

TBEN-L4 and TBEN-L5 Digital I/O Modules

Instructions for Use



Table of Contents

1	About the	ese instructions	5
	1.1	Target groups	5
	1.2	Explanation of symbols	5
	1.3	Additional documents	5
	1.4	Feedback about these instructions	5
2	Notes on	the product	6
	2.1	Product identification	6
	2.2	Scope of delivery	6
	2.3	Turck service	6
3	For your s	afety	7
	3.1	Intended use	7
	3.1.1	Foreseeable Misuse	7
	3.2	General safety instructions	7
	3.3	Notes on UL approval	7
	3.4	Notes on Ex protection	8
	3.5	Requirements for Ex approval	8
4	Product d	escription	9
	4.1	Device overview	9
	4.1.1	Operating elements	10
	4.1.2	Indication elements	10
	4.1.3	Block diagram	10
	4.2	Properties and features	11
	4.3	Functions and operating modes	11
	4.3.1	Multiprotocol technology	11
	4.3.2	Digital modules – extended digital functions	12
	4.3.3	Turck Field Logic Controller function (FLC ARGEF)	12
	<u>4</u> <u>4</u>	Possible Ethernet network structures	12
	4.4.1	Ethernet daisy chain - max. number of connected modules	15
5	Installing	, 	16
	5.1	Installing a device in zone 2 and zone 22	16
	5.2	Mounting onto a mounting plate	17
	5.3	Outdoor device installation	17
	5.4	Grounding the device	17
	5.4.1	Equivalent wiring diagram and shielding concept	17
	5.4.2	Shielding of the fieldbus and I/O level	18
	5.4.3	Disconnecting the direct grounding of the fieldbus level:	10
	544	Groupding the fieldbus level directly: inserting the groupding clip	10
	5.4.5	Grounding the device – mounting on a mounting plate	19
6	Connectir	ng	20
	6.1	Connecting a device in zone 2 and zone 22	20
	6.2	Connecting the device in safety applications	20
	6.3	Connecting the device to Ethernet	21
	6.3.1	Applications with QuickConnect (QC) and Fast Start Up (FSU)	21



	6.4 6.4.1	Connecting the power supply Supply concept	22 23
	6.5	Connecting digital sensors and actuators	24
	6.5.1	TBEN-L16DIP and TBEN-L4-16DIN	24
	6.5.2	TBEN-L16DOP and TBEN-L4-16DON	24
	6.5.3	TBEN-L16DXP and TBEN-L4-16DXN	25
	6.5.4	TBEN-L8DIP-8DOP	25
7	Commissi	ioning	27
	7.1	Using the device in safety applications	27
	7.1.1	Safety function	27
	7.1.2	Safety planning	28
	7.1.3	Safe commissioning	28
	7.1.4	Cited Standards	29
	7.2	Adjusting network settings and operation mode	29
	7.2.1	Adjusting network settings and operation mode via rotary coding switches	29
	7.2.2	Adjusting network settings via TAS (Turck Automation Suite)	32
	7.2.3	Adjusting network settings via the web server	34
	7.3	Commissioning the device in PROFINET	35
	7.3.1	Address setting in PROFINET	35
	7.3.2	FSU – Fast Start-Up (prioritized startup)	36
	7.3.3	MRP (Media Redundancy Protocol)	37
	7.3.4	User data for acyclic services	38
	7.4	Connecting the devices to a PROFINET controller with TIA Portal	40
	7.4.1	Installing the GSDML-file	40
	7.4.2	Connecting the device to the PLC	41
	7.4.3	Assigning the PROFINET device name	42
	7.4.4	Setting the IP address in TIA Portal	43
	7.4.5	Setting module parameters	44
	7.4.6	Connecting the device online with the controller	45
	75	Commissioning the devices in Modbus TCP	46
	751	Implemented Modbus functions	46
	752	Modbus registers	46
	753	Data width of the I/O-modules	49
	754	Begister mapping of the devices	50
	7.5.5	Fror behavior (watchdog)	56
	76	Connecting devices to a Modeus Client with CODESVS	57
	7.0	Connecting devices to a Modbus Chefit with CODESTS	57
	7.0.1	Configuring the Network Interface	57 61
	7.0.2	Modbus TCP Server (Slave): setting the IP address	63
	7.0.5	Defining module channels	64
	7.0.4	Going online with the PI C	66
	7.6.5	Beading process data	68
	7.0.0	Commission in the device in EtherNet/ID	60
	/./ 771	Commissioning the device in EtherNet/IP	69
	7.7.1	Common Ethernet/IP reduces	60
	/./.Z 772	LUS THES ATHA CALARDY THES	60
	7.7.7 7.7.7	QuickConffect (QC)	09 71
	7.7.4	Diagnostic mossagos via process data	71 72
	7.7.5 7.7.6	Diagnostic messages via process Udla EthorNot/ID standard classos	/ Z 72
	7.7.0 7.7.7	LUIEINEU/IF Staliualu Classes	72 00
	7.7.7		00
	7.8	Connecting the devices to an EtherNet/IP scanner with Studio 5000	94
	/.8.1	Adding the devices from the Catalog files to the new project	95
	7.8.2	Configuring the device in Logix Designer	97



	7.8.3	Parameterizing the device	98
	7.8.5	Beading process data	
	7.9	Commissioning the devices in CC-Link IF Field Basic	102
	7.9.1	General features CC-Link IE Field Basic	102
	7.9.2	CSP+ files	102
	7.9.3	Cyclic data transmission	103
	7.9.4	Occupied Stations	103
	7.9.5	Bit area	104
	7.9.0	Parametermanning	107
	7.9.8	Acyclic communication via SLMP – supported functions	110
	7.10	Connecting devices to a CC-Link IE Field Basic client with GX Works3	113
	7.10.1	Register the CSP+ files in GXWorks3	113
	7.10.2	Configuring the network settings	114
	7.10.3	Configuring the CC-Link IE Field Basic network	115
	7.10.4	Defining the process data mapping for CC-Link devices in the network	121
	7.10.5	Going online with the PLC	122
	7.10.0	Reading process data	123
8	Paramete	rizing and configuring	125
	8.1	Parameters – overview	125
	8.1.1	I/O channel parameters	125
_	8.2	PROFINET parameters	126
9	Operating		127
	9.1	Process input data	127
	9.2	Process output data	128
	9.3	LED displays	129
	9.4	Software diagnostic messages	130
	9.4.1	Diagnostic telegram	130
	9.4.2		151
10	Troublesh	ooting	134
11	Maintena	nce	135
	11.1	Updating the firmware via TAS	135
	11.2	Updating the firmware via web server	137
12	Repair		139
	12.1	Returning devices	139
13	Disposal		139
14	Technical	data	140
	14.1	General technical data	140
	14.2	Technical data TBEN-L16DIP	142
	14.3	Technical data TBEN-L4-16DIN	143
	14.4	Technical data TBEN-L16DOP	143
	14.5	Technical data TBEN-L4-16DIN	144
	14.6	Technical data TBEN-1 -16DXP	145
	1/1 7	Technical data TBEN-1/2-16DYN	1/16
	1/1 0	Technical data TREN I	140
1-	14.0 Tunal la	recinital uata i DEN-LOVIF-OVOF	14/
15	l urck brai	ncnes — contact data	148



1 About these instructions

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

1.1 Target groups

These instructions are written for specifically trained personnel and must be read carefully by anyone entrusted with the installation, commissioning, operation, maintenance, disassembly or disposal of the device.

When using the device in Ex areas, the user must also have knowledge of explosion protection (IEC/EN 60079-14 etc.).

1.2 Explanation of symbols

The following symbols are used in these instructions:

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

1.3 Additional documents

The following additional documents are available online at www.turck.com

- Data sheet
- Declarations of conformity (current version)
- Notes on Use in Ex zone 2 and 22 (100022986)
- 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

Product identification 2.1

This instruction is valid for the following devices:

TB EN – LL – 16DXP								
ТВ	EN	Product series	-	LL	Design/connection	-	16DXP	Channels/signal type
		Protocol EN Ethernet Protuct series TB Compact block I/O module in IP65/IP67/IP69K			 Design/connection L4 7/8" power supply voltage connection (4-pin), 8 M12 connections, 2 M12 Ethernet connections L5 7/8" power supply voltage connection (5-pin), 8 M12 connections, 2 M12 Ethernet connections LL M12 power supply voltage connection (5-pin), 8 M12 connections, 2 M12 Ethernet connections, 2 M12 Ethernet connections, 2 M12 Ethernet 	et		Signal type8DIP8 digital inputs, PNP8DOP8 digital outputs, PNP16DIN16 digital inputs, NPN16DIP16 digital outputs, PNP16DON16 digital outputs, NPN16DOP16 digital outputs, PNP16DXN16 configurable inputs or outputs, NPN16DXP16 configurable inputs or outputs, PNP

Fig. 1: Type code TBEN-L...

2.2 Scope of delivery

The delivery consists of the following:

- I/O module
- Screw caps or blind caps for network and I/O connectors
- Labeling clips

2.3 Turck service

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

For the contact details of our branches worldwide, please see page [> 148].



3 For your safety

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

3.1 Intended use

Due to the Turck multiprotocol technology, the multiprotocol I/O modules for Ethernet can be operated in the Three Ethernet protocols PROFINET, EtherNet/P and Modbus TCP. The modules detect the bus protocol automatically during the start-up.

The TBEN-L devices provide eight M12 female connectors for the connection of up to 16 digital sensors or actuators.

The devices meet the requirements for passive safety [> 27] and can be used in the following applications:

Applications up to SIL CL2 (according to EN 62061:2016, section 6.7.7)

Applications up to Category 3 and Performance Level d (according to EN ISO 13849-1: 2016)

Installation directly in the field is possible thanks to degree of protection IP65, IP67 IP67K. Devices with the Ex marking are suitable for use in the Ex area in zone 2 and zone 22.

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

3.1.1 Foreseeable Misuse

The device is not suitable for:

The permanent use in liquids

Modifications to the device

It is not permitted to modify the technical function or the construction of the device.

3.2 General safety instructions

- The device must only be fitted, installed, operated, parameterized and maintained by trained and qualified personnel.
- Only use the device in compliance with the applicable national and international regulations, standards and laws.
- The device meets the EMC requirements for the industrial areas. When used in residential areas, take measures to prevent radio frequency interference.
- Change the default password of the integrated web server after the first login. Turck recommends the use of a secure password.

3.3 Notes on UL approval

- Use UL certified CYJV cables that are suitable for the current/voltage rating and have an insulation temperature of at least 75 °C.
- Only use the device in an area with no more than pollution degree 2.



3.4 Notes on Ex protection

- When using the device in Ex areas, the user must have knowledge of explosion protection (IEC/EN 60079-14 etc.).
- Observe national and international regulations for explosion protection.
- Only use the device within the permissible operating and ambient conditions (see certification data and Ex approval specifications).
- The document "Notes on Use in Ex Zone 2 and 22" (ID 100022986) contains the approval data for using the device in hazardous areas. Observe the requirements in the document.

3.5 Requirements for Ex approval

- Only use the device in an area with no more than pollution degree 2.
- Only disconnect and connect circuits when there is no potentially explosive atmosphere or when the power supply is switched off
- Only operate the switches when there is no potentially explosive atmosphere or when the power supply is switched off.
- Connect the metal protective cover to the equipotential bonding in the Ex area (cable crosssection: 4 mm²).
- Ensure impact resistance in accordance with EN IEC 60079-0 alternative measures:
 - Install the device in the TB-SG-L protective housing (available in the set with Ultem window: ID 100014865) and replace the Lexan service window with the Ultem window.
 - Install the device in an area offering impact protection (e.g. in the robot arm) and attach a warning sign: "DANGER: Do not connect or disconnect circuits under live conditions. Do not actuate the switch under live conditions".
- Keep the service window of the devices closed during operation in order to comply with the IP protection.
- Do not install the device in areas critically exposed to UV light.
- Prevent risks caused by electrostatic charge.
- Provide unused male connectors with suitable sealing or blanking caps in order to ensure degree of protection IP65, IP67 or IP69K The tightening torque for the M4 screws is 0.5 Nm.



4 Product description

The devices are designed in a fully encapsulated housing with degree of protection IP65/IP67/IP69K.

Depending on the device variant, eight digital input and output channels, 16 digital input channels, 16 digital output channels or 16 universal digital I/O channels which can be used as inputs or outputs are available for connecting digital sensors and actuators. The connections for the digital sensors and actuators are designed as A-coded M12 sockets. Two D-coded M12 sockets are provided for the Ethernet connection.

4-pin (TBEN-L4) or 5-pin (TBEN-L5) 7/8" connectors are available for connecting the supply voltage.

The multiprotocol device can be operated with the four Ethernet protocols PROFINET, Ether-Net/IP, Modbus TCP and CC-Link Field Basic by automatic protocol detection without user intervention.

4.1 Device overview



Fig. 2: Dimensions TBEN-L4-...



Fig. 3: Dimensions TBEN-L5-...



4.1.1 Operating elements

The device has the following operating elements:

- Rotary coding switches for adjusting the network settings
- Reset button for executing a device restart

4.1.2 Indication elements

The device is provided with the following LEDs:

- Power supply voltage
- Group and bus error
- Status
- Diagnostics

4.1.3 Block diagram







Fig. 4: Block Diagram



4.2 Properties and features

- Fiber-glass reinforced housing
- Shock and vibration tested
- Fully potted module electronics
- Degree of protection IP65/IP67/IP69K
- UV-resistant according to DIN EN ISO 4892-2
- Metal connectors
- Separated power groups for safety shutdown
- Integrated Ethernet-switch for building up a line-topology
- Transmission speed 10 Mbps/100 Mbps
- Integrated web server
- Multiprotocol: PROFINET device, EtherNet/IP device, Modbus TCP server, CC-Link IE Field Basic server
- PROFINET:
 - Conformance Class B PA
 - Conformity according to PROFINET specification V2.35
 - System redundancy S2
 - Network load class 3
- EtherNet/IP:
 - Predefined in- and output assemblies

4.3 Functions and operating modes

4.3.1 Multiprotocol technology

The device can be used in the following Ethernet protocols:

- PROFINET
- EtherNet/IP
- Modbus TCP
- CC-Link IE Field Basic

The required Ethernet protocol can be detected automatically or determined manually.

Automatic protocol detection

A multiprotocol device can be operated without intervention of the user (which means, without changes in the parameterization) in all of the three Ethernet protocols mentioned.

During the system start-up phase (snooping phase), the module detects which Ethernet protocol requests a connection to be established and adjusts itself to the corresponding protocol. After this an access to the device from other protocols is read-only.

Manual protocol selection

The user can also define the protocol manually. In this case, the snooping phase is skipped and the device is fixed to the selected protocol. With the other protocols, the device can only be accessed read-only.

Protocol-dependent functions

The device supports the following Ethernet protocol-specific features:



PROFINET

- Fast Startup (FSU), prioritized startup
- Topology detection
- Address allocation with LLDP
- Media redundancy protocol (MRP)
- S2 redundancy

EtherNet/IP

- QuickConnect (QC)
- Device Level Ring (DLR)

Ethernet ports used

Port	Protocol
00022	SFTP
00053	DNS TCP
00067	DHCP
00080	HTTP
00093	PROFINET DCP
00502	Modbus TCP
58554	Turck Services

4.3.2 Digital modules – extended digital functions

In PROFINET, the extended digital functions are configured via device parameterization via GSDML file. In EtherNet/IP, the functions are provided in special catalog files for RSLogix from Rockwell Automation. In Modbus TCP the extended functions are configured via Modbus registers. In addition to that, the functions are configurable via the device's web server or the device DTMs.

The digital TBEN modules provide the following extended digital functions:

4.3.3 Backplane Ethernet Extension Protocol (BEEP)

BEEP (Backplane Ethernet Extension Protocol) is a technology that is available in many digital Turck multi protocol block I/O modules. BEEP allows a network, of up to 33 participants (one controller and 32 devices) or 480 bytes of data, to appear to the PLC as a single device on a single connection using a single IP address.

Detailed information about BEEP can be found in the document "BEEP – Backplane Ethernet Extension Protocol" (ID 100002454).

4.3.4 Turck Field Logic Controller function (FLC ARGEE)

The device supports logic processing via the "Turck Field Logic Controller (FLC ARGEE)" function. This enables the device to implement small to medium-sized control tasks in order to reduce the load of the central controller. The FLCs can be programmed in the ARGEE engineering environment.

The ARGEE programming software can be downloaded free of charge from www.turck.com.

The "SW_ARGEE_Environment_Vx.x.zip" file also contains the documentation for the programming environment as well as the software.



4.4 Possible Ethernet network structures



Fig. 5: Network structure, example 1





Fig. 7: Network structure, example 3



4.4.1 Ethernet daisy chain - max. number of connected modules

Prerequisites:

- Optimized network: only TBEN modules in the daisy chain, no additional switches, no thirdparty devices
- Exchange of pure cyclical process data, no acyclical data

Cycle time	Maximum number of TBEN modules
1 ms	21
2 ms	42



NOTE

Deviations from the specification above may lead to a reduction of possible TBEN modules connected to one daisy chain.



Fig. 8: Daisy chain



5 Installing

5.1 Installing a device in zone 2 and zone 22

The devices can be used in combination with the TB-SG-L (ID 100014865) protective housing set in zone 2 and zone 22.



DANGER

Potentially explosive atmosphere Risk of explosion due to spark ignition Operation in zone 2 or zone 22:

- Only install the device if there is no potentially explosive atmosphere present.
- Observe the requirements for Ex approval.
- Screw on the housing. Use a Torx T8 screwdriver.
- Replace the service window with the supplied Ultem window.
- Place the device on the base plate of the protective housing fasten both together on the mounting plate, see --- FEHLENDER LINK ---.
- ► Connect the device, see [▶ 20].
- ► Fit the housing cover and screw on as shown in the following figure. The tightening torque for the Torx T8 screw is 0.5 Nm.



Fig. 9: Installing the device in the TB-SG-L protective housing



5.2 Mounting onto a mounting plate



NOTICE

Mounting on uneven surfaces

Device damage due to stresses in the housing

Attach the device to the mounting plate with two M6 screws.

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

5.3 Outdoor device installation

The device is UV resistant in accordance with DIN EN ISO 4892-2. Direct sunlight may cause material wear and changes in color. The mechanical and electrical properties of the device are not impaired.

