-L...-PLC-...

Installing the EDS file

- Install the device's EDS file (Turck CDS3.eds) in the configuration software. It can be downloaded fromwww.turck.com
- ⇒ The device is added as CDS 3 Ethernet/IP Slave to the device catalog in RSLogix.

8 RSLogix 5000 - PLC_1756L72 in TBEN_PLC_Lx.AC	D [1756-L72 20.12] - [MainProgram - MainRoutine]								
Eile Edit View Search Logic Commu	ications <u>T</u> ools <u>W</u> indow <u>H</u> elp	_ <i>8</i> ×							
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	🗸 🦓 🍇 🐘 🄃 📝 🕂 🔍 🔍 Select a La	nguage 🔻 🧕							
Offline 📴 🗸 🗖 RUN	Path: AB_ETHIP-1\192.168.145.241\Backplane\0* 🗸 🔠								
No Forces									
No Edits	o Edits								
Redundancy Rol	U ← Favorites & Process & Drives & Filters & Select/Limit &								
Controller Organizer 🚽 🕂	Select Module Type								
Scale Controller PLC_1756L72	Catalog Module Discovery Favorites								
Tasks	Enter Search Text for Module Type	H <u>i</u> de Filters							
📄 🚑 MainTask									
📥 🚭 MainProgram	Module Type Category Filters	Module Type Vendor Filters							
Program Tags	Communication	lley 🗧							
一 道 MainRoutine	Communications Adapter	orporation							
Unscheduled Programs / Phases	Controller Endress+r	Hauser							
📄 📹 Motion Groups									
Ungrouped Axes									
Data Types		Vendor Category							
User-Defined	0 CDS3 EtherNet/IP Slave	Turck Communications Ada							
🕀 🔙 Strings	6811493 BLCEN-8PBLT	Turck Communications Ada							
	6814029 TBEN-S2-2RFID-4DXP	Turck Communications Ada							
Predefined	6814129 FEN20-4DIN-4DXN	Turck Communications Ada							
🕀 🛄 Module-Defined	6827329 BL20-E-GW-EN	Turck Communications Ada							
Trends	6931089 FEN20-16DXP	Turck Communications Ada							
	6931090 FEN20-4DIP-4DXP	Turck Communications Ada							
	•								
	7 of 236 Module Types Found	Add to Favorites							
Create End Of Transition instruction	Close on Create	Create Close Help							

Fig. 64: RSLogix5000: Device catalog with EtherNet/IP Slave CDS 3



Configuring the device

• Enter the device name and the device's IP address.

RSLogix 5000 - PLC_1756L72 in TBEN_PLC_Lx.ACD	1756-L72 20.12] - [MainProgram - MainRoutine]	
Eile Edit View Search Logic Communic	ations <u>T</u> ools <u>W</u> indow <u>H</u> elp	_ <i>8</i> ×
Image: Constraint of the constr		2
Redundancy Controller Organizer → 및 ×	New Module	×
Controller PLC_1756L72 Controller Tags Controller Fault Handler Power-Up Handler Tasks MainTask MainProgram Tags MainRoutine Unscheduled Programs / Phases Motion Groups Motion Groups Motion Groups Data Types Data Types Data Types Data Types Data Types Data Types Data Types	General* Connection Module Info Internet Protocol Port Configuration Type: 0 CDS3 Ethernet/IP Slave Vendor: Turck Vendor: Turck Ethernet Address Parent: Scanner Name: TBEN_Lx_PLC10 Description: IP Address: 192 . 1 Image: Image: Image: Image: Image: <t< td=""><td>68 . 001 . 15</td></t<>	68 . 001 . 15
Greate End Of Transition instruction	Module Definition Revision: 2 7 Electronic Keying: Compatible Module Connections: Name Size Tag Suffix Exclusive Owner Input: 256 SINT 1 TBEN_Lx_PLC10:11 TBEN_Lx_PLC10:01 Select a connection Car J2	cel Help
	OK Cancel Help	

Fig. 65: Settings at the CDS3 Ethernet/IP Slave

Configuring the in- and output data

The device is automatically configured with a data width of 256 byte in- and 256 byte output data.

Module Definition					×		
<u>R</u> evision: 2	•	7 🚖					
Electronic Keying: Compatible Module							
Connections:							
Name		Size		Tag Su	ffix		
Exclusive Owner	Input:	256	SINT	4	TBEN_Lx_PLC10:I1		
Exclusive Owner	Output:	256	SINT	'	TBEN_Lx_PLC10:01		
Select a connection							
			OK		Cancel Help		

Fig. 66: EtherNet/IP[™] Connection CDS3 Ethernet/IP Slave



NOTE

The EDS file limits the maximum number of in- and output data for the device to 256 Byte each. If the device is configured as generic device, than up to 496 Byte input data and 492 Byte output data are possible.



Configuring the in- and output data which have to be exchange with the CODESYS device is not necessary. The Controller Tags are created automatically.

\iint RSLogix 5000 - PLC_1756L72 in TBEN_PLC_Lx.ACD [1756-L72 20.12]* - [Controller Tags - PLC_1756L72(controller)]					
🖉 Eile Edit View Search Logic Communications Tools Window Help					
"∎≓∎ ቆ % •∎ ഭ ∽ ∾	✓ # 4 7. TE V P • Q	Select a Language	e 🔻 🕺		
Offline 📴 🗸 🗖 BUN	Path: AB_ETHIP-1\192.168.145.241\Backplane\0*	- ₩			
No Forces					
No Edits a I/O	JSR SBR RET ABS NC SIZE SFR SFP EOT	•			
Redundancy 💀	□ Favorites (Process (Drives (Filters (Select/L))	mit 👗			
Controller Organizer - 🕈 🗙	Scope: 🗓 PLC_1756L72 👻 Show: All Tags	•	T. Enter Name Filter	•	
Controller PLC_1756L72	Name 💷 🛆	Value 🗧	Style Data Typ	je Desi 🔺	
Controller Tags	-TBEN_Lx_PLC10:11	{}	_0030:0_	F0C832	
Power-Up Handler	TBEN_Lx_PLC10:11.ConnectionFaulted	0	Decimal BOOL		
Tasks	TBEN_Lx_PLC10:I1.Data	{}	Decimal SINT[25]	5]	
🖞 🛱 MainTask	TBEN_Lx_PLC10:I1.Data[0]	0	Decimal SINT		
🚽 🚔 MainProgram	TBEN_Lx_PLC10:11.Data[1]	0	Decimal SINT		
Program Tags	TBEN_Lx_PLC10:11.Data[2]	0	Decimal SINT		
📲 MainRoutine	TBEN_Lx_PLC10:11.Data[3]	0	Decimal SINT		
Unscheduled Programs / Phases	ns / Phases E TBEN_Lx_PLC10:11.Data[4] 0 Decimal SINT				
🚊 🚎 Motion Groups	TBEN_Lx_PLC10:11.Data[5]	0	Decimal SINT		
Ungrouped Axes	TBEN_Lx_PLC10:11.Data[6]	0	Decimal SINT		
Add-On Instructions	TBEN_Lx_PLC10:11.Data[7]	0	Decimal SINT		
🚊 📇 Data Types	TBEN_Lx_PLC10:11.Data[8]	0	Decimal SINT		
User-Defined	TBEN_Lx_PLC10:11.Data[9]	0	Decimal SINT		
i	TBEN_Lx_PLC10:11.Data[10]	0	Decimal SINT		
Add-On-Defined	TBEN_Lx_PLC10:11.Data[11]	0	Decimal SINT		
	TBEN_Lx_PLC10:11.Data[12]	0	Decimal SINT		
	TBEN_Lx_PLC10:11.Data[13]	0	Decimal SINT		
Trends		0	Decimal SINT		
i → 1756 Backplane 1756-A10		0	Decimal SINT		
1750 Backplane, 1750-A10		0	Decimal SINT		
[1] [1] 1756-EN2TR Scanner		0	Decimal SINT		
Ethernet	TBEN_Lx_PLC10:11.Data[18]	0	Decimal SINT		
	TBEN_Lx_PLC10:11.Data[19]	0	Decimal SINT		
	TBEN_Lx_PLC10:11.Data[20]	0	Decimal SINT		
	Monitor Tags / Edit Tags /	٠ III		►	

Fig. 67: Automatically created Controller Tags of the CDS 3 Ethernet/IP Slave

7.3.14 Commissioning TBEN-L...-PLC-... parallel as EtherNet/IP[™] Scanner and Slave (Device)

If the device is used simultaneously as both a EtherNet/IP[™] Scanner and a EtherNet/IP[™] Slave (Device), a second Ethernet interface must be added to the device. The assignment of the Ethernet ports in CODESYS is as follows:

Ethernet interface in CODESYS	Function
eth0	Ethernet/IP [™] Slave (Device)
eth1	EtherNet/IP [™] Scanner

Adding and configuring the second Ethernet interface

Configuring the Ethernet/IP[™] Scanner

- ✓ The Ethernet interface eth1 is configured as described under "Configuring the Ethernet interfaces" [▶ 35].
- ✓ The EtherNet/IP Scanner from 3S Smart Software Solutions GmbH is used.
- Add the EtherNet/IP[™] Scanner to Ethernet using the Add Device function and configure it.

TBEN_LPLC.project - CODESYS				-		×
<u>File Edit View Project Build Online Debug</u>	<u>T</u> ools <u>W</u> indow <u>H</u> elp				·	₹
19 🖆 🔒 🕼 🗠 🕹 🐚 🕼 🗙 🛤 🌿 🕌 📜 🧐	 ៕ ∦ 醖 ໝ- fî 盥 0\$ 0\$ →	- * [(= %= 4=	1월 8월 1월			
Devices – 🖛 🗙	🗃 Ethernet 🗙					•
TBEN_LPLC	Conoral					_
Device (TBEN-Lx-PLC-1x)	General	Interface: eth1				
🖻 🗐 PLC Logic	Status	IP Address	192 168 83 43			
Application		Il Address	152 . 100 . 05 . 15			
Library Manager	Ethernet Device I/O Mapping	Subnet Mask	255 . 255 . 255 . 0			
PLC_PRG (PRG)	Ethernet Device IEC Objects	Default Gateway	192 . 168 . 83 . 1			
	· · · · · · · · · · · · · · · · · · ·	Adjust Operating	System Settings			
ENIPScannerIOTask	Information		, ,			
EtherNet_IP_Scanner.IOCycle						
ENIPScannerServiceTask						
EtherNet_IP_Scanner.ServiceCycle						
🗏 🥩 MainTask						
PLC_PRG						
- 🕒 LEDs (LEDs)						
Cocal_IO (Local IO)						
DXP (DXP)						
Diagnosen (Diagnostics)						
VAUX_Control (VAUX control)						
COMO						
CANbus						
Ethernet (Ethernet)						
Ethernet_1 (Ethernet)						
EtherNet_IP_Scanner (EtherNet/IP Scanner)						
						_
	< · · · · · · · · · · · · · · · · · · ·					>
Sevices POUs	Messages - Total 0 error(s), 0 warning(s)), 0 message(s)			• 7	×
	Last build: 😐 (0 🖲 0 Precompile	: 🗸 😭 Projec	t user: (nobody)	C C)

Fig. 68: Ethernet/IP[™] Scanner at eth1



Configuring the EtherNet/IP[™] Slave (Device)

- Configure EtherNet/IP[™] Slave device at interface eth0 as described under "Commissioning TBEN-L...-PLC-... as Ethernet PROFINET Device" [▶ 58].
- 7.3.15 Commissioning TBEN-L...-PLC-... as CANopen Manager

Properties		
Max. number of devices	127	
Input data	max. 8 kB	
Output data	max. 8 kB	

Configuring the CANopen Manager

- ✓ The CANopen Manager from 3S Smart Software Solutions GmbH is used.
- Add the CANopen Manager to the CANbus using the Add Device function and configure it.

TBEN LPLC.project* - CODESYS	- D X
File Edit View Breiest Build Online Deb	re Taola Window Hala
Devices 🗸 🗸 🗙	CANopen_Manager x
Image: Symbol Configuration Image: Configuration	General General CANopen I/O Mapping Node ID: 127 Check and Fix Configuration CANopen IEC Objects Autostart CANopenManager Polling of Optional Slaves Status Start Slaves NMT Error Behaviour: Restart Slave Information Information Guarding Information Enable Heartbeat Producing Node ID: 127 Producer Time (ms): 200 Sync TIME
CANopen_Manager (CANopen_Manager) CANopen_Manager (CANopen_Manager (CANopen_Manager) CANopen_Manager (CANopen_Manager (CANopen_Manager) CANopen_Manager (CANopen_Manager (CANope	<

Fig. 69: Adding the CANopen Manager

Configuring an external CANopen Device

• Add an external CANopen Device to the CANopen Manager using the **Add Device** function and configure it.