• To prevent material wear and color changes: Protect the device from direct sunlight with protective panels.

5.4 Grounding the device

5.4.1 Equivalent wiring diagram and shielding concept





Fig. 10: TBEN-L4 digital modules – equivalent wiring diagram and shielding concept

Fig. 11: TBEN-L5 digital modules – equivalent wiring diagram and shielding concept



5.4.2 Shielding of the fieldbus and I/O level

The fieldbus and the I/O level of the modules can be grounded separately.



Fig. 12: Grounding clip (1), grounding ring (2) and metal screw (3)

The grounding ring (2) is the module grounding. The shielding of the I/O level is permanently connected to the module grounding. The module grounding is only connected to the reference potential of the installation when the module is mounted.

I/O level shielding

In the case of direct mounting on a mounting plate, the module grounding is connected to the reference potential of the system via the metal screw in the lower mounting hole (3). If module grounding is not desired, the electrical connection to the reference potential must be interrupted, e.g. by using a plastic screw.

Fieldbus level shielding

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

In the delivery state, the grounding clip is mounted.

- 5.4.3 Disconnecting the direct grounding of the fieldbus level: removing the grounding clip
 - Use a flat screwdriver to slide the grounding clip forward and remove it.



Fig. 13: Removing the grounding clamp



5.4.4 Grounding the fieldbus level directly: inserting the grounding clip

- Place the grounding clip between the fieldbus connectors by using a screwdriver in such way that the clip contacts the metal housing of the connectors.
- The shielding of the fieldbus cables is connected to the grounding clip.



Fig. 14: Mounting the grounding clip

- 5.4.5 Grounding the device mounting on a mounting plate
 - For mounting onto a mounting plate: Fix the device with a metal screw through the lower mounting hole.
 - ⇒ The module grounding is connected to the reference potential of the installation via the metal screw.
 - ➡ With mounted grounding clip: The shielding of the fieldbus and the module grounding are connected to the reference potential of the installation.



6 Connecting



NOTICE

Penetration of liquids or foreign objects due to leaking connections Loss of degree of protection IP65/IP67/IP69K possible

- Tighten M12 male connectors with a tightening torque of 0.6 Nm.
- ▶ Tighten 7/8" male connectors with a tightening torque of 0.8 Nm.
- Only use accessories that guarantee the protection class.
- Provide unused male connectors with suitable sealing or blanking caps. The tightening torque for the M4 screws is 0.5 Nm.
- 6.1 Connecting a device in zone 2 and zone 22



DANGER

Explosive atmosphere Explosion due to ignitable sparks For use in Zone 2 and Zone 22:

- Only disconnect and connect circuits when there is no potentially explosive atmosphere or when the power supply is switched off.
- Only use connecting cables that are approved for use in potentially explosive atmospheres.
- ► Use all connectors or seal them with screw caps or blind caps. The tightening torque for the screw caps is 0.5 Nm.
- Observe requirements for Ex approval.

6.2 Connecting the device in safety applications



WARNING

Intrusion of liquids or foreign bodies through leaking connections Danger to life due to failure of the safety function

- ▶ Tighten M12 male connectors with a tightening torque of 0.6 Nm.
- ▶ Tighten 7/8" male connectors with a tightening torque of 0.8 Nm.
- Provide unused male connectors with suitable sealing or blanking caps. The tightening torque for the M4 screws is 0.5 Nm.



6.3 Connecting the device to Ethernet

For the connection to Ethernet the device has an integrated auto-crossing switch with two 4-pin M12 x 1-Ethernet-connectors. The maximum tightening torque is 0.6 Nm.

Fig. 15: M12 Ethernet connector

- Connect the device to Ethernet according to the pin assignment below.
- Provide unused male connectors with suitable sealing or blanking caps. The tightening torque for the M4 screws is 0.5 Nm.



Fig. 16: Pin assignment Ethernet connectors

6.3.1 Applications with QuickConnect (QC) and Fast Start Up (FSU)

- Do not use crossover cables in applications with QuickConnect (QC) and and Fast Start Up (FSU) applications.
- Connect incoming Ethernet cables to P1.
- Connect outgoing Ethernet cables to P2.



6.4 Connecting the power supply

The device is provided with two 7/8" connectors for connecting the power supply. The plug connectors are 4-pin (TBEN-L4) or 5-pin (TBEN-L5) connectors. V1 and V2 are electrically isolated from each other. The maximum tightening torque is 0.8 Nm.

- Connect the device to the power supply according to the pin assignment below.
- Provide unused male connectors with suitable sealing or blanking caps. The tightening torque for the M4 screws is 0.5 Nm.

-	-(-
1 RD = 24 VDC V2 2 GN = 24 VDC V1 3 WH = GND V1 4 BK = GND V2	$4 \bigcirc 0 \bigcirc 2$	3 1 BK = GND V2 2 BU = GND V1 3 GNYE = FE 1 4 BN = 24 VDC V1 1 5 WH = 24 VDC V2
X1	X2	X1

Fig. 17: TBEN-L4... – pin assignment of the power supply connections

Fig. 18: TBEN-L5... – pin assignment of the power supply connections

-(

X2

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



NOTE

The system voltage (V1) and the load voltage (V2) are supplied and monitored separately. If the voltage goes below the permissible lower limit, the connectors are disconnected according to the supply concept of the module type. If V2 goes below the permissible minimum voltage, PWR LED changes from green to red. If V1 goes below the permissible minimum, the PWR LED goes out.



6.4.1 Supply concept

The devices are supplied via two separate voltages V1 and V2.

- V1 = supply of the module electronics and the respective connectors
- V2 = supply of the respective connectors (can be switched-off separately)

The supply concept enables the safety-related shutdown of parts of the plant via emergency stop circuits by externally switching off the V2 supply.





Fig. 19: Supply TBEN-L...-16DIP and TBEN-L4-DIN



Fig. 21: Supply TBEN-L...-16DXP and TBEN-L4-16DXN

Fig. 20: Supply TBEN-L...-16DOP and TBEN-L4-16DON

1/1		0	
V I-) (
V2-		/ \	Ŧ
		0	
	۲		\bigcirc
	۲		\bigcirc
			0000
	0		
	Ô		Ð

Fig. 22: Supply TBEN-L...- 8DIP-8DOP



6.5 Connecting digital sensors and actuators

The device has eight 5-pin M12 connectors for connecting digital sensors and actuators. The maximum tightening torque is 0.6 Nm.

[8 . []	

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

6.5.1 TBEN-L...-16DIP and TBEN-L4-16DIN

- Connect digital sensors to the device according to the pin assignment.
- Provide unused male connectors with suitable sealing or blanking caps. The tightening torque for the M4 screws is 0.5 Nm.



Fig. 24: Connectors for digital sensors - pin assignment



Fig. 25: Connectors for digital sensors - wiring diagram

6.5.2 TBEN-L...-16DOP and TBEN-L4-16DON

- Connect digital actuators to the device according to the pin assignment.
- Provide unused male connectors with suitable sealing or blanking caps. The tightening torque for the M4 screws is 0.5 Nm.



Fig. 26: Connectors for digital actuators - pin assignment



Fig. 27: Connectors for digital actuators – wiring diagram



6.5.3 TBEN-L...-16DXP and TBEN-L4-16DXN

- Connect digital sensors and actuators to the device according to the pin assignment.
- Provide unused male connectors with suitable sealing or blanking caps. The tightening torque for the M4 screws is 0.5 Nm.

-($1 = V_{aux}1$ 2 = Signal In/Out 3 = GND V1 4 = Signal In/Out 5 = FE 4 C0...C3

Fig. 28: Connectors for digital sensors and actuators - pin assignment



Fig. 29: Connectors for digital sensors and actuators - pin assignment



Fig. 30: Connectors for digital sensors and actuators at - wiring diagram

6.5.4 TBEN-L...-8DIP-8DOP

- Connect digital sensors and actuators to the device according to the pin assignment.
- Provide unused male connectors with suitable sealing or blanking caps. The tightening torque for the M4 screws is 0.5 Nm.

Inputs



Fig. 31: Connectors for digital sensors - pin assignment



Fig. 32: Connectors for digital sensors – wiring diagram



Outputs



Fig. 33: Connectors for digital actuators – pin assignment



Fig. 34: Connectors for digital actuators - wiring diagram



7 Commissioning

7.1 Using the device in safety applications

The device is designed in accordance with EN ISO 13849-1 "Safety of machinery - Safety-related parts of control systems".

Performance Level (PL)/SIL Level

Due to the galvanic isolation of load and operating voltage, the design of the devices allows the fault exclusion of voltage carry-over to safely disconnected equipment with a single fault safety of category 3 for safety functions up to performance level d (according to EN ISO 13849). The maximum achievable Safety Integrity Level is SIL CL2 (according to EN 62061:2016, section 6.7.7).

The device is part of a safety-related overall system. The overall system must always be evaluated as a whole with regard to the requirements of EN ISO 13849-1 and EN 62061.

7.1.1 Safety function

Passive safety - galvanically isolated load voltage

The following slots of the devices, incl. inputs and outputs, are supplied by the VAUX2 supply voltage:

- TBEN-L...-16DOP, C0...C7 TBEN-L...-16DON:
- TBEN-L...-8DIP-8DOP: C4...C7
- TBEN-L...-16DXP, C4...C7 TBEN-L...-16DXN:

VAUX2 is supplied from the supply voltage V2 (load voltage) of the device (s. "Connecting" \rightarrow "Supply concept").

In the safe state, the VAUX2 supply and the outputs supplied via V2 are voltage-free. The load voltage is switched off externally in the higher-level system via an external safety relay or a safety control system.

Safety characteristic data for the galvanic isolation

Characteristic data	Value	
MTTF	See "Technical data"	
Lifetime	20 years	
Diagnostic coverage	099 %	Determination via FMEA according to ISO 13849-2: 2013



NOTE

The calculation of MTTF_{D} data of electronic components is done according to ISO 13849-1:201, Annex C.5: "MTTF_D data of electrical components" and D.1: "Parts count method".



7.1.2 Safety planning

The operator is responsible for the safety planning.

Prerequisites

- Perform a hazard and risk analysis.
- Develop a safety concept for the machine or plant.
- Calculate the safety integrity for the complete machine or plant.
- Validate the complete system.

7.1.3 Safe commissioning

Installing connecting cables safely



- Install and connect the cables safely and separately in accordance with EN 60204-1.
- Install cables with cross-circuit protection if the safe installation of the cables is not possible.

Switch off supply voltage safely



WARNING 1-pole switch-off the supply voltage

Safe separation not guaranteed

Always switch-off the supply voltage on both poles.

Connecting sensors and actuators



WARNING

External feed

Deactivation of the galvanic isolation

- If the galvanic isolation is used, ensure on the application side that no external feed can occur.
- DXP channels that operate with safe disconnectable potential must be supplied by the corresponding conenctor.



7.1.4 Cited Standards

Standard	Title
DIN EN ISO 13849-1:2016	Safety of machinery – Safety-related parts of control systems
DIN EN 62061:2005 + A1:2013 IEC 62061:2005	Safety of machinery – Functional safety of safety-related electrical, electronic and pro- grammable electronic control systems
DIN EN 61508:2011 IEC 61508:2010	Functional safety of electrical/electronic/pro- grammable electronic safety-related systems
DIN EN 61131-2:2008 IEC 61131-2:2007	Programmable controllers
EN ISO/ISO 12100	Safety of machinery – General principles for design – Risk assessment and risk reduction

7.2 Adjusting network settings and operation mode



NOTE Changes to network settings and operating mode are only applied after restarting the device.

Adjusting network settings

The network settings can be adapted via three rotary coding switches on the device, via TAS (Turck Automation Suite), the web server, the DTM a DHCP server or PROFINET DCP.

The setting is made during commissioning of the device and is necessary to establish a connection between the PLC and the device.

Configuring the operating mode

The operating mode of the device (Rotary, BootP, PGM-DHCP etc.) can only be adjusted using the decimal rotary coding switches on the device.

7.2.1 Adjusting network settings and operation mode via rotary coding switches

The rotary coding switches are located together with the reset button under a service window.

×	Reset	$\frac{\begin{bmatrix}9&0&1\\7&0&5&4\\x&100\end{bmatrix}}{x&10} \begin{bmatrix} 9&0&1\\7&0&5&4\\x&10\end{bmatrix} \begin{bmatrix} 9&0&1\\7&0&5&4\\x&10\end{bmatrix}$	
			\bigcirc

Fig. 35: Service window

- Open the service window.
- Set the rotary coding switch to the desired mode according to the table below.
- Carry out voltage reset.
- NOTICE! IP65, IP67 or IP69K protection is not guaranteed when the service window above the rotary coding switches is opened. Device damage through penetrating foreign objects or liquids is possible. Tightly close the service window.



Switch positions

The network settings of the device depend on the selected mode. Changes to the settings become active after a voltage reset.

Switch settings 000 and 900 are no operation modes. After each reset of the device to the default values, the setting of an operating mode is necessary.

Switch position	Mode	Description
000	Network reset	The Network reset resets the following the network settings to the default values: IP address: 192.168.1.254 Subnet mask: 255.255.255.0 Gateway: 192.168.1.1
1254	Rotary	In rotary mode (static rotary), the last byte of the IP address can be set manually at the gateway. The other network settings are stored in the non-volatile memory of the gateway and cannot be changed in rotary mode. Addresses from 1254 can be set.
300	BootP	In BootP mode, the network settings are automatically assigned by a BootP server in the network. The subnet mask assigned by the BootP server and the default gateway address are stored non- volatile in the memory of the gateway.
400	DHCP	 In DHCP mode, the network settings are 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.
500	PGM	In PGM mode, the complete network settings can be assigned manually via TAS (Turck Automation Suite), the DTM or a web server. The data are stored non-volatile in the device.
600	PGM-DHCP	In PGM-DHCP mode, the device is initially a DHCP client and sends DHCP requests until it is assigned a fixed IP address. The DHCP client is automatically deactivated as soon as the device has received an IP address via TAS (Turck Automation Suite), the DTM or the web server. The data are stored non-volatile in the device. In PROFINET: If a DHCP server is used in the network, problems may occur when assigning the IP address, as in this case both the DHCP server and the PROFINET controller (via DCP) attempt to assign the IP address.



Switch position	Mode	Description
701899	Name	 The "Name" mode is used to set the DNS name of the device in Ethernet/IP networks. This mode is mainly used for DNS-based addressing in Schneider Electric controllers. The IP address is assigned automatically. The devices are addressed via the prefix "TBEN" and the address set on the rotary coding switches as follows: Switch position 701: TBEN_701
	Fo stowy yosst	The featers reset resets all settings to the default values
900	Factory reset	 Network setting (IP address, subnet mask, gateway) PROFINET device name Device parameters



7.2.2 Adjusting network settings via TAS (Turck Automation Suite)

In the delivery state the device has the IP address 192.168.1.254. The IP address can be set via TAS (Turck Automation Suite). TAS is available free of charge at www.turck.com.

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

TAS DESKTOP DOC	CUMENTATION	Your Global Automat	DIKK ion Partner
TURCK AUTOMATION SUITE	TAS DESKTOP → VIEW/FEATURE → NETWORK		
VIEW/FEATURE			
Network	Scan network Add device Edit device Change PW FW Update Set Clock Global PW Export CSV Import CSV Print Help		
ARGEE	Actions ? Device type/feature ? PN device IP address Adapter address Address mode ? MAC address	Subnet mask/Gateway	Version
(Ф) BEEP	name		
Profinet			
Diagnostics			
CODESYS			
စြာ IO-Link			
🗘 M12Plus			

Fig. 36: Home screen in TAS

 \Rightarrow TAS shows the connected devices.

TAS DESKTOP DOC	UMENTATION	Your Global Automati	DIFK ion Partner
TURCK AUTOMATION SUITE	TAS DESKTOP → VIEW/FEATURE → NETWORK		
Network ARGEE	Scan network. Add device Edit device Change PW FW Update Set clock Global PW Export CSV Import CSV Print Help PN device PN device		
ම BEEP ම Profinet	Actions ? Device type/feature ? IP address Adapter address Address MAC address ○ グ 介 ☆ 公 ☆ ③ 192.168.1.254 192.168.1.254 192.168.1.201 00.07.46.A9.27.85	Subnet mask/Gateway 255.255.255.0 / 192.168.1.1	Version
Diagnostics			
ල CODESYS ලි IO-Link			
分 M12Plus			

Fig. 37: Found devices in TAS

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

TAS DESKTOP DOCI	UMENTATION				YOURCEK Your Global Automation Partner
TURCK AUTOMATION SUITE	TAS DESKTOP -> VIEW/FEAT	JRE -> NETWORK			
VIEW/FEATURE	Scan network Add device Edit	🖊 🤌 🤑 🕓 device Change PW FW Update Set clock	Global PW Export CSV Import CSV P	🖶 🤗 Irint Help	
්ල් ARGEE බ _{REED}	Actions ?	Device type/feature ? PN device name	IP address Adapter address	Address mode ? MAC address	Subnet mask/Gateway Version
ලා Profinet (මා Diagnostics	☑☺∥∩▫ଓё⊗	BL25-PG-EN-V3 C anargy	<u>192.168.1.254</u> 192.168.1.201	00:07:46:A9:2	7:85 255.255.255.0 / 192.168.1.1
CODESYS					
່ເອງ່ IO-Link 💫 M12Plus					

Fig. 38: Selecting the device in TAS



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



- Change the device name, the IP address and the network mask if necessary.
- Save changes by clicking on **APPLY**.

Edit network settings							
PN device name	unarga						
IP address	192.168.1.254						
Default gateway	192.168.1.1						
Subnet mask	255.255.255.0						
Take care, that the IP add APPLY CANCEL	dress isn´t used by any other devices or switches!						

Fig. 39: Changing network settings in TAS



7.2.3 Adjusting network settings via the web server

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



Turck recommends changing the password after the first login for security reasons.

- Open the device's web server.
- Enter **Username** and **Password**.
- Click Login



NOTE

To be able to adjust the network settings via the web server, the device must be in PGM mode.

- Click TBEN-L... \rightarrow Parameter \rightarrow Network.
- Adjust the network settings.
- ▶ Write the changes into the device via SET NETWORK CONFIGURATION.