In this example the Turck BL67-CANopen gateway BL67-GW-CO is used as CANopen device.

TBEN_LPLC.project* - CODESYS			- 🗆 X
<u>File E</u> dit <u>V</u> iew <u>P</u> roject <u>B</u> uild <u>O</u> nline <u>D</u> eb	oug <u>T</u> ools <u>W</u> indow <u>H</u> elp		T
管 🖻 🖶 🚭 🗢 🖙 🐰 🗈 🛍 🗙 🗛 🌿 🐴 🌿	乳乳乳乳 = == 6 = 6	🖇 💖 🕨 🔳 🕊 🗊 🖅 🖆 👘 🕷 🛒	7
Devices 👻 👎 🗙	CANopen_Manager	BL67_GW_CO ×	▼
Device (TBEN-Lx-PLC-1x)	Conoral		
PLC Logic	General	General	
Application	PDOs	Node ID: 16	C
👘 Library Manager			
PLC_PRG (PRG)	SDOs	Enable Expert Settings	Autoconfig PDO Mapping
		Enable Sync Producing	
E K Configuration	CANopen IEC Objects		
🖻 🍪 MainTask	Status	⊿ Guarding	
PLC_PRG	-		
LEDs (LEDs)	Information	Enable Nodeguarding	Enable Heartbeat Produc
Local_IO (Local IO)		Guard Time (ms): 0	Producer Time (ms): 20
DXP (DXP)			
Diagnosen (Diagnostics)		Life Time Factor: U	 Heartbeat Consuming
VAUX_Control (VAUX control)			
Modulstatus (Module status)		A Emergency	A TIME
		Enable Emergency	Enable TIME Producing
CANDUS		COB-ID: \$NODEID+16#80	COB-ID (Hex): 16# 10
CANOPER_Manager (CANOPER_Manager			Enable TIME Consuming
Generic BL67_GW_CO (BL67-GW-CO)			
Generic BL67_2A12A0 (Generic BL		Checks at Startup	
generic_bcor_ox5d (deneric bc			
< >>			
2 Devices Devices			>
Messages - Total 0 error(s), 0 warning(s), 15 message(s)			→ ₽ X
		Last build: 🝳 0 💿 0 Precompile: 🗸	Project user: (nobody)

Fig. 70: Configuring the CANopen Device



7.3.16 Commissioning TBEN-L...-PLC-... as CANopen Device

Properties	
max. number of I/O data	max. 512 RxPDOs
	max. 512 TxPDOs

Configuring the CANopen Device

- ✓ The CANopen Device from 3S Smart Software Solutions GmbH is used.
- Add the CANopen Device to the CANbus using the **Add Device** function.
- Configure the Node ID etc.
- Add input and output areas for the Device via the Edit I/O Area function.

Devices 🗸 🗸	CANopen_Device X	•
TEEN_LPLC TEEN_LPLC-1x) PLC Logic Application PLC_PRG (PRG) Symbol Configuration Task Configuration MainTack Edit L/O Area	General General Object Dictionary Node ID: PDOs Device Profile: CANopen I/O Mapping Edit I/O Area	Edit SDO Parameter Area
CANbus CANopen_Device (C	Count Datatype Index Force new PDO s1 1 USINT 16#3800 Image: Control of the state	Export EDS File

Fig. 71: Configuring the CANopen Device

Which data will be mapped into the configured input and output data, depends on assignments in the PLC program or in the I/O mapping of the TBEN-L...-PLC-....

TREN LPLC project* _ CODESYS								X
File Edit View Project Build Online	Debug <u>l</u> ools <u>W</u> indow <u>H</u> e	elp	0.6 %	- 0.1.5				۲.
1 🖙 🖬 😂 🗠 ભ 🕹 🖷 📧 🗙 🛤 🈘 🐴 🏹 		1 🛄 1 🧐	9 99 90 LE 92 42 42 4	1410				
Devices - A X	CANopen_Device ×	CANbu:	s					
TBEN LPLC		- 						
Device [connected] (TBEN-Lx-PLC-1x)	General		Bus cycle options	at here and a				
PLC Logic	Object Dictionary		Bus cycle task Use pare	ent bus cycle	e setting 🗸			
🖹 🔘 Application [run]	·	_			-			
Library Manager	PDOs		Find		Filter Show all			Add FB for
PLC_PRG (PRG)	CANopen I/O Mapping		Variable ■- 🗀 Rx IoRange 16#3000:	Mapping	Channel	Address	Туре	Current Value
Task Configuration	CANopen IEC Objects		Tx IoRange 16#3800:					
=-⊗ MainTask			Application.PLC_PR	۴	Digital_Inputs1_1	l %QB2	USINT	152
	Status		· · · · · · · · · · · · · · · · · · ·		Bit0	%QX2.0	BOOL	FALSE
	Information		- ~?? K.		Bit1	%QX2.1	BOOL	FALSE
OR DXP (DXP)					BIT2	%QX2.2	BOOL	
Diagnosen (Diagnostics)					Bit4	%QX2.3	BOOL	
			- **		Bit5	%0X2.5	BOOL	FALSE
			- **		Bit6	%QX2.6	BOOL	FALSE
COM0			* ø		Bit7	%QX2.7	BOOL	TRUE
• • • • • • • • • • • • • • • • • • •								
E G Abbus								
CANopen_Device (CANopen Device)								
			<					
		[16#3800:16#1	Re	eset mapping	Always update va	riables: U	se parent device setting
	<	[-						
Device user: Anonymous Last build: O C) 0 Precompile: 🗸 🔒	RUN	Program loaded		Program u	nchanged	Pro	ject user: (nobody)

Fig. 72: Data mapping: CANopen Device



Export an EDS file for the CANopen Device

Use the **Export EDS File** function to create and export a device specific EDS file for the use in a higher-level CANopen PLC.

Devices • a x TBEN_LPLC • Image: Device (TBEN-Lx-PLC-1x) • Image: Device Profile •	× □ - ×
Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX control) Product Number: 1 Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX control) Product Number: 1 Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX control) Image: Second Control (VAUX contro) Image: Second Contro	- CRNope
Z Devices POUs	>
Messages - Total 0 error(s), 0 warning(s), 0 message(s)	→ ‡ X

Fig. 73: Exporting the EDS file

7.3.17 Commissioning TBEN-L...-PLC-... as SAE J1939 Manager

Properties		
Max. number of devices	254	
Input data	max. 8 KB	
Output data	max. 8 KB	

Configuring the SAE J1939 Manager

- The J1939 Manager from 3S Smart Software Solutions GmbH is used.
 - Add the SAE J1939 Manager to the CANbus using the Add Device function and configure it.



Fig. 74: Adding the SAE J1939 Manager



Configuring an external SAE J1939-Device (ECU)

Add J1939_ECU from 3S - Smart Software Solutions GmbH to the J1939-Manager via the Add Device function and configure it according to the manufacturer's specifications of the connected J1939 device.

TBEN_LPLC.project* - CODESYS				– 🗆 X
<u>File E</u> dit <u>V</u> iew <u>P</u> roject <u>B</u> uild <u>O</u> nline	<u>Debug T</u> ools <u>W</u> indow <u>H</u> elp			τ.
🗎 🚅 📕 🥔 이 이 중 ங 🛍 🗙 🗛 😘 🍕	🜢 🌿 📕 🤋 🦹 🆄 👘 🎼 🖆 🕯	🗄 🐝 💖 🕞 💼 🔏 💭 🕾 🤤	a *8 ¢ 🛒 💎 👘	
Devices 👻 🕂 🗙	🔥 CANbus 🔐 J1939_Manager	r J1939_ECU 🗙		-
TBEN_LPLC	General			
Device (TBEN-Lx-PLC-1x)		General		
PLC Logic	TX Signals	Preferred Address: 0	* *	SAF 11939
			Lumad	5AL 91959
	J1939 IEC Objects			
Symbol Configuration	Status	✓ ECU NAME		
Task Configuration Section MainTask	Information	NAME (64 bit): 16# 0		
		Arbitrary Address Capable	•	
LEDs (LEDs)		Industry Group	0: Global, applies to all industri	es v
Local_IO (Local IO)		Vehicle System Instance	0	
₩ DXP (DXP)		Mahida Gustan		
Diagnosen (Diagnostics)		Vehicle System		
VAUX_Control (VAUX control)		Reserved		
COM0		Function	0	
		Function Instance	0	
E & CANbus		ECI I Instance	0	
🚽 📆 J1939_Manager (J1939_Manager)		Leo instance		
🕤 J1939_ECU (J1939_ECU)		Manufacturer Code	0	
		Identity Number	0	
		A Communication Watchde	og	
		Enable Communication W	atchdog	
		Watchdog Time (in ms):	1500	
	4			>
Messages - Total 0 error(s), 0 warning(s), 0 messag	je(s)			→ ↓ ×
		Last build: 🤇	🕽 0 🔹 0 🔹 Precompile: 🗸	Project user: (nobody) 🛛 🔇

Fig. 75: Configuring the J1939_ECU

7.3.18 Displaying task and processor information

Displaying the average cycle time

The average cycle time for the task with the highest priority should not be higher than 80 % of the cycle time set for this task.

In the following example the Profinet_IOTask has the highest priority, the cycle time is set to 1 ms:

TBEN_LPLC.project* - CODESYS		– 🗆 ×
<u>File E</u> dit <u>V</u> iew <u>P</u> roject <u>B</u> uild <u>O</u> nline	Debug <u>T</u> ools <u>W</u> indow <u>H</u> elp	₹
🛍 🚔 🔲 🥔 이 이 🕹 ங 🛍 🗙 🐴 😘 🌢	貝 11 11 11 11 11 11 11 11 11 11 11 11 11	
Devices	Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image: Second system Image:	ms v
	Add Call × Remove Call Change Call A Move Up Move Down Open POU Comment	
	Messanes - Total () error(s), () warning(s), 16 messane(s)	* ¹ X
COM1	Download • O 0 error(s) • 0 warning(s) • 2 message(s) × ×	
Griedus Griedus Grief (Ethernet (Ethernet) Grief PN_Controller (PN-Controller)	Description Project Object Image: A Core Dump created on the 07.10.2019 10:32:55 for the application 'Appli Project Object Image: A Core Dump created on the 07.10.2019 10:32:55 for the application 'Appli Image: A Core Dump created on the 07.10.2019 10:32:55 for the application 'Appli Image: A Core Dump created on the 07.10.2019 10:32:55 for the application 'Appli Image: A Core Dump created on the 07.10.2019 10:32:55 for the application 'Appli Image: A Core Dump created on the 07.10.2019 10:32:55 for the application 'Appli Image: A Core Dump created on the 07.10.2019 10:32:55 for the application 'Appli Image: A Core Dump created on the 07.10.2019 10:32:55 for the application 'Appli Image: A Core Dump created on the 07.10.2019 10:32:55 for the application 'Appli Image: A Core Dump created on the 07.10.2019 10:32:55 for the application 'Appli Image: A Core Dump created on the 07.10.2019 10:32:55 for the application 'Appli Image: A Core Dump created on the 07.10.2019 10:32:55 for the application 'Appli Image: A Core Dump created on the 07.10.2019 10:32:55 for the application 'Appli Image: A Core Dump created on the 07.10.2019 10:32:55 for the application 'Appli Image: A Core Dump created on the 07.10.2019 Image: A Core Dump created on the 07.10	Position
C POUs Devices POUs Lact huild: 0 0 0 0	Prenomnile: 1 20 STOP Program loaded Program unchanned Pro	iert user: (nohodv)
Device user: Anonymous Last build: 😺 0 😗 0	Program Unchanged Program Unchanged Pro	ject user: (nobody)

Fig. 76: Profinet_IOTask, priority1, cycle time 1 ms

The maximum average cycle time recommended for the example is calculated as follows: 1 ms \times 80 % = 800 µs.

An average cycle time of 800 μs should not be exceeded for this example.

The Average Cycle Time is shown in the register tab **Monitor** of the Task Configuration.