START IO-LINK	DOCUMENTATION		Your Global Automation Partner
TREN-LL-BOLA	START -> DEVICE -> PARAMETERS		Logout
DEVICE ji Info @ Parameters	Read Write Tab view Print Data format Network Network		~
Co Diagnostics A	MAC address Addressing mode	00:07:46:ff:a9:97 PGM-DHCP ?	
 ↓¹ Ex-/Import Change password <u> </u>	Addressing method IP address Netmask	DHCP 192.168.145.124 255.255.255.0	
لOCAL I/O ر	Default gateway SNMP Public Community	0.0.0. public	
℃ Diagnostics <u>∧</u>	Set network configuration SNMP Private Community LLDP status	SET NETWORK CONFIGURATION ?	
🕐 Output ji) Info	LLDP MAC address 1 LLDP MAC address 2	00:07:46	
	Fieldbus configuration Deactivate Modbus TCP	no 🗸	*
English 🗸			

Fig. 40: Web server - adjusting network settings



7.3 Commissioning the device in PROFINET

7.3.1 Address setting in PROFINET

In IP-based communication, the field devices are addressed by means of an IP address. PROFINET uses the Discovery and Configuration Protocol (DCP) for IP assignment.



NOTE

DCP is a standard protocol and can also be used outside PROFINET, e.g. in IPC operating systems (Windows, Linux). DCP is available in tool packages such as WinPcap, Npcap, Wireshark etc.

When delivered, each field device has, among other things, a MAC address. The MAC address is sufficient to give the respective field device a unique name.

The address is assigned in two steps:

- Assignment of a unique plant specific name to the respective field device
- Assignment of the IP address from the IO-Controller before the system start-up based on the plant-specific (unique) name

PROFINET naming convention

The names are assigned via DCP. The device name is checked for correct spelling during input. The following rules apply to the use of the device name in accordance with PROFINET specification V2.3.

- All device names must be unique.
- Maximum name size: 240 characters
 - Allowed:
 - Lower case letters a...z
 - Numbers 0...9
 - Hyphen and dot
- The name may consist of several components separated by a period. A name component, i.e. a string between two dots, may be a maximum of 63 characters long.
- The device name must not start or end with a hyphen.
- The name must not begin with or "port-xyz" (y...z = 0...9).
- The name must not have the form of an IP address (n.n.n.n, n = 0...999).
- Do not use special characters.
- Do not use capital letters.



7.3.2 FSU – Fast Start-Up (prioritized startup)

FSU enables a PLC to build up connections to PROFINET nodes in less than 500 ms after switching-on the network power supply (V1). The fast start-up is necessary for fast tool changing applications at robot arms for example in the automobile industry.



NOTE For the correct cabling in FSU applications please observe the note in the chapter "Connecting the Device to Ethernet" [> 21].

Fast Start-Up (FSU) in TBEN

The devices support the prioritized start-up (FSU).

Activating FSU

In order to enable FSU, the fieldbus nodes have to be configured respectively, for example in TIA-Portal (Siemens).

Auto negotiation:

deactivated

Transmission medium/duplex: Set to a fixed value

- During configuration, please observe that the neighboring devices do also support FSU and that the settings for the ports of neighboring devices are identical.
- Set "Transmission rate/duplex" to a fix value.
- Deactivate auto-negotiation

Vî Pro ⊡	Sie oject	mens - C: t Edit V	\ Users\christin /iew Insert project 📑	a.scheuer\Auto Online Option X 🗐 📬 🗙	matisier s Tools	Ung\TIA\T Windov	BEN-LL_V1 v Help	6\TBEN-LL	_ V16 So online 🔊 Go offli	Totally Integ	grated Automat PC	ion ORTA	□× L
	тв	EN-LL_V1	6 ▶ Ungroup	oed devices →	turck-th	oen-15-16	dop [TBEI	N-L5-16DC	0P]		- 1	•∎×	
								đ	Topology view	A Network view	Device vi	ew	1
		Device	e overview	1									품
ž						-				1			- dv
2		1	Module	10.001	Rack	Slot	laddress	Q address	Туре	Article no.	Firmware	Co	- Pe
E			 turck-tben- 	-15-16dop	0	0			TBEN-L5-16DOP	6814087	SWV 1.5.0		a
অ			PN-IO		0	0 X1			turck-tben-15-16dop				들
i e			16DOP_1		0	1			16DOP				g
Š	3												4
	ē.												Q.
	evic												9
	ŏ												
													a
													0
		<										>	- ē
			5-16dop [TBE	N-L5-16DOP]					Reporties	🗓 Info 🔒 🎚 Diag	nostics		2
	6	Seneral	IO tags	System cont	stants	Texts							1
		Jeneral	10 tags	System cons	ativate th	in part for							-1
		Ethernet	addresses		cuvate in	is port for	use						늼뎕
		 Advanced 	d options		_	_		_				-	
		Interfa	ce options	Conr	nection								0
		Media	redundancy										
		Real til	me settings		Transmis	sion rate	/ duplex:	/P 100 Mbps	full duplex				
		✓ Port 1	[X1 P1 R]				S	🖉 Monitor					2
		Ger	neral				F	Enable a	utonegotiation				
		Port	t interconnec										1
		Port	t options										
	<	Port 7	[V1 P2 P]	>								~	
					1		_						

Fig. 41: TIA-Portal – port-settings for FSU


• Activate the prioritized start-up at the I/O device.

Vîô	Sie	emens											□ × □
Project Edit View Insert Online Options Tools Window Help Totally Integrated Automation													
1	📑 🞦 🔚 Save project 🚇 🐰 🗉 🖆 🗙 🏷 ± (주 ± 🖥 🛄 🗊 🖉 🕼 🖉 🕼 🖉 Go online 🖉 Go offline 🕨 PORTAL												
	TBEN-L_V16 > Ungrouped devices > turck-tben-I5-16dop [TBEN-L5-16DOP]												
								1	Topology view	A Network view	Device vie	w	
		Dev	ice overview										Ha
		Dev	ice overview					,					đ
			Module		Rack	Slot	I address	Q address	Туре	Article no.	Firmware	Co	are
			 turck-tbe 	en-l5-16dop	0	0			TBEN-L5-16DOP	6814087	SWV 1.5.0		a
			PN-IC)	0	0 X1			turck-tben-l5-16dop				a
			16DOP_	1	0	1			16DOP				g
		-											
		-											2
		•											9
		-											-
													e t
													0
													l S
		<										>	Ĩ
	tu	rck-ther	-15-16dop [TB	RENU 5-16DOP					Properties	1 Info (1) Diagno	ation		۱ <u>۲</u>
		TCK-tbei				1			S Properties		sucs		- °
		General	IO tags	System const	ants	Texts							
		Ethern	net addresses		face on	tions							E
		▼ Advan	ced options	- inter	ace op							_	bra
		Inte	erface options										rie
		Me	dia redundancy	Pri Pri	oritized	startup							"
		Rea	I time settings	🔤 🗖 🗹 Us	e IEC V2	2.2 LLDP mo	de						H
		▼ Por	t 1 [X1 P1 R]		-								Ad
			General Dest intereserves	-									4
			Port ontions										S
		Por	+ 2 [V1 P2 P]	~									
	<			>									
		Portal	view	Cverview	📥 tur	ck-tben-l5			<u></u>				

Fig. 42: TIA-Portal – prioritized start-up, activation at the I/O device

7.3.3 MRP (Media Redundancy Protocol)

The device supports MRP. MRP is a standardized protocol according to IEC 62439. It describes a mechanism for media redundancy in ring topologies. With MRP, a defective ring topology with up to 50 nodes is detected and reconfigured in the event of an error. With MRP a trouble-free switch-over is not possible.

A Media Redundancy Manager (MRM) checks the ring topology of a PROFINET network defined by the network configuration for functionality. All other network nodes are Media Redundancy Clients (MRC). In the error-free state, the MRM blocks normal network traffic on one of its ring ports, with the exception of the test telegrams. The physical ring structure thus becomes a line structure again at the logical level for normal network traffic. If a test telegram fails to appear, a network error has occurred. In this case, the MRM opens its blocked port and establishes a new functioning connection between all remaining devices in the form of a linear network topology.

The time between ring interruption and recovery of a redundant path is called reconfiguration time. For MRP, this is a maximum of 200 ms. Therefore, an application must be able to compensate for the 200 ms interruption. The reconfiguration time always depends on the Media Redundancy Manager (e.g. the PROFINET PLC) and the I/O cycle and watchdog times set here. For PROFINET, the response monitoring time must be selected accordingly > 200 ms.

It is not possible to use Fast Start-Up in an MRP network.



7.3.4 User data for acyclic services

The acyclic data exchange is by using via Record Data CRs (Communication Relation). Via these Record Data CRs the reading and writing of the following services is realized:

- Writing of AR data (AR = Application Relation)
- Writing of configuration data
- Reading and writing of device data
- Reading of diagnostic data
- Reading of I/O data
- Reading of Identification Data Objects (I&M functions)

Acyclic device user data

Index		Name	Data type	Access	Comment
Dec.	Hex.				
1	0x01	Module parameters	WORD	read/ write	Parameter data of the module (slot 0)
2	0x02	Module designation	STRING	read	Designation assigned to the module (slot 0)
3	0x03	Module revision	STRING	read	Firmware revision of the module
4	0x04	Vendor ID	WORD	read	Vendor ID for Turck
5	0x05	Module name	STRING	read	The device name assigned to the module
6	0x06	Module type	STRING	read	Device type of the module
7	0x07	Device ID	WORD	read	Device ID of the module
823	0x08 0x17	reserved	-	-	-
24	0x18	Module diagnostics	WORD	read	Diagnostic data of the module (slot 0).
2531	0x19 0x1F	reserved	-	-	-
32	0x20	Input list	ARRAY of BYTE	read	List of all module input channels
33	0x21	Output list	ARRAY of BYTE	read	List of all module output chan- nels
34	0x22	Diag. list	ARRAY of BYTE	read	List of all I/O-channel dia- gnostics
35	0x23	Parameter list	ARRAY of BYTE	read	List of all I/O-channel parameters
36 28671	0x24 0x6FFF	reserved	-	-	-
28672	0x7000	Module parameters	WORD	read/ write	Activate fieldbus protocol
28673 45039	0x7001 0xAFEF	reserved	-	-	-
45040	0xAFF0	I&M0-functions		read	Identification & Maintaining
45041	0xAFF1	I&M1-functions	STRING[54]	read/ write	I&M Tag function and location



Index		Name	Data type	Access	Comment
45042	0xAFF2	I&M2-functions	STRING[16]	read/ write	I&M Installation Date
45043	0xAFF3	I&M3-functions	STRING[54]	read/ write	I&M Description Text
45044	0xAFF4	I&M4-functions	STRING[54]	read/ write	I&M Signature
45045 45055	0xAFF5 0xAFFF	I&M5 to I&M15- functions		-	Not supported

Acyclic I/O channel user data

Index		Name	Data Type	Access	Comment
Dec.	Hex.				
1	0x01	Module parameters	specific	read/ write	Parameters of the module
2	0x02	Module type	ENUM UINT8	read	Contains the module type
3	0x03	Module version	UINT8	read	Firmware version of I/O channels
4	0x04	Module ID	DWORD	read	Ident number of the I/O
59	0x05 0x09	reserved	-	-	-
10	0x0A	Controller Version	UINT8 array [8]	read	
1118	0x0B 0x12	reserved	-	-	-
19	0x13	Input data	specific	read	Input data of the respective I/O-channel
2022	0x14 0x16	reserved	-	-	-
23	0x17	Output data	specific	read/ write	Output data of the respect- ive I/O-channel
•••	•••	reserved	-	-	-



7.4 Connecting the devices to a PROFINET controller with TIA Portal

Prerequisites

- The software is started.
- A new project has been created.
- The controller has been added to the project.

7.4.1 Installing the GSDML-file

The GSDML file is available for free at www.turck.com.

- ► Adding the GSDML file: Click **Options** → **Manage general station description files (GSD)**.
- ▶ Installing the GSDML file: Define the source path for the GSDML-file and click Install.
- \Rightarrow The device is added to the hardware catalog.

Manage general sta	tion description	ı files			×						
Installed GSDs	GSDs in the p	project									
Source path: C\ Automatisierung\TBEN-s\AdditionalFiles\GSD											
Content of imported	Content of imported path										
File		Version	Language	Status	Info						
GSDML-V2.3-Turck	-TBEN_LN-2019	V2.3	English, Ger	Not yet installed	TBEN Line T						
GSDML-V2.3-Turck	-TBEN_LP-2019	V2.3	English, Ger	Not yet installed	TBEN Line T						
GSDML-V2.35-Turo	k-TBEN_LN-201	V2.35	English, Ger	Not yet installed	TBEN Line T						
GSDML-V2.35-Turo	:k-TBEN_LP-201	V2.35	English, Ger	Already installed	TBEN Line T						
<					>						
				Delete Install	Cancel						

Fig. 43: Installing the GSDML-file



7.4.2 Connecting the device to the PLC

- Select the TBEN device from the Hardware catalog and drag it into the hardware window.
- Connect the device to the PLC in the "Devices & networks" editor.

	ensvutomatisterungin ben-L4_L3/i ben-L4_L3	-
ect Edit View Insert Online	Options Tools Window Help	Hardware catalog
🎦 🛃 Save project 🛛 🝶 🐰 📋	🖹 🗙 🎝 🛨 (주 🗄 🛄 🛐 🖳 💋 Go online 🧬 Go offline 🕌 🌆 👫 🚽 🚺 Search in project>	Options
roject tree 🔲 🖣	TBEN-L4 L5 > Devices & networks	
Devices		Le : t
Devices		✓ Catalog
iii	💦 Network 🔢 Connections 🔄 HMI connection 💌 🐷 📲 🖽 🛄 🔍 🛨	ini in
	0	🖌 Filter Profile: <all> 💌</all>
TBEN-L4_L5		Field devices
Add new device		▼ ☐ Other field devices
Devices & networks	CPU_1513-1 PN TERN-15-1600P	Additional Ethernet devices
PLC_1 [CPU 1513-1	PIC 1	✓ Im PROFINET IO
La Ungrouped devices	The second se	Drives
Security settings		Encoders
Cross-device functions	PLC_1.PROFINET IO-Syste	🕨 🧊 Gateway
Common data		▼ 10
Documentation setti		▶ Liii Leuze
Languages & resource		Phoenix Contact GmbH
La Version control interf		SIEMENS AG
Online access		TURCK
Displayinide interfaces		▼ Li Turck
		▼ Li Turck
Lintal(R) Cigabit (T.Do.		ARGEE
		► LI BEEP
Display more info		▶ Lim BL Compact
Display more mio		▶ Lim BL20
U Online & diag		• U BL6/
		BLCEN-8PBL1
Details view		CODESTS3
		EXCOM
		TIDEN-L
Name		TRENUL 1 16DOR
		TRENJ 4-16DIN
	Natural grant free 10 annumination 100 TalaC at 1	TRENJ 4-16DIR
	Network overview Connections I/O communication VPN relecontrol	TBEN-14-16DON
	Y Device Type Address in subnet Subnet Master / IO system Devic	TBEN-14-16DOR
	 S71500/ET200MP station_1 S71500/ET200MP station 	TBEN-L4-16DXN
	▶ PLC_1 CPU 1513-1 PN	TBEN-L4-16DXN
	▼ GSD device_1 GSD device	TBEN-L4-8DIN-8DON
	turck-tben-I5-16dop TBEN-L5-16DOP	TBEN-L4-8DIP-8DOP
		TBEN-L4-BIOL
		TBEN-L4-BIOLA
		TBEN-L4-SE-M2
	Q Properties	TBEN-L5-16DIN
	General Cross-references Compile	TBEN-L5-16DIP
	entre compre	
		TBEN-L5-16DON
	Show all messages	TBEN-L5-16DON

Fig. 44: Connecting the device to the PLC



7.4.3 Assigning the PROFINET device name

- ► Select Online access → Online & diagnostics.
- Functions \rightarrow Assign PROFINET device name.
- Assign the desired PROFINET device name with **Assign name**.

Image: Seve project Image: Seve proj	ject Edit View Insert Online Opt	ions Tools Window Help					Totally, late mote d.A.	
Project tee Image access > Intel(R) Gigabit CT Desktop Adapter > then15/16dop [192.168.144.200] > then15/16dop [192.168.144.200] Project tee Project tee<	🕒 🔒 Save project 🔠 🐰 🏥 📜	X ら t C t 由 田 田 田 日	📕 🔊 Go online 🖋 Go of	ffline 🎝 🖪 🖪 🗴	ا 🗉 🖻	•	Totally Integrated A	PORTA
Devices With and days devices PERFAGE Properties Properties Properties	Project tree 🛛 🔳 🖣	…ine access ➤ Intel(R) Gigat						_∎∎×
Beller 4, L5 Configured PROFINET device name Configured PROFINET device name Configured PROFINET device Acsign PROFINET device name Configured PROFINET device Acsign PROFINET device name Configured PROFINET device Acsign PROFINET device name Configured PROFINET device PROFINET device name Configured PROFINET device PROFINET device name Device type:	Devices							
TBEHL4_L5 Diagnotic status Channel diagnostics Pac_1 (CPU 1513 r PA) Configured PROFINET device name: Device type: Devic	11 12 12 12 12 12 12 12 12 12 12 12 12 1	Diagnostics General	Assign PROFINET devic	e name				
A Stign PE address A Stign PE address A Stign PE address A Stign PE address Device type:	Add new device	Diagnostic status Channel diagnostics PROFINET interface [X1] Functions		Configured PROFIN	NET device	e		
Documentation settings Languages & resources Languages & resources Device filter Doline access Device filter Online access Device filter Only show devices of the same type Only show devices with bad parameter settings Only show devices in the network: P plc_1 profinet interface f etallos leasenese 16 [19:21.6. f etallos leasenese 16 [29:21.6. f etallos leasenese 16 [29:21.6. f etallos view	Generation Generation Generation Generation Generation Generation Generation	Assign IP address Assign PROFINET device n Reset to factory settings		PROFINET device n Device	ame: 🔟 type: TE	SEN-L5-16DOP		
Comparing and the same type Comparing a subtrant of the same ty	Bocumentation settings Commentation settings Commentation settings Languages & resources Commentation settings Commentation settings Languages & resources Languages & resources			Device filter				
Accessible devices in the network: Paddress MAC address Device PROFINET device name Status Paddress MAC address Device name Status Comparison of the status	Displaylhide interfaces Displaylhide interfaces COM (RS232/PPI multi-mas R9 COM <3> (RS232/PPI multi R9 Intel(R) Gigabit CT Deskt Displayle accessible device			Only show dee Only show dee Only show dee	vices of the vices with b vices withou	same type ad parameter settings ut names		
Imachine interface Imachine interfac	Pisplay more information		Accessible devic	es in the network:				
Implementation Implementation Implementation Implementation Implementation	 iii plc_1.profinet interface iii et200sp-textlab [28-63 iii scalance+216 [192.16 iiii scalance+216-serverra iiii tben-15-16dop [192.16 iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii		IP address	MAC address Dr	evice F	PROFINET device name	Status	
Image: Constraint of the second se	Intel(R) 82579LM Gigabit N		<		LED flas	III ihes U	pdate list Assign) name
💁 Properties 🖞 Info 🖞 Diagnostics 📑 🖻		< III >	<	Ш				>
						Properties	Info 🛛 🖸 Diagnostics	

Fig. 45: TIA Portal: Assigning the PROFINET device name



7.4.4 Setting the IP address in TIA Portal

- Select Device view \rightarrow register Properties \rightarrow Ethernet addresses.
- Assign the desired IP address.



Fig. 46: TIA Portal: Assigning the IP address



7.4.5 Setting module parameters

- ► Select **Device view** → **Device overview**.
- Select the device to be parameterized.
- Click Properties \rightarrow General \rightarrow Module parameters.
- Set the device parameters.

Siemens - C:\Users\testplatz\Documents\Automatisieru	ng\TBEN-L4_L5\TBEN-L4_L5									-	ΞX
Project Edit View Insert Online Options Tools Wi	ndow Help						Te	tally Inter	rated Autom	ation	
📑 🔁 🔒 Save project 📑 🐰 🗉 🛍 🗙 🏷 🛨	🖥 🗓 🔝 🖳 🗛 💋 Go online	🖉 Go offline	å? 🖪		3 💷 🖂	Search in project>	G _M ``	any meg	F	ORTA	L
Project tree 🔲 🖡	TBEN-L4_L5 ► Ungrouped de	vices 🕨 turck-	tben-15-	16dop [TE	EN-L5-16	DOP]			_		((
Devices						📲 Topology view	📥 Netw	ork view	Device	view	
					Device view	a					H
	Device overview				A						rdwa
2 TBEN+L4_L5											Te
🚊 📑 Add new device	Module	Rack	Slot	I address	Q address	Туре	Article no.		Firmware	Com	2
Devices & networks	 turck-tben-15-16dop 	0	0			TBEN-L5-16DOP	6814087		SWV 1.5.0		8
PLC_1 [CPU 1513-1 PN]	PN-IO	0	0 X1			turck-tben-l5-16dop					, e
👌 🕨 🔚 Ungrouped devices	16DOP_1	0	1		01	16DOP					
Security settings											2
Cross-device functions							_				9
Common data	16DOP_1 [16DOP]					Q Properties	🛄 Info	🖁 🖁 Diagi	nostics		
Documentation settings	General IO tags Sy	stem constants	5 Te	exts							t
Languages & resources	▼ General	Module par	ameters								100
Version control interface	Catalog information										
 Online access 	Module parameters	Station p	aramete	r						_	
Y Display/hide interfaces	I/O addresses										
COM [RS232/PPI multi-master cable]	no addresses	Manu	al reset a	fter overcur	r.					_	ask
COM <3> [RS232/PPI multi-master cable]					. <u>y</u> es						S
👻 🛄 Intel(R) Gigabit CT Desktop Adapter 👼		Manu	al reset a	tter overcur Chi	r. I no						
Lipdate accessible devices		1000			no						
Display more information		Manu	arreseta	Ch2	yes						
plc-testlab-1513-v2 [192.168.144.102]		Manu	alreceta	fter overcur							ari
Accessible device [192.168.145.10]		Maria	arresera	Ch:	: no						es
• 🛄 et200sp-testlab [28-63-36-3A-FA-79]		Manu	al reset a	fter overcur	r						
scalance-x216 [192.168.144.163]				Ch4	l: no						
Image: Scalance-x216-serverraum [192.168.144		Manu	al reset a	fter overcur	т.						dd
Intel(R) 82579LM Gigabit Network Connecti		4		Ch	i: no						15
Intel(R) Gigabit CT Desktop Adapter <2>		Manu	al reset a	fter overcur	r						l ~
🕨 🔽 PC internal [Local]		1		Che	5: no					_	
< >		Manu	al reset a	fter overcur	r					_	
✓ Details view				Chi	r: no					_	
		Manu	al reset a	fter overcur	r					_	
				Chi	3: no					_	
		Manu	al reset a	fter overcur	r.					_	
Name				Ch	no no					_	
		Manu	al reset a	fter overcur	r.					_	
				e carre						_	
		Manu	ai reset a	tter overcur Ch11	r. I: no						
		1 hours		for over							
		Manu	uneseta	Ch12	2: no						
											-
		< III		_	_					>	
Portal view 🔛 Overview 🚠 turck-tb	en-15 🖞 2 Online & 🛓					🖃 🚺	Scanning for o	devices comp	leted for int		

Fig. 47: Setting Module Parameters



7.4.6 Connecting the device online with the controller

- Start the online mode (Go online).
- ⇒ The device has been successfully connected to the PLC.



Fig. 48: TIA Portal: Online mode



7.5 Commissioning the devices in Modbus TCP

7.5.1 Implemented Modbus functions

The devices support the following functions for accessing process data, parameters, diagnostics and other services.

Function Cod	e
3	Read Holding Registers – reading multiple output registers
4	Read Input Registers – reading multiple input registers
б	Write Single Register – writing single output register
16	Write Multiple Registers – writing multiple output
23	Read/Write Multiple Registers – reading and writing multiple registers

7.5.2 Modbus registers

Address	Access	Meaning
0x00000x01FF	read only	Packed Process data of the inputs (identical to registers 0x8000 0x8FFF)
0x08000x09FF	read/write	Packed Process data of the outputs (identical to registers 0x90000x9FFF)
0x10000x100B	read only	Module identifier, contains the first 24 characters of the device type
0x100C	read only	Module status (status word)
0x1012	read only	Process image length in bit for the digital output mod- ules
0x1013	read only	Process image length in bit for the digital input modules
0x1017	read only	Register mapping revision (always 1, if not, mapping is incompatible with this description)
0x1020	read only	Watchdog, actual time in ms
0x1120	read/write	Watchdog, predefined time in ms (default: 500 ms)
0x1130	read/write	Modbus connection mode register
0x1131	read/write	Modbus connection timeout in s. (default: 0 = never)
0x113C0x113D	read/write	Modbus parameter restore (reset of parameters to default values)
0x113E0x113F	read/write	Modbus parameter save (permanent storing of parameters)
0x1140	read/write	Deactivate protocol Deactivates explicitly the selected Ethernet protocol: Bit 0 = deactivate EtherNet/IP Bit 1 = deactivate Modbus TCP Bit 2 = deactivate PROFINET Bit 15 = deactivate web server
0x1141	read/write	Active protocol Bit 0 = EtherNet/IP active Bit 1 = Modbus TCP active Bit 2 = PROFINET active Bit 15 = web server active



Address	Access	Meaning
0x1150	read only	LED behavior (PWR) at V2 undervoltage Bit 0:
		0 = red
		1 = green flashing
0x2400	read only	V1 in mV: 0 at undervoltage
0x2401	read only	V2 in mV: 0 at undervoltage
0x80000x8400	read only	Process data of the inputs (32 registers per device)
0x90000x9400	read/write	Process data of the outputs (32 registers per device)
0xA0000xA400F	read only	Diagnostics (32 registers per device)
0xB0000xB400	read/write	Parameters (32 registers per device)

The following table shows the register mapping for the different Modbus addressing methods:

Description	Hex	Decimal	5 digit	Modicon
Inputs	0x00000x01FF	0511	4000140512	400001400512
Outputs	0x08000x09FF	20482549	4204942560	402049402560
Module identifier	0x10000x1006	40964102	4409744103	404097404103
Module status	0x100C	4108	44109	404109
Process image length in bit for the digital output modules	0x1012	4114	44115	404115
Process image length in bit for the digital input modules	0x1013	4115	44116	404116
Register mapping revision	0x1017	4116	44117	404117
Watchdog, actual time	0x1020	4128	44129	404129
Watchdog, predefined time	0x1120	4384	44385	404385
Modbus connection mode register	0x1130	4400	44401	404401
Modbus connection timeout in s.	0x1131	4401	44402	404402
Modbus parameter restore	0x113C0x113D	44124413	4441344414	404413404414
Modbus parameter save	0x113E0x113F	44144415	4441544416	404415404416
Deactivate protocol	0x1140	4416	44417	404417
Active protocol	0x1141	4417	44418	404418
LED behavior (PWR) at V2 undervoltage	0x1150	4432	44433	404433
V1 in mV	0x2400	9216	49217	409217
V2 in mV	0x2401	9217	49218	409218
Process data inputs	0x8000, 0x8001	32768, 32769	-	432769, 432770
Process data outputs	0x9000, 0x9001	36864, 36865	-	436865, 436866
Diagnostics	0xA000, 0xA001	40960, 40961	-	440961, 440962
Parameters	0xB000, 0xB001	45056, 45057	-	445057, 445058



Register 0x1130: Modbus connection mode

Bit	Designation	Value	Meaning
0	MB_OnlyOneWritePermis- sion	0	All Modbus connections receive the write authorization.
		1	Only one Modbus connection can receive the write permission. A write permission is opened until a disconnect. After the disconnect the next connection which requests a write access receives the write authorization.
1	MB_ImmediateWritePer- mission	0	With the first write access, a write authoriza- tion for the respective Modbus connection is requested. If this request fails, an exception response with exception-code 0x01 is gener- ated. If the request is accepted, the write ac- cess is executed and the write authorization remains active until the connection is closed.
		1	The write authorization for the respective Modbus connection is already opened during the connection establishment. The first Modbus connection thus receives the write authorization, all following connections do not (only if bit $0 = 1$).
215	Reserved	-	-

This register defines the behavior of the Modbus connections.

Register 0x1131: Modbus connection timeout

This register defines after which time of inactivity a Modbus connection is closed through a disconnect.

Value range: 0...65535 s

default: 0 s = never (Modbus connection will never be closed)

Behavior of the BUS LED

If Modbus is the active protocol in case of a connection timeout and no further Modbus connections exist, the BUS LED behaves as follows:

Connection timeout	BUS LED
Timeout	Green flashing

Register 0x113C and 0x113D: Restore Modbus connection parameters

Registers 0x113C and 0x113D serve for resetting the parameter-register 0x1120 and 0x1130 to 0x113B to the default settings. The service resets the parameters without saving them.

Procedure:

- ▶ Write 0x6C6F to register 0×113C.
- To activate the reset of the registers, write 0x6164 ("load") within 30 seconds in register 0x113D. Both registers can also be written with one single request using the function codes FC16 and FC23.
- ⇒ The parameters are reset to default values.
- Save changes via a subsequent Save service.



Register 0x113E and 0x113F: Save Modbus connection parameters

Registers 0x113E and 0x113F are used for the non-volatile saving of parameters in registers 0x1120 and 0x1130 to 0x113B.

Procedure:

- Write 0x7361 to register 0×113E.
- Write 0x7665 ("save") within 30 seconds in register 0x113F to activate the reset of the registers. Both registers can also be written with one single request using the function codes FC16 and FC23.
- ⇒ The parameters are saved.
- 7.5.3 Data width of the I/O-modules

The following table shows the data width of the TBEN-L... modules within the Modbus register area and the type of data alignment.

Module	Process input	Process output	Alignment
TBEN-L16DIP, TBEN-L16DIN	16 bit	-	Bit by bit
TBEN-L16DOP, TBEN-L16DON	-	16 bit	Bit by bit
TBEN-L16DXP, TBEN-L16DXN	16 bit	16 bit	Bit by bit
TBEN-L8DIP-8DOP	8 bit	8 bit	Bit by bit



7.5.4 Register mapping of the devices Meaning of register bits [> 55]

TBEN-L...-16DIP, TBEN-L4-16DIN

Register	Bit no.																		
no.	15	14	13	12	11		10	9	8	7		6	5	4	3	2	1	0	
Inputs																			
0x0000	DI15 C7 P2	DI14 C7 P4	DI13 C6 P2	DI12 2 C6 P4	DI1 4 C5	1 P2	DI10 C5 P4	DI9 C4 P2	DI8 C4 P	D 4 C	l7 3 P2	DI6 C3 P4	DI5 1 C2 P2	DI4 C2 P4	DI3 C1 P2	DI2 C1 P4	DI1 C0 P2	DI0 C0 P4	
Status wo	ord	1										1			1		1		
0x0001	-	FCE	-	-	CF	G	СОМ	V1	-	-		-	-	-	-	-	AR- GEE	Diag Warn	
Group dia	agnost	tics													1	1			
0x0002	-	-	-	-	-		-	-	-	-		-	-	-	-	-	-	l/O Diag	
<u></u>			Input	regist	ers														
Register	Bit no.	•																	
no.	15	14	13	12	11		10	9	8	7		6	5	4	3	2	1	0	
0x8000	DI15 C7 P2	DI14 C7 P4	DI13 C6 P2	DI12 2 C6 P4	DI1 4 C5	1 P2	DI10 C5 P4	DI9 C4 P2	DI8 C4 P	4 C	17 3 P2	DI6 C3 P4	DI5 4 C2 P2	DI4 C2 P4	DI3 C1 P2	DI2 C1 P4	DI1 C0 P2	DI0 C0 P4	
<u></u>	Diagnostic registers											1	1	1	1	1			
Register	Bit no	•																	
no.	15	14	13	12 [·]	1	10	9	8	7		6		5	4	3	2	1	0	
0xA000	-	-				-	-	-	VE V1 Ch 15	RR C7 14/	VE V1 Ch 13	RR C6 12/	VERR V1 C5 Ch10/ 11	VERR V1 C4 Ch8/ 9	VERR V1 C3 Ch6/ 7	VERR V1 C2 Ch4/ 5	VERR V1 C1 Ch2/ 3	VERR V1 C0 Ch0/ 1	
			Parar	neteri	egis	ters		·				·							
Register	Bit no	•																	
no.	15	14	13	12	11		10	9	8	7		6	5	4	3	2	1	0	
0xB000	-	-	-	-	-		-	-	-	-		-	-	-	-	-	-	-	
0xB001	lnv. DI15	lnv. DI14	lnv. DI13	lnv. DI12	ln Dl	v. 11	lnv. DI10	lnv. Dl9	lnv. Dl8	lr C	יע. 17ו	lnv. Dl6	lnv. DI5	lnv. Dl4	lnv. DI3	lnv. Dl2	lnv. Dl1	lnv. Dl0	
0xB002				IS	T DIC)				r	eserv	ved							
0xB003				IS	T DI2	2				IST DI1									
	1																		
0xB009				IST	DI1	4								IST	DI13				
0xB00A	reserved										IST DI15								



TBEN-L...-16DOP, TBEN-L4-16DON

Register Bit no. no. 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 Status word CFG COM V1 V2 0x0000 FCE AR-Diag GEE Warn **Group diagnostics** 0x0001 I/O Diag Output data (packed) Bit no. Register no. 15 14 13 12 11 10 9 7 2 0 8 6 5 4 3 1 D015 D014 D013 D012 D011 D010 D09 0x0800 DO8 DO7 D06 DO5 DO4 DO3 DO2 D01 DO0 C7 P2 C7 P4 C6 P2 C6 P4 C5 P2 C5P4 C4P2 C4P4 C3P2 C3 P4 C2 P2 C2 P4 C1 P2 C1 P4 C0P2 C0 P4 Output registers Bit no. Register no. 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 D015 D014 D013 D012 D011 D010 D09 0x9000 D08 DO7 DO6 DO5 DO4 DO3 DO2 DO1 DO0 C7 P2 C7 P4 C6 P2 C6 P4 C5 P2 C5P4 C4P2 C4P4 C3P2 C3 P4 C2 P2 C2 P4 C1 P2 C1 P4 C0P2 C0 P4 Diagnostic register Register Bit no. no. 15 14 13 12 11 10 9 7 6 5 4 3 2 1 0 8 ERR7 ERR6 ERR5 ERR4 ERR3 ERR2 ERR1 ERR0 VERR VERR VERR VERR VERR VERR VERR VERR 0xA000 V2 C7 V2 C6 V2 C5 V2 C4 V2 C3 V2 C2 V2 C1 V2 C0 Ch8/ Ch6/ Ch14/ Ch12/ Ch10/ Ch4/ Ch2/ Ch0/ 15 13 11 9 7 5 3 ERR 0xA001 ERR ERR ERR ERR ERR ERR9 ERR8 15 14 13 12 11 10

Parameter register

Register	Bit no.															
no.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0xB000	SRO DO15	SRO DO14	SRO DO13	SRO DO12	SRO DO11	SRO DO10	SRO DO9	SRO DO8	SRO DO7	SRO DO6	SRO DO5	SRO DO4	SRO DO3	SRO DO2	SRO DO1	SRO DO0
0xB001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