TBEN_LPLC.project* - CODESYS						- 0	×
File Edit View Project Build Online Debug Tools	Window Hel	n					
	*ill≣ ‰• ∩îll	- 05 0 5 ⊾ ∎	N 103 93	4= +≣ 8 ¢	종(금) 장		
Devices	Profinet_1	IOTask 🛛 🔣 Ta	sk Configura	ation ×			-
TBEN_LPLC Monitor Variation	able Usage System	Events Properties	5				
Bevice [connected] (TBEN-Lx-PLC-1x)	Status	IEC-Cycle Co	Cycle Co	Last Cycle Tim	Average Cycle Ti	Max. Cycle Tim	Min.
PLC Logic 🛞 MainTask	Valid	564	621	22	22	94	
Application [run]	ommuni Valid	5637	6211	169	74	1073	
Library Manager)Task Valid	56372	62114	73	47	3731	
PLC_PRG (PRG)							
Symbol Configuration							
Task Configuration							
🖻 🥩 MainTask							
PLC_PRG							
🖻 🕸 Profinet_CommunicationTask							
PN_Controller.CommCycle							
Profinet_IOTask							
EDs (LEDs)							
Elecal_IO (Local IO)							
DXP (DXP)							
- Sig Diagnosen (Diagnostics)							
VAUX_Control (VAUX control)							
Gill Modulstatus (Module status)							
a como							
Call Strength (Sthemath)							
Ethernet (Ethernet)							
Se Devices POUs							>
Device user: Anonymous Last build: 🔮 0 🖲 0 Precompile: 🗸	RUN RUN	Program loa	ded	Program unch	nanged Pro	ject user: (nobody)	(

Fig. 77: Monitoring the task configuration

In the example, the average cycle time is 47 $\ensuremath{\mu s}$.

Displaying processor information

►

Information about the processor load can be displayed in the PLC Shell of the TBEN-L...-PLC-... using the function **plcload**.

- TBEN_L...-PLC.project* CODESYS \times ₹ <u>File Edit View Project Build Online Debug Tools Window H</u>elp 🖆 🖨 🖬 🗠 이 상 🖻 🛍 🗙 🛤 😘 📥 🏹 📜 🦎 개 개 개 🛅 🎦 🖆 199 🧐 🕨 🖿 📽 💷 개 요구하 🛒 (국 19 Devices **→** ₽ X Device X B TBEN_L...-PLC b1cload Communication Settings B-OID Device [connected] (TBEN-Lx-PLC-1x) PLC load average: 4% 🗏 🗐 PLC Logic Applications 🗄 🔘 Application [run] 0 CoreID: 👔 Library Manager Backup and Restore PLC Core load: 4% PLC_PRG (PRG) Files 🛓 🌃 Task Configuration Log 🗏 🍪 MainTask PLC_PRG PLC Settings 🖣 😻 Profinet_CommunicationTask PN_Controller.CommCycle PLC Shell A Profinet IOTask Users and Groups 😔 🕒 LEDs (LEDs) 🗏 😏 🚮 Local_IO (Local IO) Access Rights 😏 🕼 👔 DXP (DXP) -Set II Diagnosen (Diagnostics) Symbol Rights 😔 🗊 Modulstatus (Module status) Parameters 😔 🔓 сомо Task Deployment 😔 🏅 СОМ1 😏 ኔ CANbus Status 😏 🗊 Ethernet (Ethernet) Information < ~ ... 😤 Devices 🗋 POUs 0 n l Last build: 😳 0 😗 0 Precompile: 🗸 RUN Device user: Anonymous Program loaded Project user: (nobody)
- Call the function **plcload** in the device's PLC Shell.

Fig. 78: Call the function plcload.

⇒ The PLC load for the TBEN-L...-PLC-... is displayed in %.



TBEN_LPLC.project* - CODESYS				_		×
<u> </u>	<u>.</u> Debug <u>T</u> ools <u>W</u> indow <u>H</u> elp					₹
🎦 🚔 🔚 🎒 い つ ぶ ங 🋍 🗙 🐴 😘 🐴	¶ ¶ ¶ = = 6' #	🐝 🗱 🕨 🔳 % ÇE 🖙 d	i *i \$ • ∭ ↓ ∿			
Devices 🗸 🖬 🗙	Device X					•
Billing TREN IPLC		0				1
Service [connected] (TBEN-Lx-PLC-1x)	Communication Settings	plcload				
PLC Logic	Applications	PLC load average:	4%			
Application [run]		CoreID:	0			
- 🎁 Library Manager	Backup and Restore	PLC Core load:	48			
PLC_PRG (PRG)	Files	120 0010 1000				
Symbol Configuration						
	Log					
PLC_PRG	PLC Settings					
Profinet_CommunicationTask	PI C Shell					
Profinet_IOTask						
	Users and Groups					
■ 😏 🗊 Local_IO (Local IO) — 😔 🖬 ① DXP (DXP)	Access Rights					
- 今時創 Diagnosen (Diagnostics) - 今時創 VAUX_Control (VAUX control)	Symbol Rights					
· · · · · · · · · · · · · · · · · · ·	Parameters					
	Task Deployment					
- 😯 🏅 CANbus - 😯 🎲 Ethernet (Ethernet)	Status					
	Information					
< >>						
🛫 Devices 🗋 POUs					-	<u>_</u>
Device user: Anonymous L	ast build: 😳 0 😗 0 🛛 Precompile: 💊	Y CON RUN	Program loaded	Project user: (nobody)		V

Fig. 79: Processor load in %

CODESYS-exception "ProcessorLoadWatchdog"

In case of a PLC load of approximately 80 %, CODESYS generates the exception **ProcessorLoad-Watchdog**. The TBEN-L...-PLC-... remains in Stop.

Reasons for the processor overload of the TBEN-L...-PLC-... may be:

- Max. number of Devices/Slaves exceeded
- Max. number of process data exceeded
- Too low cycle times set for the number of connected devices.



Fig. 80: Exception in CODESYS in case of processor overload



7.4 Commissioning TBEN-L...PLC-... as Cloud gateway

To transmit data to the Turck Cloud, the TBEN-L...PLC-... must be integrated into an Ethernet network with Internet access. Access can be via any Internet router. Port 443 (SSL) must be enabled in the Internet router for the connection with the Turck Cloud.

Application example

	NOTE				
	In Dual MAC arating the Et ating the TBE ate the auton	mode, the connect thernet ports. For s N-LPLC in Dual nation network fro	ed networks are separate ecurity reasons, Turck the MAC mode in cloud appl m the Internet.	ed from each o erefore recom lications in or	other by se imends op der to sep
TBE DU/ wor IP a -	EN-LPLC (firm AL MAC mode act rks Iddresses: - Ethernet port P 192.168.1.100 , - IP address for E	nware version ≥ 1.4 tivated [> 26], the T 1 (locale network): assigned via Turck thernet port P2 (int	4.6.0): IBEN-L PLC is a member of Service Tool [▶ 28] ternet):	of 2 separate	Ethernet n
	192.168.83.43,	assigned via DHCP	server in the network		_
					~
MAIN DOCUMENTAT	TION CLOUD		LOGIN	?	
TBEN-L5-PLC-10	TBEI	N-L5-PLC-10 - Gatew	vay - Parameter		
(i) Info	-				
2	▶ ₽				
2 {ဂ္ဂ်ိန် Parameter	Write	Channel view			
දිරිූි Parameter ලා Diagnosis	Write	Channel view name Ethernet pert /		~	
ද్రోస్త Parameter ్ర్రై Diagnosis ్ర√్ Statu <u>s</u>	¥ Write	Channel view name Ethernet port 7 Addressing	PGM-DHCP	?	
 కర్టి Parameter ల్ల Diagnosis చ్చ Status ఈ Event log 	Write	Channel view name Ethernet port ' Addressing mode	PGM-DHCP	?	
دي کې Parameter کې Diagnosis کړ Status گې Event log	Write	Channel view name Ethernet port 4 Addressing mode MAC address	PGM-DHCP 00:07:46:1d:71:20	?	
값 Parameter 값 Diagnosis 값 Status % Event log 나 Ex- / Import	Write	Channel view name Ethernet port 7 Addressing mode MAC address Connection	PGM-DHCP 00:07:46:1d:71:20 Autonegotiation	? ?	
¿ Parameter Image: Diagnosis Image: Diagnosis Image: Diagnosis Image: Diagn	Write	Channel view name Ethernet port 4 Addressing mode MAC address Connection mode	PGM-DHCP 00:07:46:1d:71:20 Autonegotiation	?]] ?	
¿ Parameter Image: Diagnosis Image: Diagnosi	Write	Channel view name Ethernet port ' Addressing mode MAC address Connection mode IP address	PGM-DHCP 00:07:46:1d:71:20 Autonegotiation 192.168.1.100	?] ?	
Image: Status Image: Status <t< td=""><td>Write</td><td>Channel view name Ethernet port 4 Addressing mode MAC address Connection mode IP address Netmask</td><td>PGM-DHCP 00:07:46:1d:71:20 Autonegotiation 192.168.1.100 255.255.255.0</td><td></td><td></td></t<>	Write	Channel view name Ethernet port 4 Addressing mode MAC address Connection mode IP address Netmask	PGM-DHCP 00:07:46:1d:71:20 Autonegotiation 192.168.1.100 255.255.255.0		
Image: Status Image: Status <t< td=""><td>Write</td><td>Channel view name Ethernet port 4 Addressing mode MAC address Connection mode IP address Netmask Default gateway</td><td>PGM-DHCP 00:07:46:1d:71:20 Autonegotiation 192.168.1.100 255.255.255.0 192.168.1.1</td><td></td><td></td></t<>	Write	Channel view name Ethernet port 4 Addressing mode MAC address Connection mode IP address Netmask Default gateway	PGM-DHCP 00:07:46:1d:71:20 Autonegotiation 192.168.1.100 255.255.255.0 192.168.1.1		
Image: Second system Image: Status	Write	Channel view name Ethernet port 4 Addressing mode MAC address Connection mode IP address Netmask Default gateway Set network	PGM-DHCP 00:07:46:1d:71:20 Autonegotiation 192.168.1.100 255:255.255.0 192.168.1.1 SET NETWORK CONFIGURATION	?	
Image: Status Image: Status <td< td=""><td>Write</td><td>Channel view name Ethernet port of Addressing mode MAC address Connection mode IP address Netmask Default gateway Set network configuration</td><td>PGM-DHCP 00:07:46:1d:71:20 Autonegotiation 192.168.1.100 255.255.255.0 192.168.1.1 SET NETWORK CONFIGURATION</td><td></td><td></td></td<>	Write	Channel view name Ethernet port of Addressing mode MAC address Connection mode IP address Netmask Default gateway Set network configuration	PGM-DHCP 00:07:46:1d:71:20 Autonegotiation 192.168.1.100 255.255.255.0 192.168.1.1 SET NETWORK CONFIGURATION		
Image: Symmetry Image: Symmetry Image: Status	Write	Channel view name Ethernet port 4 Addressing mode MAC address Connection mode IP address Netmask Default gateway Set network configuration Ethernet port 4	PGM-DHCP 00:07:46:1d:71:20 Autonegotiation 192.168.1.100 255.255.255.0 192.168.1.1 SET NETWORK CONFIGURATION 2 00:07:46:1d:71:21		
Image: Second system Image: Second system Image: Secon	Write	Channel view name Ethernet port 4 Addressing mode MAC address Connection mode IP address Netmask Default gateway Set network configuration Ethernet port 4 MAC address	PGM-DHCP 00:07:46:1d:71:20 Autonegotiation 192.168.1.100 255.255.255.0 192.168.1.1 SET NETWORK CONFIGURATION 2 00:07:46:1d:71:21		
Image: Second system Image: Second system Image: Secon	Write	Channel view name Ethernet port 4 Addressing mode MAC address Connection mode IP address Netmask Default gateway Set network configuration Ethernet port 4 MAC address Connection Texter	PGM-DHCP 00:07:46:1d:71:20 Autonegotiation 192.168.1.100 255.255.255.0 192.168.1.1 SET NETWORK CONFIGURATION 2 00:07:46:1d:71:21 Autonegotiation		
Image: Second system Image: Second system Image: Second	Write	Channel view name Ethernet port of Addressing mode MAC address Connection mode IP address Netmask Default gateway Set network configuration Ethernet port 2 MAC address Connection mode IP address	PGM-DHCP 00:07:46:1d:71:20 Autonegotiation 192.168.1.100 255.255.255.0 192.168.1.1 SET NETWORK CONFIGURATION 2 00:07:46:1d:71:21 Autonegotiation 192.168.83.43		
Image: Second system Image: Second system Image: Secon	Write	Channel view name Ethernet port 4 Addressing mode MAC address Connection mode IP address Netmask Default gateway Set network configuration Ethernet port 4 MAC address Connection mode IP address	PGM-DHCP 00:07:46:1d:71:20 Autonegotiation 192.168.1.100 255.255.255.0 192.168.1.1 SET NETWORK CONFIGURATION 2 00:07:46:1d:71:21 Autonegotiation 192.168.83.43 255.255.255.0		
Image: Second system Image: Second system <td>Write</td> <td>Channel view name Ethernet port 4 Addressing mode MAC address Connection mode IP address Netmask Default gateway Set network configuration Ethernet port 4 MAC address Connection mode IP address Connection mode IP address Netmask Default</td> <td>PGM-DHCP 00:07:46:1d:71:20 Autonegotiation 192.168.1.100 255.255.255.0 192.168.1.1 SET NETWORK CONFIGURATION 00:07:46:1d:71:21 Autonegotiation 192.168.83.43 255.255.255.0 192.168.83.1</td> <td></td> <td></td>	Write	Channel view name Ethernet port 4 Addressing mode MAC address Connection mode IP address Netmask Default gateway Set network configuration Ethernet port 4 MAC address Connection mode IP address Connection mode IP address Netmask Default	PGM-DHCP 00:07:46:1d:71:20 Autonegotiation 192.168.1.100 255.255.255.0 192.168.1.1 SET NETWORK CONFIGURATION 00:07:46:1d:71:21 Autonegotiation 192.168.83.43 255.255.255.0 192.168.83.1		
Image: Second system Image: Second system <td>Write</td> <td>Channel view name Ethernet port 4 Addressing mode MAC address Connection mode IP address Netmask Default gateway Set network configuration Ethernet port 2 MAC address Connection mode IP address Connection mode IP address Connection MAC address Connection mode IP address Connection MAC</td> <td>PGM-DHCP 00:07:46:1d:71:20 Autonegotiation 192.168.1.100 255.255.255.0 192.168.1.1 SET NETWORK CONFIGURATION 00:07:46:1d:71:21 Autonegotiation 192.168.83.43 255.255.255.0 192.168.83.1</td> <td></td> <td></td>	Write	Channel view name Ethernet port 4 Addressing mode MAC address Connection mode IP address Netmask Default gateway Set network configuration Ethernet port 2 MAC address Connection mode IP address Connection mode IP address Connection MAC address Connection mode IP address Connection MAC	PGM-DHCP 00:07:46:1d:71:20 Autonegotiation 192.168.1.100 255.255.255.0 192.168.1.1 SET NETWORK CONFIGURATION 00:07:46:1d:71:21 Autonegotiation 192.168.83.43 255.255.255.0 192.168.83.1		
Image: Second system Image: Second system Image: Secon	Write	Channel view name Ethernet port 4 Addressing mode MAC address Connection mode IP address Netmask Default gateway Set network configuration Ethernet port 4 MAC address Connection mode IP address Connection mode IP address Connection mode Set network Default gateway Set network Connection mode IP address Connection MAC Connection	PGM-DHCP 00:07:46:1d:71:20 Autonegotiation 192.168.1.100 255:255.255.0 192.168.1.1 SET NETWORK CONFIGURATION 2 00:07:46:1d:71:21 Autonegotiation 192.168.83.43 255:255.255.0 192.168.83.1 SET NETWORK CONFIGURATION		