TBEN-L...-16DXP, TBEN-L4-16DXN

Register	Bit no.																
no.	15	14	13	12	11	10	9	8	;	7	6	5	4	3	2	1	0
Inputs																	
0x0000	DI15 C7 P2	DI14 C7 P4	DI13 C6 P2	DI12 C6 P4	DI11	DI10	DI9	9 C) 8 [4 P4	DI7 C3 P2	DI6 C3 P4	DI5 1 C2 P2	DI4 C2 P4	DI3 C1 P2	DI2 C1 P4	DI1 C0 P2	DI0 C0 P4
Status wo	ord							<									
0x0001	-	FCE	-	-	CFG	CON	1 V1	-		-	-	-	-	-	-	AR- GEE	Diag Warn
Group di	agnost	tics			_												
0x0002	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	I/O Diag
	1		Input	regist	er			I		1		1		1		1	
Register	Bit no.																
no.	15	14	13	12	11	10	9	8	}	7	6	5	4	3	2	1	0
0x8000	DI15	DI14	DI13	DI12	DI11	DI10	DI	9 C	018	DI7	DI6	DI5	DI4	DI3	DI2	DI1	DI0
	C7 P2	C7 P4	C6 P2	C6 P4	C5 P	2 C5 P	4 C4	P2 C	:4 P4	C3 P2	2 C3 P4	4 C2 P2	C2 P4	C1 P2	C1 P4	C0 P2	C0 P4
			Outpl	it data	a (paci	(ed)											
Register	Bit no.	•								1						1	
no.	15	14	13	12	11	10	9	8	}	7	6	5	4	3	2	1	0
0x0800	DO15	DO14	D013	D012	2 DO1	1 DO1)9 [008	DO7	D06	DO5	DO4	DO3	DO2	DO1	DO0
	C7 P2	C7 P4			FIC5 P	2 C5P	4 C4	P2 C	.4P4	C3P2	C3 P4	+ C2 P2	C2 P4	CTP2	CT P4	COP2	C0 P4
			outpt	leiegi	51015												
Register	Bit no.										-		-	-	-		
	15	14	13	12	11	10	9	8		7	6	5	4	3	2	1	0
0x9000	C7 P2	DO14	DO13	C6 P4			$\begin{array}{c c} 0 & DC \\ 1 & C4 \end{array}$)9 L P2 C	008 4P4	DU/	DU6	1 C2 P2	DO4 C2 P4	DO3	DO2 C1 P4	COP2	DO0 C0 P4
	0/12		Diagn	ostic	registe	er								10112		2012	
Register	Bit no	_	-														
no.	15		13	12	11	10	9	8	7	6		5	4	3	2	1	0
0xA000	ERR7	ERR6	ERR5	ERR4	ERR3	ERR2	ERR1	ERR	0 VE	RR V	'ERR	VERR	VERR	VERR	– VERR	VERR	VERR
									V2	C7 V	2 C6	V2 C5	V2 C4	V1 C3	V1 C2	V1 C1	V1 C0
									Ch	14/ C	h12/	Ch10/	Ch8/9	Ch6/7	Ch4/5	Ch2/3	Ch0/1
0xA001	_	_	_	_				_	FPI		S RR	FRR	FRR	FRR	FRR	FRRQ	FRRS
									15	1	4	13	12	11	10		LINIO



Parameter register	
--------------------	--

Register	Bit no.	,															
no.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
0xB000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
0xB001	lnv. DI15	lnv. DI14	lnv. DI13	lnv. DI12	lnv. DI11	lnv. DI10	lnv. DI9	lnv. DI8	lnv. DI7	lnv. Dl6	lnv. DI5	lnv. Dl4	lnv. DI3	lnv. Dl2	lnv. Dl1	lnv. DI0	
0xB002	SRO DO15	SRO DO15SRO DO14SRO DO13SRO DO12SRO DO12SRO DO11SRO DO11SRO DO10SRO DO10							SRO DO7	SRO DO6	SRO DO5	SRO DO4	SRO DO3	SRO DO2	SRO DO1	SRO DO0	
0xB003	EN DO15	EN DO14	EN DO13	EN DO12	EN DO11	EN DO10	EN DO9	EN DO8	EN DO7	EN DO6	EN DO5	EN DO4	EN DO3	EN DO2	EN DO1	EN DO0	
0xB004				IST	DI0			-	Reserved								
0xB005				IST	DI2							IS	۲DI1				
0xB00B			IST DI13														
0xB00C				Rese	rved				IST DI15								



TBEN-L...-8DIP-8DOP

Register	Bit no	•															
no.	15	14	13	12	11	10	9	8	7		6	5	4	3	2	1	0
Inputs																	
0x0000	-	-	-	-	-	-	-	-	DI7	7	DI6	DI5	DI4	DI3	DI2	DI1	DI0
									C3	P2	C3 P4	C2 P2	C2 P4	C1 P2	C1 P4	C0 P2	C0 P4
Status w	ord	1	1		-1					r	r	1	1	1	1	1	
0x0001	-	FCE	-	-	CFG	i CON	И V1	-	-		-	-	-	-	-	AR- GEE	Diag Warn
Group di	agnos	tics															
0x0002	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	I/O Diag
			Input	regis	ter												
Register	Bit no	•															
no.	15	14	13	12	11	10	9	8	7		6	5	4	3	2	1	0
Input da	ta																
0x8000	-	-	-	-	-	-	-	-	DI7	7	DI6	DI5	DI4	DI3	DI2	DI1	DI0
									C3	P2	C3 P4	C2 P2	C2 P4	C1 P2	C1 P4	C0 P2	C0 P4
			Outp	ut dat	a (pac	ked)											
Register	Bit no	•															
no.	15	14	13	12	11	10	9	8	7		6	5	4	3	2	1	0
0x0800	-	-	-	-	-	-	-	-	DO)15	DO14	D013	DO12	D011	DO10	DO9	DO8
				<u> </u>					C7	P2	C7 P4	C6 P2	C6 P4	C5 P2	C5P4	C4P2	C4P4
			Outp	ut reg	Isters												
Register	Bit no	•															
no.	15	14	13	12	11	10	9	8	7		6	5	4	3	2	1	0
0x9000	-	-	-	-	-	-	-	-	DO)15	DO14	DO13	DO12	DO11	DO10	DO9	DO8
			<u> </u>						C7	P2	C7 P4	C6 P2	C6 P4	C5 P2	C5P4	C4P2	C4P4
			Diagi	nostic	regist	er											
Register	Bit no).															
no.	15	14	13	12	11	10	9	8	7	6	5	5	4	3	2	1	0
0xA000	ERR	ERR	ERR	ERR	ERR	ERR	ERR9	ERR8	VERR	VE	RR \	/ERR	VERR	VERR	VERR	VERR	VERR
	15	14	13	12	11	10			V2 C7	V2	C6	/2 C5	V2 C4	V1 C3	V1 C2	V1 C1	V1 C0
									Ch14	Ch	112/ (0	_n10/	CN8/9	Ch6/7	Ch4/5	Cn2/3	Ch0/1



Parameter register

Register	Bit no.																		
no.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0			
0xB000	SRO DO15	SRO DO14	SRO DO13	SRO DO12	SRO DO11	SRO DO10	SRO DO9	SRO DO8	lnv. DI7	lnv. Dl6	lnv. DI5	lnv. Dl4	lnv. DI3	lnv. Dl2	lnv. DI1	lnv. Dl0			
0xB001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
0xB002				IST	DI0				Reserved										
0xB003				IST	DI2				IST DI1										
0xB004				IST	DI4				IST DI3										
0xB005		IST DI6									IST DI5								
0xB006				Rese		IST DI7													

Meaning of the register bits

Designation	Meaning
In-/output data	
DI	Digital input
DO	Digital output
DXP	DXP channel
Ρ	Pin
Х	Connector
Module status	
ARGEE	ARGEE program running in the device
DIAG	Diagnostics available at the device.
FCE	The DTM Force Mode is activated. The actual output values may not match the ones defined and sent by the field bus.
V1	System voltage too low
V2	V2 too low
Parameters	
The chapter "Paramete detailed parameter des	rizing and Configuring" Parametrieren und Konfigurieren contains a scription.
EN DO	Activate digital output
IST DI1	Pulse stretching of the input signal
Inv. DI	Invert digital input
SRO	Manual output reset after overcurrent
Diagnostics	
The chapter "Operating	g" Betreibencontains a detailed parameter description.
ERR	Overcurrent output
VERR V1 C K	Overcurrent supply V1 or V2 at the respective connector and channel
VERR V2 C K	



7.5.5 Error behavior (watchdog)

Behavior of outputs

In case of a failure of the Modbus communication, the outputs' behavior is as follows, depending on the defined time for the Watchdog (register 0x1120):

Watchdog	Behavior of outputs
0 ms	All outputs maintain the actual value in case of an error
> 0 ms (default = 500 ms)	Outputs switch to 0 after the watchdog time has expired (setting in register 0x1120).



NOTE

Setting the outputs to predefined substitute values is not possible in Modbus TCP. Eventually parameterized substitute values will not be used.

Behavior of the BUS LED

When the watchdog triggers, the BUS LED lights up red.

Behavior of the device in case of loss of Modbus communication

If Modbus is the active protocol and all Modbus connections are closed, the watchdog switches all outputs to "0" after the watchdog time has expired, unless another protocol (PROFINET, EtherNet/IP) has been activated in the meantime.



7.6 Connecting devices to a Modbus Client with CODESYS

Naming convention

Turck uses the terms "Modbus client" and "Modbus server" according to Modbus Organization. The following description uses the terms "Modbus TCP Master" (client) and "Modbus TCP Slave" (server) only because of the naming in CODESYS.

Used hardware

The following hardware components are used in this example:

- TX715-P3CV01 (IP address: 192.168.145.72)
- Block module TBEN-L...- (IP address: 192.168.145.200)

Used software

The following software tools are used in this example:

CODESYS 3.5.18.2 (can be downloaded for free under www.turck.com).

7.6.1 Connecting the device to the PLC

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

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



Adding the Ethernet Adapter

- Right-click **Device** in the project tree **TX715-P3CV01**.
- Select Add Device.
- Select Ethernet Adapter.
- Click Insert device.
- ⇒ The Ethernet Adapter is added to the project tree as **Ethernet (Ethernet)**.

TBEN.project* - CODESYS	- 0	×
File Edit View Project Build Onlin	M Add Device	\times
管 😅 🖬 🎒 🗠 여 🐰 🖻 💼 🗙 세	Name: Ethernet Action: Action: Append device O Insert device O Plug device O Update device	
B TEEN		
Device (TX715-P3CV01)	String for a fulltext search Vendor: <all vendors=""></all>	\sim
	Name Vendor Version Description Image: Second Secon	<
④ Visualization	Image: Ethernet Vendor: Turck Vendor: Turck Categories: Ethernet Adapter, Ethernet Adapter, Ethernet Adapter Version: 35.11.0 Order: Number: - Paceriation: Ethernet Link Append selected device as last child of Version: Overce Image: Overcome and the target node in the navigator while this window is open.)	
Cevices POUs	Add Device Clos	e (})

Fig. 49: Adding the Ethernet Adapter



Adding the Modbus TCP Master

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

TBEN.project* - CODESYS		– 🗆 X
File Edit View Project Build Online Debug	M Add Device	×
1 1 1 1 1 1 1 1 1 1 1 1 1 1	Name Modbus_TCP_Master Action Action Depended evides Or Beart devices Or Bins devices Or Update devices	
Device TERV Device TY715-P3CV01) Device Application Diage Application Diage Device (TX715-P3CV01) Device Application Diage Diage Diage <		Version Description 4.1.0.0 A device the ated versions en.) evice Close
	Last build: 👽 0 🤫 0 Precomplie: 🗸 Project User: ((100004) 🔰 👘

Fig. 50: Adding the Modbus TCP Master



Adding the Modbus TCP Server (Slave)

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

TBEN.project* - CODESYS	– – X
File Edit View Project Build Online Debug	· 🛍 Add Device 🛛 👋
Image: Second state of the second	Name: Modbus_TCP_Slave_1 Action:
Application Application ImagePool PLC_PRG (PRG) Kannaser PLC_PRG (PRG) Kannask PLC_PRG VISUITAsk VISUITASK VISUITAKK VISUITAKKK VISUITAKKK VISUITAKKK VISUITAKKK VISUITAKKK VISUITAKKK VISUITAKKK VISUITAKKK VISUITAKKKK VISUITAKKK VISUITAKKKKKK VIS	Fieldbuses Fieldbuses Modbus Serial Slave Modbus Slave, COM Port 3S - Smart Software Solutions GmbH 4.1.0.0 A Group by category Display all versions (for experts only) Display outdated versions Please select a device from the list above.
Generating	(You can select another target node in the navigator while this window is open.) Add Device Close Last build: O 0 0 Precompile: Project user: (nobody)

Fig. 51: Adding the Modbus TCP Slave



7.6.2 Configuring the Network Interface

- Click Device \rightarrow Scan network.
- Select Modbus TCP Master (here: TX715-P3CV01) and confirm with OK.

TBEN.project	* - CODESYS	- 🗆 X
File Edit V	iew Project Build Online Debug Tools Window Help	7
12 🛋 🗐	い マ み 陶 🋍 🗙 桷 🍕 🌺 🏰 🎚 🎕 🦄 🎚 🏙 - 😭	웹 🐝 🥨 🕞 📲 🕲 [로 1월
		1
Devices		•
BEN		Scan network Gateway - Device -
🖹 🗊 Device	(TX715-P3CV01) Communication Setti	ngs Starrietwork Gateway + Device +
E II PLC	CLogic Select Device	×
	Ime Select the network path to the controller:	•
-	Libe Gateway-1	Device Name:
	PLC TX715-P3CV01 [0301.B048]	TX715-P3CV01
	u∰ Tas ⊐≪>	Device Address: G
		Block driver
		UDP
		Number of channels:
		4
. I.	Ust Vist	Serial number: AA00012MH000079339AA
🖹 - 🔐 Eth	ernet (E	Target ID:
	Modbus 77	10CD 0209
	III Mo	Target Name:
		4096
		· · · · · · · · · · · · · · · · · · ·
Devices	Hide non-matching devices, filter by Target ID	OK Cancel
	Last build: 🙆 0 🕐 0	Breiert user (ochodu)

Fig. 52: Configuring the network interface



- Double-click Ethernet.
- Open the dialog box Network Adapter by clicking the Browse... button in the register tab General.
- Select the interface TX715-P3CV01 (here: 192.168.145.72)

TBEN-L.project* - CODESYS					— D) ×			
File Edit View Project Build Online	Debug	Tools Wind	low Help			₹			
一日ののよりは×143 1000000000000000000000000000000000000	S 🐴 😘 I	IF PL	御 陽 海・ 6	🛗 😋 👒 ,	- * (] • • • •	8 0 -			
						•			
Devises		Devier	Val at an at a						
Devices •		Device	i Ethernet X			•			
Even Device Connected (TV715 D2CV01)	G	eneral							
				Network interface	eth0	Browse			
	St	atus		IP address	192 . 168 . 147 . 199				
ImagePool		harnat Davisa	1/O Manajan	Subnet mask	255 . 255 . 255 . 0				
Library Manager	Dibrary Manager								
PLC_PRG (PRG)	Network A	dapters				^			
Task Configuration	Interfaces	:							
⊟ S MainTask	Name	Description	IP Address						
	lo		127.0.0.1	_					
UisuElems.Visu Pro	eth0		192.168.145.72						
TextList	eth1		0.0.0						
🗉 📲 Visualization Manager	eth2		0.0.0						
Visualization									
🖹 🗊 Ethernet (Ethernet)									
Modbus_TCP_Master (Modbus TCP Ma	IP Addres	is 1	92 . 168 . 145 . 7	2					
Modbus_TCP_Slave (Modbus TCP	Subnet M	ask 2	55 . 255 . 255 . 0						
	Default G	ateway	0.0.0.0						
		, [00							
	MAC Add	ress):07:46:25:09:3C						
					OK	Cancel			
<					UK C	, and a			
Sevices POUs	<					>			
	Last build	: 😳 0 🕐 0	Precompile: 🗸	ቤ	Project user: (nobody)	()			

Fig. 53: Selecting the interface



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

- Double click Modbus TCP Server (Slave).
- Enter the slave IP address in the General register tab (here: 192.168.145.200).

TBEN.project* - CODESYS			— 🗆 ×	<
File Edit View Project Build Online Debug	Tools Window Help			5
○ ○ 本 ● ● ○ ○ 本 ● ● × ● ○ ◆ ● ○ ○ ○ 本 ● ● × ● ○ ○ ● ○ ● ○ ● ○ ● ○ ● ○ ○ ● ○ ● ○ ● ○ ● ○ ● ○ ● ○ ● ○ ● ○ ● ○ ●	乳乳油	🖮 😋 🕫 🕞 🛶 🔏	[≡ 9≡ ¢≡ +≡ 8 ⇔ 素 ╤ f	7/
				-
Devices – I Y	Modbus TCP Slave Y			-
				-
Device (TX715-P3CV01)	General	Modbus-TCP		
= - III PLC Logic	Madhua Claus Channel	Slave IP Address	192 168 145 200	
Application	Modbus Slave Channel	Slave Ir Address.	152 - 160 - 115 - 200	
	Modbus Slave Init	Response Timeout ((ms): 1000	
Library Manager		Port:	502	
Task Configuration	ModbusTCPSlave Parameters			
AmainTask	ModbusTCPSlave IEC Objects			
PLC_PRG				
S VISU_TASK	Status			
UisuElems.Visu_Prg	Information			
IextList Isyalization Manager				
Visualization				
Ethernet (Ethernet)				
Modbus_TCP_Master (Modbus TCP Master)				
Modbus_TCP_Slave (Modbus TCP Slave)				
< >>				_
2 Devices POUs	<			>
	Last build: 🙆 0 😗 0	Precompile: 🗸	Project user: (nobody)	

Fig. 54: Modbus TCP Slave: Setting the IP address



7.6.4 Defining modbus channels

Defining channel 0 (input data)

- Double click Modbus TCP Slave.
- ▶ In the register tab select Modbus Slave Channel → Add Channel.
- Enter the following values: Channel name Access type: Read Input Registers Offset: 0x0000 Length: 1 register
- Confirm with OK.

TBEN.project* - CODESYS								- 🗆	×
File Edit View Project Build Online	File Edit View Project Build Online Debug Tools Window Help								
₩ X B G N N N B B X B	Vi 🐴 Vi 🔲 🕅	1 1 B	■< [î ॐ ଔ → ■	* Ç= 9:	I 4I +I 8	¢ 🎢	∏ ' ∛∕		
	/ Modbus_TCP_SI	ave X							•
□ - □ 7EEV □ - □ Device (TX715-P3CV01) □ - 테 PLC Logic	General		Name Access Type	Trigger	READ Offset	Length	Error Handling	WRITE Offset	Len
G Application	Modbus Slave Channel								
ImagePool	Modbus Slave Init	ModbusChannel	4			×			
PLC_PRG (PRG)	ModbusTCPSIave Par	Channel Name	Inputs]					
⊂ 🍪 MainTask	ModbusTCPSlave IEC	Access Type	Read Input Registers (Function	on Code 4)		\sim			
Service Transk	Status	Trigger	Cyclic ~	Cycle Time ((ms) 100				
TextList	Information	Comment							
🕀 🖶 Visualization Manager		READ Register							
Uisualization		Offset	0x0000			~			
Ethernet (Ethernet)		Length	1						
Modbus_TCP_Slave		Error Handling	Keep last Value V						
		WRITE Register	r						
		Offset				\sim			
		Length	1						
< >>					ок	ancel	Add Channe	el Dele	:te
🗝 Devices 🗋 POUs	<								>
			Last build: 📀	0 🕐 0 🛛 Pre	ecompile: 🗸		Project user: (no	body)	()

Fig. 55: Defining the input register



Defining channel 1 (output data)

- Double click Modbus TCP Slave.
- ▶ In the register tab select Modbus Slave Channel → Add Channel.
- Enter the following values: Channel name Access type Write Single Register Offset: 0x0800 Length: 1 register
- Confirm with OK.