Fig. 81: Webserver – Ethernet port settings

DNS server

A DNS server must be available for Internet access. The DNS server can be configured automatically via DHCP or manually.

Example DNS server: 8.8.8.8 (Google)

MAIN DOCUMENTATION	CLOUD			LOGOU
TRENJ 5.PL C.10	TREN 15 DI	C 10 Gatou	av Paramotor	
			ay - I alameter	
ξ ⁶ Ωs Parameter	Write Channel v	iew		
[0] Diagnosis _స ఛ్, Status	Device	Global SNMP Public	public	
لللل Event log جام Ex- / Import	USB	Community SNMP Private	private	
Change Password	Date and time	Community DUAL-MAC status	Dual MAC mode	
LOCAL I/O	Network	LLDP status DNS-Mode	Init Manual	✓ / ?
Diagnosis	Firewall	DNS Domain DNS Name	Google 8.8.8.8	/ / /
्र Input		Sonvor 1		

Fig. 82: Web server - Set up DNS server

7.4.1 Register or login user and project in the cloud

In order to use the TBEN-L...PLC-... as a cloud gateway in the Turck Cloud, a cloud user account with a cloud project must exist. In the customer project, the TBEN-L...PLC-... can then be activated as a cloud gateway.

- No user account available: Create a new user account in the Turck Cloud www.turck.cloud by clicking Register.
- User account available: Request user data from the cloud administrator. Newly created users will receive a confirmation e-mail.
- Follow the link to the new user account in the e-mail and assign your own user password.



7.4.2 Creating a Cloud project

- Create a project via MANAGE \rightarrow PROJECTS \rightarrow Create a project.
- Assign a project name under **Project** and select a Service user.
- Confirm the entries via **Check input**.



Fig. 83: Creating a Cloud project

In the 2nd step of the process, the costs resulting from creating a new project are displayed.

Click the button Order and activate with costs to create a project.

			TURCH
MANAGE:	GATEWAYS SURFACE	PROJECTS BILLING USER	EXPORT 🔄 💮 🛄
	◀ HIDE SIDEBAR	Create a project	
SEARCH	Q	<	Create a project
		1	2 3
		input data	order overview order confirmation
		Project	cost overview
		Name Project1	uniquely monthly
		Description	Creation of a new project 50,00 € - 9940005
		Service user Author	TCS-Portal-Project-Registration-01
			EDIT INPUT information
			All costs are net plus the applicable VAT. If you click on the "Order and activate with costs" button, we will
			send you an e-mail confirming your order. The
			confirmation e-mail or upon tecept of the project,
			I have read the <u>AGB</u> , <u>Privacy policies</u> and <u>code of</u> <u>conduct</u> and agree to their validity.
			ORDER AND ACTIVATE WITH COSTS
2019 Hans Turck Grr	nbH & Co. KG		Legal notice Terms of Use Privacy stater
J. 84: Turck (Cloud – order and a	activate project with co	osts

						TU		СК	Ľ
MANAGE:	GATEWAYS	SURFACE	PROJECTS	BILLING USER EXPORT		e,	٢	AUTO ZS	R
		DE SIDEBAR	Project1						
SEARCH		Q	Ľ	Project1					
Create a project		+	Name	Project1	-				
Project1		>	Project address	https://project1.turck.cloud					
			Service user	Author (Documentation, Author)					
			Maximum limit for history storage	365 Days					
© 2019 Hans Turck Gr	nbH & Co. KG				Lega	l notice Terms o	f Use Pri	vacy stateme	nt
Fig. 85: Turck Clo	oud – proje	ct created, l	ink to projec	t URL					



After the project has been created, the specified service user receives an e-mail as order and order confirmation. The e-mail also contains a link to the project URL.

7.4.3 Activate a device as Cloud gateway in Turck Cloud Portal

✓ Gateways can only be added to projects for which the user has appropriate rights. The Turck Cloud manual contains further information on user rights.

TURCK

- Open the project URL and log in to the project.
- Add the gateway to the project via MANAGE \rightarrow GATEWAYS \rightarrow Activate gateway.

GATEWAYS		•	0 1	RUTO	*	
		Gateways				
SEARCH	Q	no gateway available				
Activate gateway	+					
© 2019 Hans Turck GmbH & Co. KG Legal notice Terms of Use Privacy statement						
Fig. 06. Turck Cloud	activato gatoway					

Fig. 86: Turck Cloud – activate gateway



- In the 1st step of Activate gateway select the TBEN-L...-PLC-... as gateway and enter the MAC address of the device.
- Assign a Scope (gateway name in cloud interface), a gateway user name under User and a password under Password.
- Confirm the entries via **Check input**.



NOTE

The gateway user name should be unique in the project. It is not associated with the user's user name.

		TURCK
MANAGE: GATEWAYS SURFACE	PROJECTS BILLING USER	👌 😧 💻 👗
✓ HIDE SIDEBAR	Activate gateway	
SEARCH Q	< Act	ivate gateway
TBEN_PLC_TURCK	1 input data orde	2 3 r overview order confirmation
TCG20_Turck	Template data structure Gateway*	Portal Host turck.cloud Project project1
	MAC address* 000746280081	Scope* TBEN_PLC_TURCK
		Description User* PLC-1
		Password* 3
		Repeat
		Generate
		CHECK INPUT
	* Black input fields are mandatory fields, grey input field	is can be filled optionally.
© 2019 Hans Turck GmbH & Co. KG		Legal notice Terms of Use Privacy statement

Fig. 87: Turck Cloud Portal – activate TBEN-L...-PLC-... as Cloud gateway (step 1)

In the 2nd step of the process **Activate gateway**, the costs resulting activate a new Gateways are displayed.

Click the button **Order and activate with costs** to create a gateway.

			TURCK
MANAGE:	GATEWAYS SURFACE	PROJECTS BILLING USER	🌧 😵 💻 👗
		Activate gateway	
SEARCH	9	<	Activate gateway
TCG20_Turck		1 input data	2 order overview order confirmation
		Template data structure	cost overview
		MAC address 00:07:46:28:00:81	Registering a new device 15,00 € - 9940006 TOS Portel Device Desistantian 01
		Portal Host turck.cloud Project project1	Monthly data flat rate - 13,00 € 9940007 TCS-Portal-Device-Dataflat-Month- 01
		Scope TBEN_PLC_TURCK	information
		Username PLC-1	All costs are net plus the applicable VAT. If you click on the "Order and activate with costs" button, we will send you an e-mail confirming your order. The contract comes into effect upon receipt of the confirmation e-mail or upon activation of the project, which is then immediately available to you.
			I have read the <u>AGB</u> , <u>Privacy policies</u> and <u>code of</u> <u>conduct</u> and agree to their validity. ORDER AND ACTIVATE WITH COSTS
© 2019 Hans Turck Gmb	bH & Co. KG		Legal notice Terms of Use Privacy statement

Fig. 88: Turck Cloud Portal – order and activate Gateway with costs

After the project has been created, the specified project responsible receives an e-mail as order and order confirmation. The e-mail also contains a link to the project URL.



Configuring the Cloud access in the web server 7.4.4

Enter Cloud access data (credentials)

In the web server, the access data for the Turck Cloud are entered under CLOUD ightarrow Credentials.

- Activate the portal access via Turck Cloud Portal \rightarrow Enable
- Enter the Turck Cloud access data. The access data are displayed in the cloud under Man-age \rightarrow Gateways at the TBEN-L...-PLC-... entry.
- If necessary, configure a proxy server.
- Write the access data to the TBEN-L...-PLC-... via the Write button.



Fig. 89: Webserver – Transfer access data from the Turck Cloud

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- Restart the device.
- ⇒ The cloud connection status (Status) shows that the TBEN-L...-PLC-... is connected to the cloud.

		TURCH
MAIN DOCUMENTATIO	DN CLOUD	
PORTAL (i) Status (오) Credentials (강) Node Options 법 Nodes	Status General Connection Status Latest error message	ready -
For comments or questions ple	ase find your local contact on www.turck.com	

Fig. 90: Webserver – TBEN-L...-PLC-... – Cloud connection established (Status)

7.4.5 Transfer process data from CODESYS to the cloud

The transfer of the process data of the TBEN-L...-PLC-... from a CODESYS project into the Turck Cloud takes place via a symbol configuration in the CODESYS project.

- ► Add a symbol configuration to the project CODESYS project via Application → Add Object → Symbol Configuration. The symbol configuration contains all variables used in the project.
- Mark variables to be displayed in the web server and in the cloud and in the Access Rights column define whether the variables should only be read, written or read and written in the cloud. The web server only allows read access under CLOUD → Portal → Nodes see "Clean Data Nodes (Nodes)" [▶ 114].





Fig. 91: Symbol configuration



NOTE If access rights have been defined in CODESYS, then the respective access data have to be entered in the web server [> 114].

7.4.6 Setup firewall for Ethernet port P2

A firewall can be set up for the Ethernet port P2 in the area Parameter ightarrow Firewall .

- Activate the firewall for P2 via Activate Firewall for Port 2.
- Define Fix Firewall rules or define own firewall rules under User firewall rules x.
- Write the changes into the device via the **Write**.
- Apply firewall rules via the **Apply** button.

MAIN DOCUMENTATION	CLOUD	LOGOU
TBEN-L5-PLC-10	TBEN-L5-PLC-10 - Gateway - Parameter	
(i) Info		
နိုင်္ခန် Parameter	Write Channel view	
Diagnosis	Global Device Activate firewall for port 2 yes	⊻ ?
	Apply firewall rules	APPLY
	USB Eix Eirowall rulos	
Ex- / Import	Turck discovery (Port 58553) enable	V
Change Password	Date and time Turck service (Port 58554) disable enable	· ·
Firmware	Turck Cloud (Port 443) enable	v
LOCAL I/O	Network CODESYS-Gateway (Port 1217) disable	v
နိုင်္ဂိုန် Parameter	CODESYS-PLC-Handler I (Port 1740) disable	×
Cy Diagnosis	Firewall CODESYS-PLC-Handler II (Port 11740) disable	×
ా√్ Input	CODESYS WebVisu (Port 8080) disable	×
പ്പം Output	OPCUA-Server (Port 4840) enable	×
	HTTP (Port 80) disable	×
	HTTPS (Port 443) disable	×
	SFTP (Port 22) disable	×
	SNMP (Port 161) disable	~
	SNTP (Port 123) enable	~
	DHCP (Port 67) enable	×
	DNS UDP (Port 53) enable	V
		· · · ·

Fig. 92: Web server - setting up the firewall



NOTE

If the firewall on port 2 is activated and the TBEN-L...-PLC-... is to be connected to the Turck Cloud via port 2, the firewall rule Turck Cloud (port 443) must be deactivated.



8 Parameterizing and Configuring

8.1 Parameters

The general PLC parameters as well as the parameters of the local I/Os can be set via the device's web server. In addition, CODESYS and the DTM also offer the setting of many parameters Parameters like the IP address of the device (in Dual MAC mode only for port P1) as well as functions like restart, network reset etc. can also be executed via the Turck Service Tool. The **Deactivate Voltage Diagnostics** parameter is a special CODESYS parameter and can only be set there. In addition, the parameters of the serial interfaces COM0 and COM1 and the parameters of the CAN interface can only be set via CODESYS.



NOTICE

Parameter settings in CODESYS overwrite parameter settings of other programs Unwanted parameter settings

Parameter settings that can also be made in CODESYS can only be made in other programs for test purposes.

The following table contains an overview of the parameters and the setting options.

Parameter name	Settable via					
	Web server	Turck Service Tool	CODESYS	DTM		
General PLC parameter						
Deactivate WEB server	х	-	Х	х		
Reboot	х	х	-	-		
Legacy reset and reboot	х	-	-	-		
Network reset and reboot	Х	x	-	-		
Factory reset and reboot	Х	Х	-	-		
Deactivate voltage diagnostics	-	-	х	-		
Activate USB Host support	х	-	х	х		
Activate permanent mount support	х	-	-	х		
Actual time (UTC)	х	-	-	-		
Set time from host	Х	-	-	-		
Time zone	х	-	-	х		
Time server – activate SNTP	х	-	-	х		
Time server – NTP server address	Х	-	-	х		
SNMP Public Community	х	-	-	х		
SNMP Private Community	Х	-	-	х		
DNS mode	х	-	-	х		
IP Forwarding	х	-	-	х		
Device name	Х	-	-	Х		
Ethernet port 1/2 – connection mode	х	-	-	Х		
Ethernet port 1 – IP address	х	Х	-	Х		
Ethernet port 1 – net mask	х	x	_	х		

Parameter name	Settable via			
	Web server	Turck Service Tool	CODESYS	DTM
Ethernet port 1 – default gateway	Х	Х	-	х
Activate firewall for port2	Х	-	-	х
Fix firewall rules	Х	-	-	x
User firewall rules 116	Х	-	-	х
Parameters of the local I/Os				
Activate output	Х	-	х	х
Manual output reset after overcur- rent	х	-	х	х
VAUX Control				
VAUX2 pin 1 Cx (chy - z)	Х	-	Х	х
Interface parameters COM0/COM1				
Data rate	-	-	х	-
Data bits	-	-	х	-
Stopp bits	-	-	х	-
Termination active	-	-	Х	-
Biasing active	-	-	х	-
Voltage supply VAUX1	-	-	х	-
Swap A/B line	-	-	х	-
Operation mode	-	-	х	-
Parity	-	-	х	-
Interface parameters CAN				
Baud rate	-	-	х	-

8.1.1 General PLC parameters



Parameter changes become only valid after a device restart.

The TBEN-L...-PLC-... provides the following device parameters: Default parameters are displayed in bold.

Parameter name	Value	Description
Device		
Deactivate WEB server	No	Activates the web server in the device.
	yes	Deactivated the web server in the device.
Reboot		The device is rebooted.
Legacy reset and re- boot		The legacy reset resets the network and para- meter settings of the device to factory defaults and restarts the device. A CODESYS program on the device is not affected by the legacy re- set.



Parameter name	Value	Description
Network reset and reboot		The network reset resets the network settings of the device to factory defaults and restarts the device. Parameter settings and a CODESYS program on the device are not affected by the network reset.
Factory reset and reboot		The factory reset resets all settings of the device to factory defaults and restarts the device. A CODESYS program existing on the device is deleted.
Deactivate voltage diagnostics		CODESYS parameters: The load voltage diagnostics can be deactiv- ated in CODESYS if the device is operated op- erated outside the specification. This is the case, for example, with 12 V DC applications in mobile work machines.
	No	Activates the voltage diagnostics for V1 and V2
	yes	Deactivates the voltage diagnostics for V1 and V2
USB		
Activate USB Host support	yes	Activates the USB Host port support for the device. The USB Host port functions can be executed.
	No	Deactivates the USB Host port support for the device. The USB Host port functions can not be executed.
Activate permanent mount support	No	Write and read access to the USB storage device is disabled.
	yes	Enables direct write and read access to the in- serted USB storage device.
Date and time		
Actual time (UTC)		
Set time from host		Date and time are taken from the PC.
Time zone		Sets the time zone in which the unit is used.
Time server – activate SNTP	No	Time synchronization via an NTP time server is deactivated.
	yes	Time synchronization via an NTP time server is activated.
Time server – NTP server address		Address of the NTP time server.
Network		
SNMP Public		
Community		
SNMP Private Community		
DNS mode	Automatic	The DNS domain and IP addresses of the DNS name servers are determined automatically.
	manual	The DNS domain and IP addresses of the DNS name servers have to be entered manually.

Parameter name	Value	Description
IP Forwarding	deactivate	The forwarding of IP packets between the two Ethernet networks (on port 1 and port 2) is not possible.
	activate	The forwarding of IP packets between the two Ethernet networks (on port 1 and port 2) is ac- tivated.
Device name		Device name to be assigned to the PROFINET device.
Ethernet port 1/2		
Connection mode	Auto negotiation	Sets the Ethernet port to Auto-negotiation or
	10 Mbps, half duplex	to a fixed value for transmission rate and trans-
	10 Mbps, full duplex	mission mode.
	100 Mbps, half duplex	-
	100 Mbps, full duplex	-
IP address	Default setting: Port1: 192.168.1.254 Port 2: 192.168.2.254	Network settings for the relevant Ethernet port on the device. If the device is operated in switch mode, only the setting for port 1 can be made here. In Dual MAC mode, the Ethernet ports are set in-
Net mask	Default setting: 255.255.255.0	dependently of each other.
Default gateway	Default setting: Port1: 192.168.1.1 Port 2: 192.168.2.1	-
Firewall (can only be set via web server)		
Activate firewall for	No	No firewall activated for port 2
port2	yes	Activates the firewall for Ethernet port P2 in the Dual MAC mode.
Fix firewall rules		The firewall rules for port 2 can be customized
User firewall rules 116		 to meet application requirements. To apply the firewall rules, you must first activate the firewall itself using the Firewall for Port 2 parameter. If the firewall is activated, proceed as follows: Define fixed or user firewall rules. Write firewall rules to the device using the Write button. Apply firewall rules via the Apply but-
		 Apply firewall rules via the Apply ton.



Parameters of the local DXP channels (Local I/O) 8.1.2

Default values are shown in **bold**.

Parameter name	Value	Description
Activate output	No	The output is deactivated.
	yes	The output is activated.
Manual output reset after overcurrent	No	The output switches on automatically after an overload.
	yes	The output is manually switched-off and on again.

8.1.3 Parameter VAUX Control

Parameter VAUX Control (for sensor/actuator supply)

Default values are shown in **bold**.

Parameter name	Value	Description
VAUX2 Pin 1 Cx (Chy - z)	24 VDC	The 24 VDC sensor/actuator supply at Pin1 of the connector is switched on.
	switchable	The 24 VDC sensor/actuator supply at pin1 of the respective connector is switchable via the process data.
	off	The 24 VDC sensor/actuator supply at Pin1 of the connector is switched off.

Interface parameters – COM0/COM1 8.1.4

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The parameters can only be set in CODESYS. Default values are shown in **bold**.

Parameter name	Value	Description
Data rate	9600 bps	Data rate of the serial interface
	19.2 kbps	
	38.4 kbps	
	57.6 kbps	
	115.2 kbps	
	230.4 kbps	
Data bits	7 bit	Defines the number of data bits per telegram
	8 bit	
Stopp bits	1 bit	Defines the number of stop bits
	2 bit	
Termination active	No	No line termination active
	yes	Line termination activated (only valid for oper- ation mode RS485)
Biasing active	No	Deactivates the biasing resistor
	yes	Activates the biasing resistor
Voltage supply VAUX1	off	VAUX1 is switched off
	V1 (24 VDC)	VAUX1 from V1 (24 VDC) is switched on

Parameter name	Value	Description
Swap A/B line	No	
	yes	The polarity of the A and B lines of the serial in- terface is reversed (only applies to the RS485 operating mode).
Operation mode	RS232	The interface is operated as RS232 interface.
	RS485	The interface is operated as RS485 interface.
Parity	none	No parity
	odd	Odd parity (1 bit error detection)
	even	Even (1 bit error detection)

8.1.5 Interface parameters – CAN

The parameter can only be set in CODESYS.

Parameter name	Value	Description
Baudrate (kBit/s)	10	Defines the baudrate for the connected CAN
	20	network.
	50	
	100	
	125	
	500	
	800	
	1000	



8.1.6 Parameterizing and configuring the device via the web server



NOTE

The web server always displays all setting options. All values are displayed as decimal numbers.

The devices can be set and commands can be sent to the devices via the integrated web server. 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 via a web browser or via the Turck Service Tool. The procedure for accessing the web server via the Turck Service Tool is described in the section "Setting the IP address".

The Home screen displays status information and network settings.

Edit settings on the web server

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



For security reasons, 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. 93: Web server - Login

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

Example: Deactivate output

In the following example, the DO8 output on connector C4 is deactivated via the **Activate output** parameter.

- Click on Internal I/O in the navigation bar on the left side of the screen.
- Select Parameters

Fig. 94: Web server – Parameters



- Set parameter Activate output to No.
- ▶ Write the settings to the device: Click Write.

I/O- <i>i</i>	ASSISTANT WEB		TURC
MAI	IN DOCUMENTATION	CLOUD	LOGOUT
	BEN-L5-PLC-10	Internal I/O Read Write Digital In/Out B Digital In/Out 10 Digital In/Out 11 Digital In/Out 12 Digital In/Out 13 Digital In/Out 13 Digital In/Out 13 Digital In/Out 13 Digital In/Out 13 Digital In/Out 13 Digital In/Out 13 Digital In/Out 13 Digital In/Out 14 Digital In/Out 15 VAUX control	
Fe	eedback via E-Mail	Version v0	0.1.0 / 1.00.2701.7206 / 1.00.2701.7201



Export and import of parameter settings

The settings of the station and I/O channel parameters can be exported via the web server and saved for reuse. The parameterization of a device can, for example, be imported into a new device of identical type for the purpose of duplication or in the event of module replacement.