TBEN.project* - CODESYS								- 0	×
File Edit View Project Build Onlin	File Edit View Project Build Online Debug Tools Window Help								
🖹 🚅 🖬 🎒 🗠 🗠 🌡 🖻 🛍 🗙 🚧	1. C.S.	🐴 🛀 📕 🕅	資源目	a 🏧 - 🖆 🕮 얮 💖 🔸 🔳 🔧	Ç≡ ⊊≣ ≜⊒ →∃	\$ ¢ ⊼	≓ V -		
Devices 👻 🖣 🗙		Modbus_TCP_SI	ave X						•
TBEN					.	2512.07			
Device (TX715-P3CV01)			Name	Access Type	Trigger	READ Offset	Length	Error Handling	WRITE C
PLC Logic	inel	0	Inputs	Read Input Registers (Function Code 04)	Cyclic, t#100ms	16#0000	1	Keep last Value	
		ModbusChannel			×				
Library Manager		Channel							
PLC_PRG (PRG)	aram	Name	Outputs						
Task Configuration		Access Type	Write Sin	ale Register (Eurotion Code 6)	~				
□ 🍪 MainTask	'O Ma		write on						
	-C OF	Irigger	Cyclic	Cycle lime (ms)	100				
VisuElems, Visu Pra		Comment							
TextList		READ Register							
🗈 📑 Visualization Manager		Offset			~				
Usualization		Length	1						
Ethernet (Ethernet)		Congen	-						
Modbus TCP Slave (Modbus		Error Handling	Keep las	t value V					
		- WRITE Register -							
		Offset	0x0800		~				
		Length	1						
									>
				ОК	Cancel	Add Channel	De	lete E	dit
POUs	<		_				_		>
				Last build: 😋 0 😗	0 Precompile:	/	Project us	er: (nobody)	()

Fig. 56: Defining the output data register



7.6.5 Going online with the PLC

- Select the device.
- Click Online \rightarrow Login.

TBEN.project* - CODESYS									_		×
File Edit View Project Build Or	nline Debug	Tools	Window	Help	_						₹
🎦 🖆 📕 🕘 🗠 여 🐰 🖻 🛍 🎾	Login			Alt+F8	* 🕮	1 😋 💖 ,	🔲 📲 🕻 🗐 🖉	6월 4월 4 월 1	\$ \$	- AS 7	₹ V
C C C C C C C C C C C C C C C C C C C	Logout			Ctrl+F8							
Devices	Create Boot	Applicatio	on								•
B TBEN	Download				_						
🖃 🗊 Device (TX715-P3CV01)	Online Chan	ge				Modbus-TCP					
PLC Logic	Source Down	nload to C	Connected D	evice		Slave IP A	ddress:	192 . 1	168 . 14	5,200]
Application	Multiple Dov	vnload				Dessee	Timesut (ms):	1000		1]
ImagePool	Reset Warm				-	Response	nmeour (ms):	1000]	
	Reset Cold					Port:		502			
🖻 🌃 Task Configuration	Reset Origin										
🖃 😻 MainTask	Simulation										
	Security			•							
VISU_TASK	Operating M	ode			-						
TextList					-						
🗉 📑 Visualization Manager 🔛	Assign Serve	r Applicat	tions on Dov	vnload							
- 🕒 Visualization		Infor	mation								
Ethernet (Ethernet)											
Modbus_TCP_Master (Modbus	TCP Master)										
	us ICP Slave)										
	>	1									
Cevices L POUs											2
			Last build	1: 🖸 0 🕐 0	Pre	ecompile: 🗸	Pr	roject user: (no	obody)		V .:

Fig. 57: Login



- Download the application to the PLC and start it via **Debug** \rightarrow **Start**.
- ⇒ The Modbus TCP communication is setup.

TBEN.project - CODESYS				- 🗆 ×			
File Edit View Project Build Online Debug Ti	ools Windo	w Help		T			
	金目 鳥しの文画会× 藤焼蒔佐 名著海湾島海・宮田(200)、- 梁信を告任の(東京) 2 2						
			-9 -9 -	=			
Devices - I ¥	Modh	us TCP Slave ¥					
E S Device [connected] (TX715-P3CV01)	General		-Modbus-TCP				
PLC Logic			Slave ID Addresse	102 169 145 200			
🖹 🔘 Application [run]	Modbus SI	ave Channel	Slave IF Address.	152 . 100 . 143 . 200			
ImagePool	Modbus Sl	ave Init	Response Timeout (ms):	1000			
Library Manager			Port:	502			
PLC_PRG (PRG)	ModbusTC	PSlave Parameters					
AinTask	ModbusTC	PSlave I/O Mapping					
PLC_PRG							
i⊒ 👙 visu_task	ModbusTC	PSlave IEC Objects					
UsuElems.Visu_Prg	Status						
TextList	Status						
Visualization	Informatio	n					
🖻 😏 🛐 Ethernet (Ethernet)							
🖃 😏 🚮 Modbus_TCP_Master (Modbus TCP Master)							
😔 📶 Modbus_TCP_Slave (Modbus TCP Slave)							
< >							
😪 Devices 🗋 POUs	<			>			
Device user: Anonymous st build: 😳 0 🕐 0 Precompile: 🧣	RUN	Program loaded	Program unchanged	Project user: (nobody)			

Fig. 58: Modbus TCP communication



7.6.6 Reading process data

The process data can be interpreted by means of the mapping Register mapping If the device is online with the PLC.

The process data can be interpreted by means of the mapping (Register Mapping) if the device is connected to the PLC.

- Double click Modbus TCP Slave.
- Click onto register tab **Modbus TCP Slave I/O Mapping**.
- Set the function Always update variables to Enabled 1 (...).
- ⇒ The process data are displayed.



Fig. 59: Process data



7.7 Commissioning the device in EtherNet/IP

7.7.1 Common EtherNet/IP features

Feature	Description
QuickConnect	< 500 ms
Device Level Ring (DLR)	Yes
Number of TCP connections	3
Number of CIP connections	10
Input assembly instance	103
Output assembly instance	104
Configuration assembly Instance	106

7.7.2 EDS files and catalog files

The EDS and catalog files can be downloaded free of charge from www.turck.com.

TBEN-L_ETHERNETIP.zip

erties.

7.7.3 QuickConnect (QC)

QuickConnect enables a PLC to build up connections to EtherNet/IP nodes in less than 500 ms after switching-on the power supply for the EtherNet/IP network. The fast start-up is necessary for fast tool changing applications at robot arms for example in the automobile industry.

QuickConnect can be activated via the web server of the device, via Configuration Assembly (e.g. in RS Logix or via Class Instance Attribute.



NOTE Activating QuickConnect activated the automatic setting of all necessary port prop-

Port property	Status
Auto negotiation	Deactivated
Transmission speed	100BaseT
Duplex	Full duplex
Topology	Linear
AutoMDIX	Deactivated

For information on the correct connection of Ethernet cables in QuickConnect applications, please refer to the chapter Connecting [> 21].



Activating QuickConnect via Configuration Assembly

The Configuration Assembly is part of the device's Assembly Class.

- Configure the Configuration Assembly in RS Logix.
- ► Activate QuickConnect via byte9, bit 0 = 1 in the Controller Tags.

Controller Tags - TBEN_L(controller) ×							
Scope: TBEN_L V Show: All Tags V Enter Name Filter							
Name ==	▲ Force ◆	Style	Data Type	Description			
▲ TBEN_L5_16DOP:C	{}		AB:ETHERNET_M				
TBEN_L5_16DOP:C.Data	{}	Hex	SINT[400]				
TBEN_L5_16DOP:C.Data[0]		Hex	SINT	Reserved			
TBEN_L5_16DOP:C.Data[1]		Hex	SINT	Reserved			
TBEN_L5_16DOP:C.Data[2]		Hex	SINT	Reserved			
TBEN_L5_16DOP:C.Data[3]		Hex	SINT	Reserved			
TBEN_L5_16DOP:C.Data[4]		Hex	SINT	Reserved			
TBEN_L5_16DOP:C.Data[5]		Hex	SINT	Reserved			
TBEN_L5_16DOP:C.Data[6]		Hex	SINT	Reserved			
TBEN_L5_16DOP:C.Data[7]		Hex	SINT	Reserved			
TBEN_L5_16DOP:C.Data[8]		Hex	SINT	Reserved			
TBEN_L5_16DOP:C.Data[9]		Hex	SINT	Quick Connect, Eth Custom Setup, LED-behavior (PWR) at V2 undervoltage			
TBEN_L5_16DOP:C.Data[9].0		Decimal	BOOL	Quick Connect: 0=disable, 1=enable			
TBEN_L5_16DOP:C.Data[9].1		Decimal	BOOL	Eth 1 Custom Setup: 0=Auto-negotiate, 1=100BT/FD			
TBEN_L5_16DOP:C.Data[9].2		Decimal	BOOL	Eth 2 Custom Setup: 0=Auto-negotiate, 1=100BT/FD			
TBEN_L5_16DOP:C.Data[9].3		Decimal	BOOL	LED-behavior (PWR) at V2 undervoltage: 0=Red, 1=Green			
TBEN_L5_16DOP:C.Data[9].4		Decimal	BOOL	Reserved			
TBEN_L5_16DOP:C.Data[9].5		Decimal	BOOL	Reserved			
TBEN_L5_16DOP:C.Data[9].6		Decimal	BOOL	Reserved			
TBEN_L5_16DOP:C.Data[9].7		Decimal	BOOL	Reserved			
TBEN_L5_16DOP:C.Data[10]		Hex	SINT	Manual reset after overcurr.			
TBEN_L5_16DOP:C.Data[11]		Hex	SINT	Manual reset after overcurr.			
TBEN_L5_16DOP:C.Data[12]		Hex	SINT				

Fig. 60: Configuring QuickConnect in RSLogix

Activating Quick Connect via Class Instance Attribute

Activate Quick Connect via Class Instance Attribute as follows:

Class	Instance	Attribute	Value
0xF5	0x01	0x0C	0: deactivated (default) 1: activated



Activating QuickConnect via the Webserver.

Activate the checkbox Activate QuickConnect in the web server.

START DOCUMEN	ITATION		TURCK Your Global Automation Partner
TBEN-		START -> DE\	/ICE → PARAMETERS
DEVICE j Info Parameters Q _P Diagnosis A	Read Write Tab view Print Data format Deactivate PROFINET Deactivate CC-Link Fieldbus	no ~	•
 Event log Export/Import Change Password Firmware LOCAL I/O <u>1</u> Parameters Diagnosis <u>1</u> Input 	Deactivate WEB server Ethernet Port 1 Ethernet Port 2 EtherNet/IP configuration Activate GW Control Word	no v 100 Mbps, full-duplex v 100 Mbps, full-duplex v yes v	0 0 0
	Activate GW Status Word Activate QuickConnect	ves NO YES	0 0
	QuickConnect-Status Modbus TCP configuration Activation write permission Write permission Modbus connection timeout Watchdog time PROFINET configuration	enable with first write access all connections 0 s 500 ms	2 2 2 2
	Device name		?

Fig. 61: Activating QuickConnect in the web server

7.7.4 Device Level Ring (DLR)

The devices support DLR (Device Level Ring). The DLR redundancy protocol is used to increase the stability of EtherNet/IP networks.

DLR-enabled devices have an integrated switch and can thus be integrated into a ring topology. The DLR protocol is used to detect an interruption in the ring. If the data line is interrupted, data are sent through an alternative network section, so that the network can be reconfigured as soon as possible.

DLR-capable network nodes (DLR supervisor) are provided with extended diagnostic functions which enable the devices to localize errors and thus decrease the time for error search and maintenance. Normally, the controller (i.e. the controller/PLC) assumes the supervisor function, all other network nodes are DLR participants. The supervisor blocks one of its two ports for normal Ethernet traffic, so that a line topology is created for normal Ethernet telegrams. DLR messages can continue to use the ring in both directions and thus continuously check the function of the ring.



7.7.5 Diagnostic messages via process data

The devices support the evaluation of diagnostics via Explicit Messages. In addition, the diagnostic data can be mapped into the process data. Two different types of diagnostic data handling are available:

- Summarized Diagnostics
- Scheduled diagnostics (manufacturer specific)

Summarized Diagnostics

The summarized diagnostic data mode will send back the bit "I/O Diag" which indicates that one of the device channels sends a diagnosis. If Bit "I/O Diag" = 0, not diagnostic is pending.

Scheduled diagnostics (manufacturer specific)

If the manufacturer-specific diagnostics are activated via Process Data Class (VSC102), attribute 105 (0x69), manufacturer-specific diagnostic bits are mapped into the process data of the device.


7.7.6 EtherNet/IP standard classes

The modules support the following EtherNet/IP standard classes in accordance with the CIP specification.

Class code		Object name
Dec.	Hex.	
01	0x01	Identity Object [73]
04	0x04	Assembly Object [> 75]
06	0x06	Connection Manager Object [▶ 84]
245	0xF5	TCP/IP Interface Object [▶ 84]
246	0xF6	Ethernet Link Object [) 87]

Identity Object (0x01)

The following description is taken from the CIP specification, Vol. 2, Rev. 2.1 by ODVA & Control-Net International Ltd. and adapted to the Turck products.

Instance attributes

Attr. no.		Attribute name	Get/Set	Туре	Value
Dec.	Hex.				
1	0x01	Vendor	G	UINT	Contains the manufacturer ID. Turck = $0x30$
2	0x02	Product type	G	UINT	Shows the general product type. Communications Adapter $12_{dec} = 0x0C$
3	0x03	Product code	G	UINT	ldentifies a special product in a device type. default: 27247 _{dec} = 0x6A6F
4	0x04	Revision Major Minor	G	STRUCT OF: USINT USINT	Revision of the device which is represented by the Indentity Object. 0x01 0x06
5	0x05	Device status	G	WORD	WORD
6	0x06	Serial number	G	UDINT	Contains the last 3 bytes of the MAC ID
7	0x07	Product name	G	STRUCT OF: USINT STRING [13]	i.e.: TBEN-L5-16DXP



Device status

Bit	Name	Definition
01	Reserved	default = 0
2	Configured	TRUE = 1: The application in the device has been con- figured (default setting).
3	Reserved	default = 0
47	Extended Device Status	0011 = no I/O connection established 0110 = at least one I/O connection in RUN mode 0111 = at least one I/O connection established, all in IDLE mode All other settings = reserved
8	Minor recoverable fault	Recoverable fault, e.g.: Undervoltage Force mode of DTM active Diagnostics at I/O channel active
910	Reserved	
11	DIAG	Common error bit
1215	Reserved	default = 0

Common services

Service c	ode	Class	Instance	Service name		
Dec.	Hex.					
1	0x01	Yes	Yes	Get_Attribute_All Returns a predefined list of object attributes		
5	0x05	No	Yes	Reset Starts the reset service for the device		
14	0x0E	Yes	Yes	Get_Attribute_Single Returns the content of a specified attribute		
16	0x10	No	No	Set_Attribute_Single Changes a single attribute		



Assembly Object (0x04)

Assembly Objects bind attributes of multiple objects. to allow data to or from each object to be sent or received over a single connection.

The following description of the Ethernet Link Object is taken from the CIP specification, Vol. 2, Rev. 2.1 by ODVA & ControlNet International Ltd. and adapted to the Turck products.

Class attributes

Attr. no.		Attribute name	Get/set	Туре	Value
Dec.	Hex.				
1	0x01	Revision	G	UINT	2
2	0x02	Max. object instance	G	UINT	104

Instance Attributes

Attr. no.		Attribute name	Get/set	Туре	Value
Dec.	Hex.				
3	0x03	Data	S	ARRAY OF BYTE	Identifies a special product in a device type. default: 27247 _{dec} . = 0x6A6F
4	0x04	Size	G	UINT	Number of bytes in attribute 3: 256 or variable

Common services

Service code		Class	Instance Service name		
Dec.	Hex.				
1	0x01	Yes	Yes	Get_Attribute_All Returns a predefined list of object attributes.	
14	0x0E	Yes	Yes	Get_Attribute_Single Returns the content of a specified attribute.	

Configuration Assembly (Instance 106)

The modules support Configuration Assembly.

The Configuration Assembly contains:

10 bytes module configuration data (EtherNet/IP specific)

+ x Byte (parameter data, depending on device type)

Device configuration data

Default values are shown in **bold**.