Export

- Enter a file name under MAIN \rightarrow Ex-/Import.
- Click EXPORT, select a storage location for the parameter file and save it.

Import

- Select the parameter file (*.json) under MAIN \rightarrow Ex-/Import \rightarrow SELECT FILE.
- Define which parameters (station parameters and/or I/O parameters) have to be imported.
- Click **IMPORT** and import the parameter file.

8.2 Configuring the real-time clock (RTC)

The real-time clock can be set using by the Turck Service Tool, the device's web server or via CODESYS.

Properties of the RTC:	
Buffering	Via Gold CAP
Charging time for 95 % charging	min. 10 minutes
Buffer time at ambient temperature	
23 °C	4 weeks
Up to 60 °C	168 hours
Up to 70 °C	36 hours

8.2.1 Setting the RTC with Turck Service Tool

The turck Service Tool sets the RTC depending on the system time of the PC. based on the Coordinated Universal Time UTC.

			_		×
			JR	CIK	r -
Expert view	OFF Close				
Mode	Device	Version	Adapter	Protocol	
PGM_DHCP PGM_DHCP	TBEN-L5-PLC-10 FEN20-4IOL	1.4.6.0 1.0.11.0	192.168.1.130 192.168.1.130	Turck DCP, Turck	
device to the cu	rrent time				
	Expert view Mode PGM_DHCP PGM_DHCP device to the cur	Expert view OFF Close Mode Device PGM_DHCP TBEN-L5-PLC-10 PGM_DHCP FEN20-4IOL device to the current time	Expert view OFF Close Mode Device Version PGM_DHCP TBEN-L5-PLC-10 1.4.6.0 PGM_DHCP FEN20-4IOL 1.0.11.0 device to the current time	Expert view OFF Close Mode Device Version Adapter PGM_DHCP TBEN-L5-PLC-10 1.4.6.0 192.168.1.130 device to the current time	

Fig. 96: Setting the RTC with Turck Service Tool



8.2.2 Setting the RTC via the web server

The real-time clock can be set either in the web server or by activating an NTP server via SNTP.

MAIN DOCUMENTATION	CLOUD			LOGOUT
TBEN-L5-PLC-10	TBEN-L5-PL	.C-10 - Gatewa	y - Parameter	
j Info				
{္ဌိ} Parameter	Write Channel	view		
🕑 Diagnosis	Device	Settings	2040 00 44742-44-40	_
ي↓ Status	Donio	(UTC)	2019-09-11112:41:46	
Event log	USB	Set time from	SET TIME FROM HOST	?
Ex- / Import		Timezone	UTC	v 🤉
🔍 Change Password	Date and time	Timer server		_ •
Firmware		SNTP enable	no	× ?
LOCAL I/O	Network	NTP server	pool.ntp.org	?
{္က်} Parameter		auuress		
🖓 Diagnosis	Firewall			
 ∋∜c Input				

Setting the RTC via the web server

Fig. 97: Setting the RTC via the web server

Setting the RTC via SNTP

Prerequisites:

The device has to be placed in a network with access to the SNTP server.



NOTE

If the real-time clock is set via SNTP and the device has a connection to the SNTP server, changes of the real-time clock via the Turck Service Tool or the CODESYS library have no effect.

- Activate the SNTP server via SNTP enable = yes and enter the server address under NTP server.
- Restart the device.
- ⇒ The device receives Time and date from the defined SNTP server.

MAIN DOCUMENTATION	CLOUD				LOGOU
TBEN-L5-PLC-10	TBEN-L5-PL	C-10 - Gatewa	ay - Parameter		
j Info	▶ 🛱				
န့်္ခာ့ Parameter	Write Channel v	iew			
🕑 Diagnosis	Device	Settings	2040 00 44742 44:00		
√√ Status	201100	(UTC)	2019-09-11112:44:26		
Event log	USB	Set time from	SET TIME FROM HOS	т	?
Ex- / Import		Timezone	UTC	~	2
ି୍କ୍ତ୍ତୁ Change Password	Date and time	Timer server			•
Firmware		SNTP enable	yes	~	· ?
LOCAL I/O	Network	NTP server	pool.ntp.org		?
န့္လ်ို Parameter		audiess			
Diagnosis	Firewall				
 √√⊊ Input					

Fig. 98: Activate the SNTP server



8.2.3 Setting the RTC via CODESYS

In CODESYS the RTC is set in the device for example using the CODESYS library "CAA Real time Clock Extern".



Fig. 99: CAA Real time Clock Extern in CODESYS

9 Operating

9.1 LED displays

Every device displays the following statuses via LEDs:

- PLC status
- Application specific displays (freely CODESYS-programmable LED)
- Supply voltage
- Group and bus errors
- Ethernet communication
- Status
- Diagnostics

PWR LED	Meaning
Off	No voltage or undervoltage at V1
Green	Voltage at V1 and V2 ok
Red	No voltage or undervoltage at V2
Flashing white	Wink command active

LEDs ETH1 and ETH2	Meaning
Off	No Ethernet connection
Green	Ethernet connection established, 100 Mbps
Green flashing	Ethernet traffic, 100 Mbps
Yellow	Ethernet connection established, 10 Mbps
Yellow blinking	Ethernet traffic, 10 Mbps

LED BUS	Meaning
Off	No voltage connected
Green	Active connection to a master
green flashing (1 Hz)	Device is ready for operation
Red	IP address conflict, Restore mode active, F_Reset active or Modbus connection timeout
Red flashing	Wink command active
Red/green (1 Hz)	Autonegotiation and/or waiting for DHCP-/BootP-address assignment

LED RUN	Meaning
Off	No voltage connected
Green	PLC status: RUN
Green flashing	USB Host port function active, blinking pattern depends on the ex- ecuted function
Red	PLC status: STOP
Red flashing	No PLC program loaded
Red flashing $(2 \times 1 \text{ Hz})$	Factory reset running

LED APPL	Meaning
Off	This LED is controlled by the CODESYS program and can be freely pro-
Green	grammed by the user.
Green flashing	



LED APPL	Meaning			
White	Blink-/wink-command active			
Red flashing	No PLC program loaded			
Red flashing (2 \times 1 Hz)	Factory reset running			
LED 0 (COM 0)	Meaning			
Off	No TX data transmission			
on	TX data transmission			
	 .			
LED 1 (COM 0)	Meaning			
Off	No RX data transmission			
on	RX data transmission			
LED 2 (COM 1)	Meaning			
Off	No TX data transmission			
on	TX data transmission			
	Maaring			
	Meaning			
UΠ	NO RX data transmission			
on	RX data transmission			
	Meaning			
Off	This LED is controlled by the CODE	SVS program and can be freely pro		
Green	arammed by the user.			
Green flashing	_			
Green hashing				
LED 815 (DXP chan- nels)	Meaning (input)	Meaning (output)		
Off	Input not active	Output not active		
Green	Input active	Output active (max. 2 A)		

Actuator overload

Red

red flashing (1 Hz)

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Overload at the sensor supply

9.2 Software diagnostic messages

The diagnostic messages of the I/O channels and the module status are displayed in plain text both in CODESYS and in the web server.

9.2.1 Diagnostics

Diagnostics	Description
Overcurrent VAUX2 pin 1 Cx (Chy - z)	Overcurrent VAUX2 at pin 1 of the channel
Overcurrent output Chx	Overcurrent at the respective output

TBEN_LPLC.project - CODESYS				_		
<u>File E</u> dit <u>V</u> iew <u>P</u> roject <u>B</u> uild <u>O</u> nline	<u>D</u> ebug <u>T</u> ools <u>W</u> indow	<u>H</u> elp			₹	
11 🖆 🖬 😂 🗠 🗠 🕹 🖻 🖻 🗙 🔥 🕼 🖉						
Devices 🗸 🕈 🗙	PLC_PRG Device	🕫 🛙 Dia	gnosen X		•	
TBEN_LPLC	Find		Filter Show all		- B Add E	
Device (TBEN-Lx-PLC-1x)		1	The Show an		- Add H	
PLC Logic	Variable	Mapping	Channel	Address	Type	
🖹 🧔 Application	🖃 · 🦻		Diagnostics	%IB1	Diagnostics_	
📲 👔 Library Manager	···· *		Overcurrent VAUX2 Pin1 C4 (Ch8-9)	%IX1.4	BIT	
PLC_PRG (PRG)	*		Overcurrent VAUX2 Pin1 C5 (Ch10-11)	%IX1.5	BIT	
	*		Overcurrent VAUX2 Pin1 C6 (Ch12-13)	%IX1.6	BIT	
🖃 🎆 Task Configuration	*		Overcurrent VAUX2 Pin1 C7 (Ch14-15)	%IX1.7	BIT	
🖻 🕸 MainTask	*		Overcurrent output Ch8	%IX4.0	BIT	
PLC_PRG	***		Overcurrent output Ch9	%IX4.1	BIT	
EDs (LEDs)	*		Overcurrent output Ch10	%IX4.2	BIT	
🖃 📲 Local_IO (Local IO)	*		Overcurrent output Ch11	%IX4.3	BIT	
🖬 🗊 DXP (DXP)	*		Overcurrent output Ch12	%IX4.4	BIT	
🖬 🗊 Diagnosen (Diagnostics)	***		Overcurrent output Ch13	%IX4.5	BIT	
VAUX_Control (VAUX control)	*		Overcurrent output Ch14	%IX4.6	BIT	
Modulstatus (Module status)	*		Overcurrent output Ch15	%IX4.7	BIT	
🚡 COM0						
🚡 COM1	<					
- 🚡 CANbus		De				
Ethernet (Ethernet)		Ке	Always update variable	s: Use parer	t device setting	
	🍫 😑 Create new variable	~∳ = I	Map to existing variable			
Applies Polls	<				>	
Car Devices II FOUS					0	
	Last build: 😳	0 🛡 0 🛛 Pr	recompile: 🗸 👘 Project u	user: (nobody)	▼	

Fig. 100: CODESYS – I/O channel diagnostics





MAIN DOCUMENTATION CLOUD LOGOUT TBEN-L5-PLC-10 TBEN-L5-PLC-10 - Local I/O - Diagnosis ►Ę Write Channel view 🕑 Diagnosis Global Groupe diagnosis Overcurrent VAUX2 Pin1 C4 ? -(Ch8/9) Overcurrent VAUX2 Pin1 C5 ? (Ch10/11) Overcurrent VAUX2 Pin1 C6 ? Change Password (Ch12/13) Eirmware Overcurrent VAUX2 Pin1 C7 active ? (Ch14/15) LOCAL I/O Digital In/Out 8 Overcurrent output ? Digital In/Out 9 Overcurrent output ? പ√ഗ്Input Digital In/Out 10 ? Overcurrent output Digital In/Out 11 Overcurrent output ? Digital In/Out 12 Overcurrent output ? Digital In/Out 13 Overcurrent output ? Digital In/Out 14 Overcurrent output ? Digital In/Out 15 Overcurrent output -? For comments or questions please find your local contact on www.turck.com •••

Fig. 101: Webserver – I/O channel diagnostics

9.2.2 Module status

Status message	Description
Module diagnostics pending	Group diagnostics of the device. At least 1 channel sends diagnostics.
Undervoltage V2	V2 is below the nominal range (< 18 V).
Undervoltage V1	V1 is below the nominal range (< 18 V)
Internal error	Error in the device, the internal communica- tion is disturbed.
I/O-ASSISTANT Force Mode active	The force mode of the DTM is activated, i.e. the output states may no longer correspond to the specifications sent by the fieldbus or resulting from the PLC program.



Fig. 102: CODESYS - module status





9.3 Using the USB host port

CODESYS applications can be backed up, restored and transferred via the USB functions. In addition, the device firmware can be updated via the USB interface.



The USB host function can be deactivated via the web server or the CODESYS program.

FAT or FAT32 formatted USB sticks can be connected to the USB host port. It is not possible to connect NTFS-formatted sticks or USB devices such as external hard disks, keyboards, PC mice etc.

Depending on the power consumption of the USB stick, compatibility problems may occur. To ensure error-free data exchange, Turck recommends using the industrial USB stick USB 2.0 Industrial Memory Stick (Ident-No. 6827348).

9.3.1 USB host port – function overview

Both read and write access to the device is possible via the USB host port.



NOTICE

Use of recipes in CODESYS

Corrupted files when manipulating files in USB_Data directory

▶ When using recipes, only make 1:1 copies with Backup_2/Restore_2.

Read access – functions

The following table describes the executable functions:

Function	Folder name	Description	Status CODESYS program	Automatic device restart
Backup 1	BACKUP_1	 Save the CODESYS application from the device on the USB stick. The following files are stored on the USB stick: All *.app and *.crc files PlcLogic folder Existing files with the same name are overwritten. All other files remain unchanged. The names of the CODESYS application and the file names of the boot application (*.app and *.crc) must be the same. If the names are different or have been changed, the application cannot be started. 	RUN	No


Function	Folder name	Description	Status CODESYS program	Automatic device restart
Backup 2	BACKUP_2	 Save the CODESYS application and device data from the device on the USB stick. The following files are stored on the USB stick: All *.app and *.crc files PlcLogic folder Folder USB_Data IP address PROFINET Device Name Retain data (retain.bin) Existing files with the same name are overwritten. All other files remain unchanged. The names of the CODESYS application and the file names of the boot application (*.app and *.crc) must be the same. If the names are different or have been changed, the application cannot be started. 	RUN	No
Read user data	USB_DATA	 Save the "USB_Data" folder from the device on the USB stick. The following files are stored on the USB stick: CODESYS recipes and/or log files Existing files with the same name are overwritten. All other files remain unchanged. The names of the CODESYS application and the file names of the boot application (*.app and *.crc) must be the same. If the names are different or have been changed, the application cannot be started. 	RUN	No

Write access – functions

The following table describes the executable functions:

Function	Folder name	Description	Status CODESYS program	Automatic device re- start
Restore 1	RESTORE_1	 Load the CODESYS application from the USB stick into the device. The function can only be used if the data on the USB stick comes from a device with identical firmware version. The following files are loaded from the storage device to the device: All *.app and *.crc files PlcLogic folder The folder may only contain one application file (*.app). All previous applications on the device will be deleted without further warning. The names of the CODESYS application and the file names of the boot application (*.app and *.crc) must be the same. If the names are different or have been changed, the application cannot be started. The device automatically restarts when the USB stick is removed from the USB port. 	STOPP	yes

Function	Folder name	Description	Status CODESYS program	Automatic device re- start
Restore 2	RESTORE_2	 Load the CODESYS application and the device data from the USB stick into the device. The function can only be used if the data on the USB stick comes from a device with identical firmware version. The following files are loaded on the USB stick: All *.app and *.crc files PlcLogic folder Folder USB_Data IP address PROFINET Device Name Retain data (retain.bin) The folder may only contain one application file (*.app). All previous applications on the device will be deleted without further warning. The names of the CODESYS application and the file names of the boot application (*.app and *.crc) must be the same. If the names are different or have been changed, the application cannot be started. The device automatically restarts when the USB stick is removed from the USB port. 	STOPP	Yes
Firmware Update	FW_UPDATE	Update of the device firmware. The IP address, the PROFINET device name and the CODESYS application are not overwrit- ten. File name: TBEN-LxVbin The device automatically restarts when the USB stick is re- moved from the USB port.	STOPP	yes
Write user data	USB_DATA_ WRITE	Load the USB_Data folder from the storage medium into the device. Existing files with the same name are overwritten. All other files remain unchanged.	STOPP	Yes



9.3.2 Executing USB functions



NOTICE

Restart or reset of the device with plugged storage device **Destruction of the running application possible!**

• Remove the storage device from in normal operation.

When using the USB functions, observe the following:

- Define the function to be performed using the folder name on the USB stick.
- Create only one file folder on the USB stick. If the storage device contains more than one folder enthält, not function is executed.
- Only remove the storage device from the device when the RUN LED is orange (read or write completed) or alternately flashing red/green (error).

Performing Backup_1 and Backup_2

- ▶ Insert the USB stick with the folder BACKUP_1 or BACKUP_2 into the device.
- ⇒ The RUN-LED flashes green with 4 Hz.
- ⇒ The backup is executed.
- ⇒ When the RUN LED blinks orange at 1 Hz, the backup is complete.
- Remove the USB stick.

Saving user data (USB_DATA function)

- ▶ Insert the USB stick with the folder USB_DATA into the device.
- Insert the USB stick into the device.
- ⇒ The RUN-LED flashes green with 2 Hz.
- ⇒ The Data are stored on the USB stick:
- ⇒ When the RUN LED blinks orange at 1 Hz, the data has been successfully saved.
- Remove the USB stick.

Load data into the device (function RESTORE_1 or RESTORE_2)

The **RESTORE** function can only be used if the data on the USB stick comes from a device with the same firmware version.

- ▶ Insert the USB stick with the folder RESTORE_1 or RESTORE_2 into the device.
- ⇒ The RUN-LED flashes green with 0.5 Hz.
- Press the SET-button within the next 30 seconds for at least 3 seconds.
- ⇒ The RUN LED flashes in the sequence 2 × green pause (1 Hz) 2 × green pause (1 Hz)
- ➡ The data is loaded into the device.
- ⇒ When the RUN LED blinks orange at 1 Hz, the data loading is complete.
- Remove the USB stick.
- ➡ The device restarts.

Perform firmware update (function FW_UPDATE)

- Create the folder FW_UPDATE on a USB stick.
- Store the firmware as bin file in the folder FW_UPDATE.
- ▶ Insert the USB stick into the device.
- ⇒ The RUN-LED flashes green with 0.5 Hz.
- Press the SET-button within the next 30 seconds for at least 3 seconds.
- ➡ The RUN LED flashes in the sequence 3 × green pause (1 Hz) 3 × green pause (1 Hz) -
- \Rightarrow The data is loaded into the device.
- ⇒ When the RUN LED blinks orange at 1 Hz, the firmware update is complete.
- Remove the USB stick.
- Execute a power cycle.
- ⇒ The device restarts.

Write user data to the device (function USB_DATA_WRITE)

- ► Insert the USB stick with the USB_DATA_WRITE folder into the device.
- ⇒ The RUN-LED flashes green with 0.5 Hz.
- Press the SET-button within the next 30 seconds for at least 3 seconds.
- ⇒ The RUN-LED flashes green with 2 Hz.
- ⇒ The data are stored to the device.
- ⇒ When the RUN LED blinks orange at 1 Hz, the data has been successfully saved.
- Remove the USB stick.
- ⇒ The device restarts.



9.3.3 USB functions – behavior of the RUN-LED in case of an error

In case of errors when performing the USB functions, the RUN LED reacts as follows:

LED display	Error	Meaning
Red/green flashing (1 Hz)	Time out	SET-button not pressed within the 30 seconds after the plug- ging of the the USB stick device.
	Invalid folder	The USB stick contains a folder with an invalid name.The storage medium contains multiple folders.
	Empty folder	The USB stick contains an empty folder with a valid name.
Red/green flashing (1 Hz)	USB deactivated	The USB Host function has been deactivated using via web server or CODESYS program.

9.4 Operating the device with the web server

9.4.1 Changing the web server password

Changing the default password

The password for the web server is set under MAIN \rightarrow Change Password. The password should be used in conjunction with the network security concept of the overall system in which the devices are installed.

- Enter the current password under **Current password**.
- Enter new password under New password and repeat new password under Repeat new password.
- Accept new password via CHANGE PASSWORD.



The password must consist of 6 to 15 characters and contain upper and lower case letters as well as at least one numeric character.

9.4.2 Manage data node points from CODESYS symbol table

Options for CODESYS Symbols in the Web Server (Node Options)

CODESYS symbols

In CODESYS it is possible to restrict user rights for projects and to link them to individual users.

Enter access data for the CODESYS project, from which symbols are to be displayed in the web server, under CODESYS Symbols. If no access rights have been assigned in the CODESYS project, no data must be entered here.

Settings - Automatic Node delete	
Activated	Deactivating CODESYS symbols in the symbol configuration automatically deletes the corres- ponding data nodes in the Turck Cloud Portal and on the web server interface. Historical data can no longer be displayed.
deactivated	Data nodes in the Turck Cloud Portal and on the web server interface are not automatically deleted. Historical data is still displayed. You can only delete data manually in the web server (see Clean Data Nodes (Nodes)).

MAIN DOCUMENTATION	CLOUD		LOGOUT
PORTAL	Node Options		
i) Status	CODESYS Symbols		
୍କ୍ Credentials	Username		
ද්රුදු Node Options	Password		
H Nodes		WRITE	
	Settings		
	Automatic node delete		?
		WRITE	

Fig. 104: Webserver - Cloud - Node Options



Clean Data Nodes (Nodes)

This dialog shows the data nodes of the device imported from the CODESYS symbol configuration [> 86].

The data node points can be deleted manually here if Node Options \rightarrow Settings – Automatic Node delete is deactivated.

MAIN DOCUMENTATION	CLOUD	LOGOU'
PORTAL	Nodes	
(i) Status		
Credentials	Read Delete	
နိုင်္ခန် Node Options	? device-info/portal/rttavg	•
	? device-info/portal/rttmax	
Handes	? device-info/portal/rttmin	
	? device-info/system/firmwarerevision	
	? device-info/system/identnumber	
	device-info/system/mac-addresses/address1 device_info/system/mac_addresses/address1	
	device info/system/mac-addresses/address2	
	 variables/Application/PLC_PRG 	
	? 🗌 counter	
	A variable 2	

Fig. 105: Webserver – Cloud – Clean data nodes (Nodes)

- Select data nodes to be deleted.
- Delete marked data nodes via the **Delete** button
- ⇒ The data nodes including the historical data are also deleted in the Turck Cloud Portal.

10 Troubleshooting

If the device does not function as expected, first check whether ambient interference is present. If there is no ambient interference present, check the connections of the device for faults. If there are no faults, there is a device malfunction. In this case, decommission the device and replace it with a new device of the same type.



11 Maintenance

Ensure that the plug connections and cables are always in good condition. The devices are maintenance-free, clean dry if required.

- 11.1 Executing the firmware update
- 11.1.1 Executing the firmware update via USB storage medium

Proceed as follows to update the firmware via a USB storage medium:

- Create the folder FW_UPDATE on a USB stick.
- Store the firmware as bin file in the folder FW_UPDATE.
- ▶ Insert the USB stick into the device.
- ⇒ The RUN-LED flashes green with 0.5 Hz.
- Press the SET-button within the next 30 seconds for at least 3 seconds.
- ➡ The RUN LED flashes in the sequence 3 × green pause (1 Hz) 3 × green pause (1 Hz)
- ⇒ The data is loaded into the device.
- ⇒ When the RUN LED blinks orange at 1 Hz, the firmware update is complete.
- Remove the USB stick.
- Execute a power cycle.
- ➡ The device restarts.

11.1.2 Carry out firmware update via FDT/DTM

The firmware of the device can be updated via FDT/DTM. The PACTware[™] FDT frame application, the DTM for the device and the current firmware are available as downloads free of charge from www.turck.com.



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.

Example: update the firmware with the PACTware[™] FDT frame application

Launch PACTware[™].





Fig. 106: Adding a Device in PACTware[™]

PACTware		
File Edit View Project Device Extras Window Help		
- 1 📽 🖌 🍯 🕼 - 🗐 🎯 🖬 🗆 💷 😫 🤹 🌾 🐨 🛄		
Project 🛛 🐺 🛪		
Device tag 🚺		De
B HOST PC		lice
Device for	×	catalo
		pc
Enter text to search	Find Clear	
Device A Protocol Ven	ndor Group Device Version FDT version DTM version	
BL Service Ethernet BL Servic Tur	rck DTM spe 1.0.0 / 2007 1.2.0.0 1.00.260	
■ BL Service RS232 BL Service Tur	rck DTM spe 1.0.0 / 2007 1.2.0.0 1.00.260	
BL Service Ethernet Com DTM		
	OK Cancel	
< >		
Administrator		

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

Fig. 107: Selecting the Ethernet interface



- Double-click the connected device.
- ⇒ PACTware[™] opens the bus address management.