Designation	Value	•	Meaning			
QuickConnect	0	Disabled	QuickConnect is deactivated.			
	1 activated		QuickConnect is activated.			
Eth x Port-Setup	0 Auto negotiation		The port is set to autonegotiation.			
	1	100BT/FD	Fix setting of the communication parameters for the Ethernet port to: 100BaseT Full duplex			

Configuration Assembly TBEN-L...-16DIP and TBEN-L4-16DIN

Byte no.		Bit no.							
Dec.	Hex.	7	6	5	4	3	2	1	0
Device configuration data [> 76]									
08	0x00 0x08				reserv	ved			
9	0x09		Reserved LED (PWR) Eth2 port Eth1 port Quick at V2 setup Conne undervoltage						Quick Connect
Parame	ter data	[▶ 125]							
10	0x0A				reserv	red			
11	0x0B								
12	0x0C	Inv. DI7	Inv. DI6	Inv. DI5	Inv. DI4	Inv. DI3	Inv. DI2	lnv. Dl2	Inv. DI0
13	0x0D	Inv. DI15	Inv. DI14	Inv. DI13	Inv. DI12	Inv. DI11	Inv. DI10	Inv. DI9	Inv. DI8
14	0x0E				reserv	red			
15	0x0F				IST D	10			
30	0x1E				IST DI	15			



Byte no.		Bit no.							
Dec.	Hex.	7	6	5	4	3	2	1	0
Device configuration data [> 76]									
08	0x00 0x08				reserv	ved			
9	0x09		Rese	erved		LED (PWR) at V2 undervoltage	Eth2 port setup	Eth1 port setup	Quick- Connect
Parame	ter data	[▶ 125]							
10	0x0A				reserv	ved			
11	0x0B								
12	0x0C	Inv. DI7	Inv. DI6	Inv. DI5	Inv. DI4	Inv. DI3	Inv. DI2	Inv. DI2	Inv. DI0
13	0x0D	Inv. DI15	Inv. DI14	Inv. DI13	Inv. DI12	Inv. DI11	Inv. DI10	Inv. DI9	Inv. DI8
14	0x0E	SRO7	SRO6	SRO5	SRO4	SRO3	SRO2	SRO1	SRO0
15	0x0F	SRO15	SRO14	SRO13	SRO12	SRO11	SRO10	SRO9	SRO8
16	0x10	EN DO7	EN DO6	EN DO5	EN DO4	EN DO3	EN DO2	EN DO1	EN DO0
17	0x11	EN DO15	EN DO14	EN DO13	EN DO12	EN DO11	EN DO10	EN DO9	EN DO8
18	0x12				reserv	ved	•		
19	0x13				IST D	010			
34	0x22				IST DI	15			
35	0x23				reserv	ved			
41	0x29								

Configuration Assembly – TBEN-LL-16DXP



Byte no.		Bit no.							
Dec.	Hex.	7	6	5	4	3	2	1	0
Device configuration data [> 76]									
08	0x00 0x08				reserv	ved			
9	0x09		Reserved LED (PWR) Eth2 port Eth1 port Quick- at V2 setup Connec undervoltage						Quick- Connect
Paramet	ter data	[▶ 125]							
10	0x0A	Inv. DI7	Inv. DI6	Inv. DI5	Inv. DI4	Inv. DI3	Inv. DI2	Inv. DI2	Inv. DI0
11	0x0B	SRO15	SRO14	SRO13	SRO12	SRO11	SRO10	SRO9	SRO8
12	0x0C				reserv	ved			
12	0x0D								
14	0x0E								
15	0x0F				IST D	010			
22	0x16				IST D	017			
23	0x17				reserv	ved			
		1							
25	0x19	1							

Configuration Assembly – TBEN-LL-8DIP-8DOP

Configuration Assembly TBEN-L...-16DOP and TBEN-L4-16DON

Byte no.		Bit no.								
Dec.	Hex.	7	6	5	4	3	2	1	0	
Device configuration data [> 76]										
08	0x00 0x08		reserved							
9	0x09		Reserved LED (PW at V2 undervc					Eth1 port setup	Quick- Connect	
Parame	ter data	[▶ 125]								
10	0x0A	SRO7	SRO6	SRO5	SRO4	SRO3	SRO2	SRO1	SRO0	
11	0x0B	SRO15	RO15 SRO14 SRO13 SRO12				SRO10	SRO9	SRO8	
12	0x0C		·	<u>.</u>	reserv	ved	•	<u>.</u>		
13	0x0D									



Process data instances

Instance 101

Contains the device's input data (static length 256 bytes): 2 bytes status information + process data

Instance 102

Contains the device output data (static length 256 byte) 2 byte control data (mapped, but unused) + process data

Instance 103 and Instance 104

Instances 103 and 104 are input and output instances with variable size. The size of the assembly data is calculated exactly beforehand to ensure the station configuration, diagnostics etc.. The effective size of the Assembly Instance can be determined using the Assembly Object (instance 0×67, attribute 0x04) and can be from 2 to 496 bytes large.

Process data mapping

The process data mapping of the devices depends on whether the manufacturer-specific diagnostics (Scheduled Diagnostics) are activated or deactivated via the Process Data Class (VSC 102, Attribute 105) and the diagnostic data are mapped into the process data of the devices.

In addition, both the status and the control word can be activated or deactivated via the gateway class (VSC100, Instance 2, Attribute 138 and Attribute 139).



NOTE

Activating or deactivating the manufacturer-specific diagnostics and the status and control word changes the process data mapping.

• Observe the offset in the device's process data mapping.

Input data TBEN-L...-16DIP and TBEN-L4-16DIN

The status and control word can be deactivated via the gateway class (VSC 100, Instance 2, Attr. 138 (0x8A) and Attr. 139 (0x8B)) and thus hidden.

Word	Bit no	•														
no.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Status																
0x0000	-	FCE	-	-	CFG	СОМ	V1	-	V2	-	-	-	-	-	AR- GEE	DIAG
IN														•		
0x0001	DI15	DI14	DI13	DI12	DI11	DI10	DI9	DI8	DI7	DI6	DI5	DI4	DI3	DI2	DI1	DI0
	C7 P2	C7 P4	C6 P2	C6 P4	C5 P2	C5 P4	C4 P2	C4 P4	C3 P2	C3 P4	C2 P2	C2 P4	C1 P2	C1 P4	C0 P2	C0 P4
Diagno	stics															
0x0002	-	-	Sched Diag	-	-	-	-	-	-	-	-	-	-	-	-	l/O Diag
0x0003	-	-	-	-	-	-	-	-	VERR	VERR						
									V1 C7	V1 C6	V1 C5	V1 C4	V1 C3	V1 C2	V1 C1	V1 C0
									Ch14	Ch12	Ch10	Ch8C	Ch6C	Ch4C	Ch2C	Ch0C
									Ch15	Ch13	Ch11	h9	h7	h5	h3	h1

Scheduled diagnostics (manufacturer specific) activated: Status word + 1 word inputs + 2 words diagnostics

Without diagnostics: Status word + 1 words inputs

Word	Bit no.	,														
no.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Status																
0x0000	-	FCE	-	-	CFG	СОМ	V1	-	V2	-	-	-	-	-	AR-	DIAG
															GEE	
IN																
0x0001	DI15	DI14	DI13	DI12	DI11	DI10	DI9	DI8	DI7	DI6	DI5	DI4	DI3	DI2	DI1	DI0
	C7 P2	C7 P4	C6 P2	C6 P4	C5 P2	C5 P4	C4 P2	C4 P4	C3 P2	C3 P4	C2 P2	C2 P4	C1 P2	C1 P4	C0 P2	C0 P4

Output data TBEN-L...-16DIP and TBEN-L4-16DIN Control Word

Bit no. Word no. 15 7 14 13 12 11 10 9 8 6 5 4 3 2 1 0 Control 0x0000 Reserved

Hans Turck GmbH & Co. KG | T +49 208 4952-0 | more@turck.com | www.turck.com

Input data TBEN-L...-16DOP and TBEN-L4-16DON

The status and control word can be deactivated via the gateway class (VSC 100, Instance 2, Attr. 138 (0x8A) and Attr. 139 (0x8B)) and thus hidden.

Scheduled diagnostics (manufacturer specific) activated: Status word + 3 words diagnostics

Word	Bit no.															
no.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Status																
0x0000	-	FCE	-	-	-	-	V1	-	V2	-	-	-	-	-	AR-	DIAG
															GEE	
Diagno	stics															
0x0001	-	-	Sched	-	-	-	-	-	-	-	-	-	-	-	-	I/O
			Diag													Diag
0x0002	ERR7	ERR6	ERR5	ERR4	ERR3	ERR2	ERR1	ERR0	VERR							
									V2 C7	V2 C6	V2 C5	V2 C4	V2 C3	V2 C2	V2 C1	V2 C0
									Ch14	Ch12	Ch10	Ch8	Ch6	Ch4	Ch2	Ch0
									Ch15	Ch13	Ch11	Ch9	Ch7	Ch5	Ch3	Ch1
0x0003	-	-	-	-	-	-	-	-	ERR	ERR	ERR	ERR	ERR	ERR	ERR9	ERR8
									15	14	13	12	11	10		

Without diagnostics: Status word

Word	Bit no.	,														
no.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Status											-					
0x0000	-	FCE	-	-	-	-	V1	-	V2	-	-	-	-	-	AR- GEE	DIAG

Output data TBEN-L...-16DOP and TBEN-L4-16DON

Control word + 1 words outputs

Word	Bit no.															
no.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Control																
0x0000	Reserv	Reserved														
OUT																
0x0001	DO15	DO14	DO13	DO12	DO11	DO10	DO9	DO8	D07	D06	DO5	DO4	DO3	DO2	DO1	DO0
	C7 P2	C7 P4	C6 P2	C6 P4	C5 P2	C5P4	C4P2	C4P4	C3P2	C3 P4	C2 P2	C2 P4	C1 P2	C1 P4	C0P2	C0 P4



Input data TBEN-L...-16DXP and TBEN-L4-16DXN

Scheduled diagnostics (manufacturer specific) activated: Status word + 1 word inputs + 3 words diagnostics

Word	Bit no.	•														
no.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Status																
0x0000	-	FCE	-	-	-	-	V1	-	V2	-	-	-	-	-	AR- GEE	DIAG
IN																
0x0001	DI15 C7 P2	DI14 C7 P4	DI13 C6 P2	DI12 C6 P4	DI11 C5 P2	DI10 C5 P4	DI9 C4 P2	DI8 C4 P4	DI7 C3 P2	DI6 C3 P4	DI5 C2 P2	DI4 C2 P4	DI3 C1 P2	DI2 C1 P4	DI1 C0 P2	DI0 C0 P4
Diagno	stics															
0x0002	-	-	Sched Diag	-	-	-	-	-	-	-	-	-	-	-	-	I/O Diag
0x0003	ERR7	ERR6	ERR5	ERR4	ERR3	ERR2	ERR1	ERRO	VERR V2 P1 C7 Ch14 Ch15	VERR V2 P1 C6 Ch12 Ch13	VERR V2 P1 C5 Ch10 Ch11	VERR V2 P1 C4 Ch8 Ch9	VERR V1 C3 Ch6 Ch7	VERR V1 C2 Ch4 Ch5	VERR V1 C1 Ch2 Ch3	VERR V1 C0 Ch0 Ch1
0x0004	-	-	-	-	-	-	-	-	ERR 15	ERR 14	ERR 13	ERR 12	ERR 11	ERR 10	ERR9	ERR8

Without diagnostics: Status word + 1 words inputs

Word	Bit no.	,														
no.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Status																
0x0000	-	FCE	-	-	-	-	V1	-	V2	-	-	-	-	-	AR- GEE	DIAG
IN					1	1	1	1	1	1	1				1	
0x0001	DI15	DI14	DI13	DI12	DI11	DI10	DI9	DI8	DI7	DI6	DI5	DI4	DI3	DI2	DI1	DI0
	C/ P2	C7 P4	C6 P2	C6 P4	C5 P2	C5 P4	C4 P2	C4 P4	C3 P2	C3 P4	C2 P2	C2 P4	C1 P2	C1 P4	C0 P2	C0 P4

Output data TBEN-L...-16DXP and TBEN-L4-16DXN

Control word + 1 words outputs

Word	Bit no.															
no.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Control	l															
0x0000	Reserv	Reserved														
OUT																
0x0001	DO15	DO14	DO13	DO12	DO11	DO10	DO9	DO8	DO7	D06	DO5	DO4	DO3	DO2	DO1	DO0
	C7 P2	C7 P4	C6 P2	C6 P4	C5 P2	C5P4	C4P2	C4P4	C3P2	C3 P4	C2 P2	C2 P4	C1 P2	C1 P4	C0 P2	C0 P4



Input data TBEN-L...- 8DIP-8DOP

 Scheduled diagnostics (manufacturer specific) activated: Status word + 1 word inputs + 2 words diagnostics

Word	Bit no															
no.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Status																
0x0000	-	FCE	-	-	-	-	V1	-	V2	-	-	-	-	-	AR- GEE	DIAG
IN																
0x0001	-	-	-	-	-	-	-	-	DI7 C3 P2	DI6 C3 P4	DI5 C2 P2	DI4 C2 P4	DI3 C1 P2	DI2 C1 P4	DI1 C0 P2	DI0 C0 P4
Diagno	stics															
0x0002	-	-	Sched Diag	-	-	-	-	-	-	-	-	-	-	-	-	l/O Diag
0x0003	ERR7	ERR6	ERR5	ERR4	ERR3	ERR2	ERR1	ERRO	VERR V2 pin 1 C7 Ch14 Ch15	VERR V2 pin 1 C6 Ch12 Ch13	VERR V2 pin 1 C5 Ch10 Ch11	VERR V2 pin 1 C4 Ch8C h9	VERR V1 C3 Ch6 Ch7	VERR V1 C2 Ch4 Ch5	VERR V1 C1 Ch2 Ch3	VERR V1 C0 Ch0 Ch1

Without diagnostics: Status word + 1 words inputs

Word	Bit no).														
no.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Status																
0x0000	-	FCE	-	-	-	-	V1	-	V2	-	-	-	-	-	AR-	DIAG
															GEE	
IN																
0x0001	-	-	-	-	-	-	-	-	DI7	DI6	DI5	DI4	DI3	DI2	DI1	DI0
									C3 P2	C3 P4	C2 P2	C2 P4	C1 P2	C1 P4	C0 P2	C0 P4

Output data - TBEN-L...-8DIP-8DOP

Control word + 1 word

Word	Bit no	•														
no.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Control																
0x0000	Reserv	ved														
OUT																
0x0001	-	-	-	-	-	-	-	-	DO15 C7 P2	DO14 C7 P4	DO13 C6 P2	DO12 C6 P4	DO11 C5 P2	DO10 C5P4	DO9 C4P2	DO8 C4P4



Connection Manager Object (0x06)

This object is used for connection and connectionless communications, including establishing connections across multiple subnets.

The following description of the Ethernet Link Object is taken from the CIP specification, Vol. 2, Rev. 2.1 by ODVA & ControlNet International Ltd. and adapted to the Turck products.

Common services

Service o	ode	Class	Instance	Meaning
Dec.	Hex.			
84	0x54	No	Yes	FWD_OPEN_CMD (opens a connection)
78	0x4E	No	Yes	FWD_CLOSE_CMD (closes a connection)
82	0x52	No	Yes	UNCONNECTED_SEND_CMD

TCP/IP Interface Object (0xF5)

The following description of the Ethernet Link Object is taken from the CIP specification, Vol. 2, Rev. 1.1 by ODVA & ControlNet International Ltd. and adapted to the Turck products.

Class attributes

Attr. no.		Designation	Get/Set	Туре	Value
Dec.	Hex.				
1	0x01	Revision	G	UINT	1
2	0x02	Max. object instance	G	UINT	1
3	0x03	Number of instances	G	UINT	1
6	0x06	Max. class identifier	G	UINT	7
7	0x07	Max. instance attribute	G	UINT	6

Instance Attributes

Attr. no.		Designation	Get/Set	Туре	Value
Dec.	Hex.				
1	0x01	Status	G	DWORD	Interface status
2	0x02	Configuration capability	G	DWORD	Interface capability flag
3	0x03	Configuration control	G/S	DWORD	Interface control flag
4	0x04	Physical link object	G	STRUCT	
		Path size		UINT	Number of 16 bit words: 0x02
		Path		Padded EPATH	0x20, 0xF6, 0x24, 0x01



Attr. no.		Designation	Get/Set	Туре	Value
Dec.	Hex.				
5	0x05	Interface configuration	G	Structure of:	TCP/IP network interface configuration
		IP address	G	UDINT	Actual IP address
		Network mask	G	UDINT	Actual network mask
		Gateway addr.	G	UDINT	Actual default gateway
		Name server	G	UDINT	0 = no server address configured
		Name server 2	G	UDINT	0 = no secondary server address configured
		Domain name	G	UDINT	0 = no Domain Name configured
6	0x06	Host name	G	STRING	0 = no host name configured
12	0x0C	QuickConnect	G/S	BOOL	0 = deactivate 1 = activate

Common services

Service c	ode	Class	Instance	Meaning
Dec.	Hex.			
1	0x01	Yes	Yes	Get_Attribute_All
2	0x02	No	No	Set_Attribute_All
14	0x0E	Yes	Yes	Get_Attribute_Single
16	0x10	No	Yes	Set_Attribute_Single

Interface Status

The Status attribute indicates the status of the TCP/IP network interface.

Bit	Designation	Meaning
03	Interface configuration status	 Indicates the status of the Interface Configuration attribute: 0 = The Interface Configuration attribute has not been configured 1 = The Interface Configuration attribute contains valid configuration. 215 = reserved
431	Reserved	

Configuration Capability

The Configuration Capability indicates the device's support for optional network configuration capability.

Bit	Designation	Meaning	Value
0	BOOTP client	The device is capable of obtaining its network configuration via BOOTP.	1
1	DNS client	The device is capable of resolving host names by querying a DNS server.	0
2	DHCP client	The device is capable of obtaining its network configuration via DHCP.	1



Configuration control

The Configuration Control attribute is used to control network configuration options.

Bit	Designation	Meaning
03	Startup configuration	Determines how the device shall obtain its initial configuration. 0 = The device shall use the interface configuration values previously stored (for example, in non-volatile memory or via hardware switches, etc). 13 = reserved
4	DNS Enable	Always 0
531	Reserved	Set to 0

Interface Configuration

This attribute contains the configuration parameters required to operate a TCP/IP device.

To change this attribute, proceed as follows:

- Read out the attribute.
- Change the parameters.
- Set the attribute.
- ➡ The TCP/IP Interface Object applies the new configuration upon completion of the Set service. If the value of the Startup Configuration bits (Configuration Control attribute) is 0, the new configuration is stored in non-volatile memory.

The device does not reply to the set service until the values are safely stored to non-volatile memory.

An attempt to set any of the components of the Interface Configuration attribute to invalid values results in an error (status code 0x09) returned from the Set service. If initial configuration is obtained via BOOTP or DHCP, the Interface Configuration attribute components are all 0 until the BOOTP or DHCP reply is received. Upon receipt of the BOOTP or DHCP reply, the Interface Configuration attribute shows the configuration obtained via BOOTP/DHCP.