PACTware			-		×
<u>F</u> ile <u>E</u> dit <u>V</u> iew <u>P</u> roject	<u>D</u> evice E <u>x</u> tras <u>W</u> indow <u>H</u> elp				
i 🗅 💕 🖌 🎒 🎰 i 🔛	□ \$2 \$2 \$\$ \$\$ \$\$ ■				
Project 4 ×	TCP:192.168.1.130 Busaddress management			4 ⊳	× 🕅
Device tag 0 B HOST PC	2 Your Global Automation Partner		run	ск	Device
TCP:192.168.1.130	Device type BL Service Ethernet Description BL Service over ethernet communication DTM				catalog
	□ - 遼 偉 ※ 吗 时 ● 埠 蒹 幸 澤	Busaddre	ess man	agement	
	Online available devices Add devices manually				
	Industrial Ethernet_192.168.1.130 (192.168.1.130/255.255.255.0)			~	
	Device type Online ID IP address Netmask Gateway Ethernet address	Version	Mode		
	Planned devices				-
	Device type Online ID Busaddress Designation ('Tag') Device short na	ame	_	_	
<					
Image: Second	Administrator				.:

Fig. 108: Opening the busaddress management

- Search for connected Ethernet devices: Click the **Search** icon.
- Select the required device.

PACTwar	re											_		×
File Edit	View F	Project	Device	Extras 👌	Vindow	Help								
Project		4 ×	🔫 тс	P:192.168.1	.130 Bu	ısaddress r	managemer	ıt					4 0	× 🤖
Device tag B HOST PC		0	2	Your Glob	al Auto	mation Pa	artner					rur	ск	Device
TCP:19 2	2.168.1.130			Device type Description	3L Serv 3L Serv	vice Ethern vice over e	net ethernet cor	nmunication	отм					catalog
			□ ▼ Online	😤 🖙	تھ بەرم ا	i 💽 🔆 🛛	191, 191 +() 101	14 🌢 😫	. 🕮		Busaddr	ess mar	nagemen	t
			Industri	ial Ethernet_192	.168.1.13	D (192.168.1.1;	ו ייייי 30/255.255.255.	0)					~	
			De	evice type	01	nline ID IP	address	Netmask	Gateway	Ethernet addre	ss Version	Mode		j I
			TE	BEN-S2-4IOL	15	00029/C5E 19	2.168.1.100	255.255.255.0	0.0.0.0	00:07:46:0D:64	A:40 V3.3.1.0	PGM_DF	ICP	
			Planne	ed devices		Online ID	Busaddress	Desi	gnation ('Tag')	Device sh	ort name			-
						- Official D	Duodalos	Desi		Donio an				
		>												
× *	<nona< td=""><td>AIVIE></td><td>A</td><td>aministrator</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></nona<>	AIVIE>	A	aministrator										

Fig. 109: Selecting the device

				•				
PACTware						-	- 🗆	×
File Edit View Project	Device Extras Wind	dow Help						
i 🗅 💕 🖌 🎯 🖓 - i 🛄 🍋 i f	🗖 와 🕸 😫 🕸 🕻							
Project # ×	TCP:192.168.1.13	0 Busaddress manager	nent				4	> × 🍋
Device tag	Your Global	Automation Partner				TU	RCH	Device
TCP:192.168.1.130	Device type BL S Description BL S	Service Ethernet Service over ethernet	communication C	тм				e catalo
	🗖 🔻 😰 🕸	🚳 😲 🔆 IP‡ IP†	0 🖄 🖉		E	Busaddress i	nanagemei	nt
	Online available devices	Add devices manually						
	Industrial Ethernet_192.168	1.130 (192.168.1.130/255.255	255.0)				`	-
	Device type	Online ID IP address	Netmask	Gateway	Ethernet address	Version Mod	e	
	TBEN-S2-4IOL	1500029/C5E 192.168.1.100	255.255.255.0	0.0.0.0	00:07:46:0D:6A:40	V3.3.1.0 PGN	LDHCP	
	TBEN-L5-PLC-10	1504037/CD <u>192.168.1.10</u>	255.255.255.0	192.168.1.105	00:07:46:FF:A2:8C	V1.4.0.67 PGN	1_DHCP	
	Planned devices							
	Device type	Online ID Busadd	ess Desig	nation ('Tag')	Device short nam	ne		-1
< >								
<pre> NONAME> </pre>	Administrator							

Click Firmware Download to start the firmware update.

Fig. 110: Starting the firmware update

- Select the storage location and confirm with **OK**. ►
- ⇔ PACTware[™] shows the progress of the firmware update with a green bar at the bottom of the screen.

PACTware		– 🗆 X
File Edit View Project	Device Extras Window Help 回 塾 塾 ¹ 塾 ³ 谷 谷 回	
Project 4 ×	TCP:192.168.1.130 Busaddress management	d 🖻 🗙 🗖
Device tag 0 B HOST PC	3 Your Global Automation Partner	TURCK
TCP:192.168.1.130	Device type BL Service Ethernet Description BL Service over ethernet communication DTM	catalog
	🗖 🔻 😤 🕸 🧶 🛞 🔅 194 194 🖸 🖳 🎽 🚆 🚟	Busaddress management
	Online available devices Add devices manually	
	Industrial Ethernet_192.168.1.130 (192.168.1.130/255.255.255.0)	~
	Device type Online ID IP address Netmask Gateway Ethernet a	address Version Mode
	TBEN-52-410L 15000257C5t 152-1681.100 250.255.255.0 0.0.0.0 00007463 TBEN-15-PLC-10 1504037/CD 192.168.1.105 255.255.255.0 192.168.1.105 00:07.46.8	FF:A2:8C V1.4.0.67 PGM_DHCP
	Planned devices	
	Device type Online ID Busaddress Designation ('Tag') Device	ce short name
< >		
NONAME>	Administrator	

Fig. 111: Firmware update in progress



11.1.3 Executing the firmware update via the web server

- Open the web server and log in.
- ▶ Under MAIN → Firmware click the SELECT FIRMWARE FILE button.
- Select the storage location of the file and select file.
- Start the firmware update via the **UPDATE FIRMWARE** button.
- Restart the device after the firmware update has been completed.

MAIN DOCUMENTATION	CLOUD	LOGOU.
TBEN-L5-PLC-10	TBEN-L5-PLC-10 - Gateway - Firmware	
∫i) Infoईें} Parameter	SELECT FIRMWARE FILE	
🖓 Diagnosis	File TBEN-Lx-PLC-1x 01504037 V1.4.1.0_b72.bin selected	
ي∳ح Status		
ダ Event log		
Change Password		
Firmware		
LOCAL I/O		
ႏို္င္င် Parameter		
🕑 Diagnosis		
⊋ ^ل ح Input		
പ്പ് Output		

Fig. 112: Web server - executing the firmware update

12 Repair

The device must not be repaired by the user. The device must be decommissioned if it is faulty. Observe our return acceptance conditions when returning the device to Turck.

12.1 Returning devices

Returns to Turck can only be accepted if the device has been equipped with a Decontamination declaration enclosed. The decontamination declaration can be downloaded from https://www.turck.de/en/retoure-service-6079.php and must be completely filled in, and affixed securely and weather-proof to the outside of the packaging.

13 Technical data

Technical data	
Power supply	
Supply voltage	24 VDC
Permissible range	1830 VDC
Total current	Max. 9 A per voltage group V1 + V2 max. 11 A
Operating current	< 280 mA
Sensor/actuator supply V _{AUX1}	Supply of connectors C0 to C3 from V1, C0 + C1: 2 A per connector, C2 + C3: 4 A for both connectors
Sensor/actuator supply V_{AUX2}	Supply of connectors C4 to C7 from V2, 2 A per connector
Potential isolation	Galvanic isolation of V1 and V2 voltage groups
Voltage proof	Up to 500 VDC V1 and V2 to Ethernet
Power loss	Typical ≤ 5 W
System description	
Processor	ARM Cortex A8, 32 bit, 800 MHz
Program and data memory	20 MB
Remanent memory	64 kB
Add-on memory	$1 \times \text{USB}$ Host port
Real Time Clock	Yes
Operating system	Linux
PLC data	
Programming	CODESYS V3
Released for CODESYS version	
FW ≥ V1.3.0.0	V 3.5.12.10
FW ≥ V 1.4.6.0	V 3.5.14.20
Programming languages	IEC 61131-3 (IL, LD, FBD, SFC, ST)
OPC	yes
OPC UA	Yes
Application tasks	10
Number of POUs	1024
Programming interface	Ethernet, USB
Cycle time	< 1ms for 1000 IL- commands (without I/O cycle)
Input data	8 kB
Output data	8 kB
System data	
Transmission rate	Ethernet 10 Mbps/100 Mbps
Connection technology	2 x M12, 4-pin, D coded
Web server	default: 192.168.1.254
Service interface	Ethernet via P1, P2 or Mini USB port
Modbus TCP Slave	
Address assignment	Static IP, BOOTP, DHCP



Technical data	
Supported function codes	FC1, FC2, FC3, FC4, FC5, FC6, FC15, FC16, FC23
Input registers	Max. 1024 registers
Input register start address	0x0000
Holding Registers	Max. 1024 registers
Output register start address	0x0000
Modbus RTU Slave	
Input registers	Max. 500 registers
Input register start address	0x0000
Holding Registers	Max. 500 registers
Output register start address	0x0000
EtherNet/IP [™] Device	
Address assignment	according to EtherNet/IP [™] standard
Number of process data	Max. 248 words input data, max 246 word output data
PROFINET Device	
Address assignment	DCP
Conformance Class	B (RT)
MinCycle Time	1 ms
Diagnostics	according to PROFINET Alarm Handling
Automatic address setting	Supported
Topology detection	Supported
Number of process data	 Up to firmware version V1.2.1.0: max. 512 byte input data/max. 512 byte output data From firmware version V1.3.0.0: max. 1024 byte input data/max. 1024 byte output data
CAN Device	
Baud rate	Up to 1 Mbps
Power supply	Internal from V1 (no external power supply allowed)
Number of PDOs	Max. 512 RxPDOs max. 512 TxPDOs
Modbus TCP Master	
Max. number of devices	64
Min. cycle time	2 ms
Max. number of devices at 2 ms	8
EtherNet/IP [™] Scanner	
Input data	max. 8 kB
Output data	max. 8 kB
Max. number of devices at 10 ms	8
PROFINET Controller	
Max. number of devices	64
Min. cycle time	1 ms
Max. number of devices at 1 ms	8
Modbus RTU Master	
Max. number of devices	32
Min. cycle time	5 ms

Technical data	
Max. number of devices at 5 ms	8
CANopen Manager	
Input data	max. 8 kB
Output data	max. 8 kB
Max. number of devices	127
SAE J1939 Manager	
Input data	max. 8 kB
Output data	max. 8 kB
Max. number of devices	254
Digital inputs	
Number of channels	8
Connection technology	M12, 5-pole
Input type	PNP
Type of input diagnostics	Short-circuit diagnostic of sensor supply per connector
Switching threshold	EN 61131-2 type 3, PNP
Signal voltage, low level	< 5 V
Signal voltage, high level	> 11 V
Low level signal current	<1,5 mA
High level signal current	> 2 mA
Sensor supply	2 A, short-circuit proof, from V2, optionally switchable via process data
Potential isolation	Galvanic isolation to P1/P2
Voltage proof	Up to 500 VDC (V1 and V2 to Ethernet)
Digital outputs	
Number of channels	8
Connection technology outputs	M12, 5-pole, a-coded
Output type	PNP
Type of output diagnostics	Short-circuit diagnostic per channel
Output voltage	24 VDC from V2
Output current per channel	2 A, short-circuit proof, max. 4.0 A per connector
Simultaneity factor	0.56
Load type	Ohmic, inductive lamp load
Short-circuit protection	Yes
Actuator supply	2 A, short-circuit proof, from V2, optionally switchable via process data
Potential isolation	Galvanic isolation to P1/P2
Voltage proof	Up to 500 VDC (V1 and V2 to Ethernet)
Standard/Directive conformity	
Vibration test	According to EN 61131
Shock test	According to EN 60068-2-27
Drop and topple	According to IEC 60068-2-31/IEC 60068-2-32
Electro-magnetic compatibility	According to EN 61131-2
Approvals and certificates	CE, FCC



Technical data	
UL cond.	cULus LISTED 21 W2, Encl.Type 1 IND.CONT.EQ.
General information	
Dimensions ($B \times L \times H$)	$60.4 \times 230.4 \times 39 \text{ mm}$
Operating temperature	-40+70 °C
Storage temperature	-40+85 °C
Operating height	max. 5000 m
Protection class	IP65/IP67/IP69K
MTTF	80 years acc. to SN 29500 (Ed. 99) 20 °C
Housing material	PA6-GF30
Housing color	Black
Material window	Lexan
Material label	Polycarbonate
Halogen-free	Yes
Mounting	2 mounting holes, Ø 6,3 mm





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