Host name

This attribute contains the device's host name. The host name attribute is used when the device supports the DHCP-DNS Update capability and has been configured to use DHCP upon start up. The mechanism allows the DHCP client to transmit its host name to the DHCP server. The DHCP server then updates the DNS records on behalf of the client.

Ethernet Link Object (0xF6)

The following description of the Ethernet Link Object is taken from the CIP specification, Vol. 2, Rev. 1.1 by ODVA & ControlNet International Ltd. and adapted to the Turck products.

Class attributes

Attrno.		Designation	Get/Set	Туре	Value
Dec.	Hex.				
1	0x01	Revision	G	UINT	1
2	0x02	Max. object instance	G	UINT	1
3	0x03	Number of instances	G	UINT	1
6	0x06	Max. class identifier	G	UINT	7
7	0x07	Max. instance attribute	G	UINT	6

Instance attributes

Attrno.		Designation	Get/Set	Туре	Value
Dec.	Hex.				
1	0x01	Interface speed	G	UDINT	Speed in megabit per second (e.g. 10, 100, 1000 etc.)
2	0x02	Interface flags	G	DWORD	Interface capability flag
3	0x03	Physical address	G	ARRAY OF USINT	Contains the interface's MAC address (Turck: 00:07:46:xx:xx:xx)
6	0x06	Interface control	G	2 WORD	Allows port-wise changes of the Ethernet-settings
7	0x07	Interface type	G		
10	0x0A	Interface label	G		

Interface flags

Bit	Designation	Meaning	Default value
0	Link status	Indicates whether or not the Ethernet communica- tions interface is connected to an active network. 0 = inactive link 1 = active link	Depends on application
1	Half/full duplex	0 = Half duplex 1 = Full duplex If the Link Status flag is 0, the value of the Half/Full Duplex flag is indeterminate.	Depends on application
24	Negotiation status	 Indicates the status of the automatic autonegotiation 0 = autonegotiation in progress 1 = autonegotiation and speed detection failed, using default values for speed and duplex (10 Mbps/half duplex). 2 = auto-negotiation failed but detected speed (default: half duplex). 3 = successfully negotiated speed and duplex 4 = autonegotiation not started, yet. Forced speed and duplex. 	Depends on application



Bit	Designation	Meaning	Default value
5	Manual setting requires reset	 0 = interface can activate changes to link parameters (auto-negotiate, duplex mode, interface speed) automatically 1 = device requires a Reset service to be issued to its Identity Object in order to adapt the changes. 	0
6	Local Hardware Fault	0 = interface detects no local hardware fault 1 = local hardware error detected	0

Common services

Service c	ode	Class	Instance	Meaning
Dec.	Hex.			
1	0x01	Yes	Yes	Get_Attribute_All
14	0x0E	Yes	Yes	Get_Attribute_Single
76	0x4C	No	Yes	Enetlink_Get_and_Clear

7.7.7 VSC-Vendor Specific Classes

In addition to supporting the above named CIP Standard Classes, the device support the vendor specific classes (VSCs) described in the following.

Class Code		Name	Name Description	
Dec.	Hex.			
100	0x64	Gateway	Data and parameters for the field bus specific part of the device.	all
102	0x66	Process data	Process data	
117	0x75	Digital Versatile Module	Describes the I/O channels	_
126	0x7E	Miscellaneous Parameters	Describes the EtherNet IP IP port properties	_

Class Instance of the VSC

The class instance attributes are the same for each VSC. The class-specific Object Instances and the corresponding attributes are explained in the paragraphs for the different VSC.

The general VSC class instance attributes are defined as follows.

Attr. no.		Designation	Get/Set	Туре	Meaning
Dec.	Hex.				
100	0x64	Class revision	G	UINT	Revision no. of the class (maj. Rel. *1000 + Min. Rel.).
101	0x65	Max. instance	G	USINT	Number of the highest instance of an object created at this level of the class hierarchy.
102	0x66	Number of instances	G	USINT	Number of object instances created in this class.
103	0x67	Max. class attribute	G	USINT	Contains the number of the last class attribute to be implemented.



Gateway Class (VSC 100)

Attr. no.		Designation	Get/Set	Туре	Meaning
Dec.	нех.				
100	0x64	Max. object attribute	G	USINT	Number of the last object attribute to be implemented
101	0x65	Hardware revision	G	STRUCT	Hardware revision number of of the device (USINT Maj./USINT Min.)
102	0x66	Firmware revision	G	STRUCT	Firmware revision of the boot firmware (maj./min.).
103	0x67	Service tool ident number	G	UDINT	BOOT-ID (identification number)
104	0x68	Hardware Info	G	STRUCT	Module hardware information (UINT)

Object instance 2

Attr. no.		Designation	Get/Set	Туре	Meaning
Dec.	Hex.				
109	0x6D	Device status	G	STRUCT	Contains the device status.
115	0x73	On IO connection timeout	G/S	ENUM USINT	Reaction when the time limit for an I/O connection is exceeded:
					0: SWITCH IO FAULTED (0): The channels are switched to substitute value.
					1: SWITCH IO OFF (1): The outputs are switched to 0.
					2: SWITCH IO HOLD (2): No further changes to I/O data. The outputs are held.
138	0x8A	GW status register	G/S	DWORD	Activates or deactivates the mapping of the status word into the device's input data. Activating or deactivating of the status word is only possible in Assembly Instance 103.
139	0x8B	GW control register	G/S	DWORD	Activates or deactivates the mapping of the control word into the device's output data. Activating or deactivating of the control word is only possible in Assembly Instance 104.



Attr. no.		Designation	Get/Set	Туре	Meaning
Dec.	Hex.				
140 0	0x8C	Disable protocols	G/S	UINT	Deactivation of the used Ethernet protocol.
					Bit 0: Deactivates EtherNet/IP (cannot be deactivated via the EtherNet/IP interface).
					Bit 1: Deactivates Modbus TCP
					Bit 2: Deactivates PROFINET
					Bit 15: Deactivates the web server

Process Data Class (VSC102)

Object Instance 1 and Object Instance 2 are not supported.

Object Instance 3, diagnostic instance

Attr. no.		Designation	Get/Set	Туре	Meaning	
Dec.	Hex.					
104	0x68	Summarized dia- gnostics	G/S	BOOL	Group diagnostic 0 = deactivated 1 = activated: the bit "I/O Diag indicates whether a diagnosis is present or not. Changes to the settings become active after a voltage reset.	
105	0x69	Scheduled diagnostic	G/S	BOOL	Manufacturer specific diagnostics 0 = deactivated 1 = activated Channel-specific diagnostic are mapped into the process input data. Changes to the settings become active after a voltage reset.	
106	0x6A	reserved			Activates or deactivates the mapping of the status word into the module's input data. Changes to the settings become active after a voltage reset.	



Attr. no Dec.	o. Hex.	Designation	Get/Set	Туре	Meaning
104	0x68	COS data mapping	G/S	ENUM USINT	The actual data are loaded to the non-volatile memory of the station. $0 = $ standard: data of COS message \rightarrow input data. 1 = process input data: only the process data input image is transferred to scanner 27 = reserved Changes to the settings become active after a voltage reset.

Object instance 4, COS/CYCLIC instance

Digital Versatile Module Class (VSC117)

This class contains all the information and parameters for the I/O channels of the devices.

Object instance

Attr. no.		Designation Get/Se		Туре	Meaning			
Dec.	Hex.							
100	0x64	Max. object attribute	G	USINT	Number of the last object attribute to be implemented			
101	0x65	reserved						
102	0x66	reserved						
103	0x67	Module ID	G	DWORD	Internal device identification nu- mer			
104	0x68	Module order number	G	UDINT	ID (order number) of the device			
105	0x69	Module order name		SHORT STRING	Device name			
106	0x6A	Module revision	G	USINT	Revision number of the device			
107	0x6B	Module type ID	G	ENUM USINT	Station type: 0X01: digital device			
108	0x6C	Module command interface	G	ARRAY OF BYTE	Command interface of the device, command byte sequence			
109	0x6D	Module response interface	G	ARRAY OF BYTE	Response interface of the device, response byte sequence			
110	0x6E	Module registered index	G	ENUM USINT	Index numbers of all station lists.			
111	0x6F	Module input channel count	G	USINT	Number of input channels in the device			
112	0x70	Module output channel count	G	USINT	Number of output channels in the device			
Input	data							
113	0x71	Module input 1	G		Device input data			
114	0x72	Module input 2	G	DWORD				
Output data								



Attr. no.		Designation	Get/Set Type I		Meaning		
Dec.	Hex.						
115	0x73	Module output 1	G	DWORD	Device output data		
116	0x74	Module output 2	G	DWORD	-		
	•••	reserved					
Diagn	nostic data	a					
119	0x77	Short circuit output error 1	G	DWORD	Short-circuit at output		
120	0x78	Short circuit output error 2	G	DWORD	Short-circuit at output		
121	0x79	Short circuit VAUX error 1	G	DWORD	Overcurrent at sensor/actuator supply		
122	0x7A	Short circuit VAUX error 2	G	DWORD	Overcurrent at sensor/actuator supply		
Paran	neter data	1					
127	0x7F	Invert input data	G/S	DWORD	Inversion of the input signal (input 015)		
•••	•••						
133	0x85	Auto recovery output	G/S	DWORD	Automatic output reset after over- current (SROx for output 015)		
••••							
137	0x89	Retriggered recovery output	G/S	DWORD	Manual output reset after overcur- rent (SROx) The output switches back on auto- matically after an overload (output 015.		
139	0x8B	Enable high side output driver	G/S	DWORD	Activate output (output 015)		
•••	•••						
149	0x95	Pulse stretching input 0	G/S	BYTE	Pulse stretching input, extension of the input signal from		
					$10 \dots 2550 \text{ ms}$		
164	0xA4	Pulse stretching input 15	G/S	BYTE	tivated (standard signal = $2,5 \text{ ms}$) example: $10 = \text{Signal of } 100 \text{ ms}$		



Miscellaneous Parameters Class (VSC 126)

This class contains 2 instances

- Instance 1: Ethernet port ETH1
- Instance 2: Ethernet port ETH2

Attribute no.		Designation	Get/set	Туре	Meaning
Dec.	Hex.				
109	0x6D	Ethernet port	G/S	DWORD	0: Autonegotiate, AutoMDIX
		parameters			1: 10BaseT, half duplex, linear topology (AutoMDIX disabled)
					2: 10BaseT, full duplex, linear topology (AutoMDIX disabled)
					3: 100BaseT, half duplex, linear topology (AutoMDIX disabled)
					4: 100BaseT, full duplex, linear topology (AutoMDIX disabled)
112	0x73	I/O controller software revision	G	DWORD	Only valid for instance 1: Firmware version of the device



7.8 Connecting the devices to an EtherNet/IP scanner with Studio 5000

Used hardware

The following hardware components are used in this example:

- Rockwell Contoller ControlLogix 1756-L72, Logix 5572
- Rockwell Scanner 1756-EN2TR
- Block module TBEN-L5-16DXP

Used software

The following software tools are used in this example:

- Rockwell Studio 5000
- Catalog file for Turck compact devices "TURCK_BLOCK_STATIONS_V....L5K" as part of the ZIP file "TBEN-..._ETHERNETIP.zip" (can be downloaded for free at www.turck.com)

Prerequisites

- An instance of the software with the catalog files is opened.
- A new project has been created in a second instance of Studio 5000.
- The PLC and the scanner mentioned above have been added to the project in the second instance of Studio 5000.



7.8.1 Adding the devices from the Catalog files to the new project

• Right-click the device entry and use **Copy**.

Controller Organizer					×
e7 "#					
					^
ETHERNET-MODULE TBEN_L5_16DIP					
 ETHERNET-MODULE TBEN_L5_16DOP ETHERNET-MODULE TBEN_L5_16DOP_01 ETHERNET-MODULE TBEN_L5_16DXP ETHERNET-MODULE TBEN_L5_8DIP_8DOP_ ETHERNET-MODULE TBEN_L5_8DIP_8DOP_ ETHERNET-MODULE TBEN_L5_8IOL ETHERNET-MODULE TBEN_LG_16DIP ETHERNET-MODULE TBEN_LG_16DXP ETHERNET-MODULE TBEN_LG_16DXP ETHERNET-MODULE TBEN_LG_16DXP ETHERNET-MODULE TBEN_LG_16DXP ETHERNET-MODULE TBEN_LG_8DIP_8DOP ETHERNET-MODULE TBEN_LG_8DIP_8DOP ETHERNET-MODULE TBEN_LG_8DIP_8DOP ETHERNET-MODULE TBEN_LG_8DIP_8DOP ETHERNET-MODULE TBEN_LG_8DIP_8DOP ETHERNET-MODULE TBEN_S ETHERNET-MODULE TBEN_S1_4DIP_4DOP ETHERNET-MODULE TBEN_S1_8DIP ETHERNET-MODULE TBEN_S1_8DOP ETHERNET-MODULE TBEN_S1_8DOP 	1 x 0	New Module Discover Modules Cut Copy Paste Delete Cross Reference Export Module Include in Trackin Properties Print	Strg+X Strg+C Strg+V Entf Strg+E g Group Alt+Eingabe		
ETHERNET-MODULE IBEN_S1_80AP					Ŷ
Madula Dafinad Taas				>	

Fig. 62: Logix Designer: copying the device entry from catalog file



 Right-click the EtherNet/IP Scanner in the 2nd instance of Logix Designer and add the device to the project via Paste.



Fig. 63: Logix Designer: adding the device to the project



7.8.2 Configuring the device in Logix Designer

- Open the device entry by double-clicking.
- Assign a module name.
- Set the IP address of the device (example: 192.168.145.181).

General* Con Type: Vendor:	nection Module Info ETHERNET-MODULE Generic Ethem Rockwell Automation/Allen-Bradley	et Module				
Parent: Name:	tben TBEN_L5_16DOP	Connection Para	Assembly	C		
Description:	^ _	Input:	Instance:	Size:		
Comm Format: Address / Ho	Data - INT v	Output: Configuration:	104	2 (16-bit) 14 (8-bit)		
IP Addres	ne: a195	Status Input: Status Output:				
Status: Offline	ОК	Cancel	Apply	/ Help]	

Fig. 64: Setting module name and IP address

• Optional: Set the connection parameters.

💰 Logix Designer - TBEN_L [1756-L72 32.11]	-	×
Module Properties Report: tben (ETHERNET-MODULE 1.001) ×		•
General* Connection Module Info		
Requested Packet Interval (RPI): 10.0 ≑ms (1.0 - 3200.0 ms)		
Major Fault On Controller If Connection Fails While in Run Mode		
Use Unicast Connection over EtherNet/IP		
Module Fault		
Status: Offline OK Cancel Apply Help		

Fig. 65: Setting the connection parameters



7.8.3 Parameterizing the device

- Open the Controller Tags of the device.
- Parameterize the device via the Controller Tags **TBEN-L5-16DOP:C**.

Logix Designer - TBEN_L [1756-L72 32.11]*				-	□ ×
👔 ち 🖆 🖶 🕹 🗗 🏦 🤊 🦿 🕇 ten20		🖄 🖟 🌾 😘 🐨			
FILE EDIT VIEW SEARCH LOGIC COMMUNICATIONS	TOOLS WINDOW HELP				
RUN OK Path: <none></none>	۰. ۳		F +/F -()(U)(L		51 B.
I/O Offline Vo Forces	No Edits 🔐 Redundancy	Reference Add-Un	Safety Alarms B	sit Timer/Counter input/Output Compare Compute/Math Move/Logical	File/Misc.
Path: <none></none>					
Controller Organizer 🛛 🔻 🕂 🗙	Controller Tags - TBEN_L(controller) ×				-
ð "E	Scope: TBEN_L - Show: All 1	ags		✓ Enter Name Filter	~
✓ Gontroller TBEN_L	Name	-al , Forco (Style	Data Tuno	Description	
	A TREN 15 16DOP/C				- 2
Controller Fault Handler Power-I In Handler	A TREN 15 16DOP/C Data	() Her	SINITI 4001		- Pe
✓ Tasks	TREN 15 15DOD-C D-t-101	() Hex		Descend	itie
🔺 🜔 MainTask	TBEN LS_10DOP:C.Data[0]	Hex	SINT	Reserved	
MainProgram	P TBEN_LS_16DOP(C,Data[1]	Hex	SINT	Reserved	- 10
Unscheduled	P IBEN_L5_16DOP:C.Data[2]	Hex	SINT	Reserved	- 1
Unarouped Axes	TBEN_L5_16DOP:C.Data[3]	Hex	SINT	Reserved	- 10
Assets	TBEN_L5_16DOP:C.Data[4]	Hex	SINT	Reserved	- 10
ኪ. Logical Model	TBEN_L5_16DOP:C.Data[5]	Hex	SINT	Reserved	- 10
▲ ⊆ I/O Configuration	TBEN_L5_16DOP:C.Data[6]	Hex	SINT	Reserved	- 10
A D 1/30 Backplane, 1/30-A/	TBEN_L5_16DOP:C.Data[7]	Hex	SINT	Reserved	
[1] 1756-EN2TR then	TBEN_L5_16DOP:C.Data[8]	Hex	SINT	Reserved	
⊿ 器 Ethernet	TBEN_L5_16DOP:C.Data[9]	Hex	SINT	Quick Connect, Eth Custom Setup, LED-behavior (PWR) at V2 undervolt	age
1756-EN2TR tben	TBEN_L5_16DOP:C.Data[9].0	Decimal	BOOL	Quick Connect: 0=disable, 1=enable	
ETHERNET-MODULE TBEN_L5_16DOP	TBEN_L5_16DOP:C.Data[9].1	Decimal	BOOL	Eth 1 Custom Setup: 0=Auto-negotiate, 1=100BT/FD	
	TBEN_L5_16DOP:C.Data[9].2	Decimal	BOOL	Eth 2 Custom Setup: 0=Auto-negotiate, 1=100BT/FD	
	TBEN_L5_16DOP:C.Data[9].3	Decimal	BOOL	LED-behavior (PWR) at V2 undervoltage: 0=Red, 1=Green	_
	TBEN_L5_16DOP:C.Data[9].4	Decimal	BOOL	Reserved	
	TBEN_L5_16DOP:C.Data[9].5	Decimal	BOOL	Reserved	
	TBEN L5 16DOP:C.Data[9].6	Decimal	BOOL	Reserved	_
	TBEN L5 16DOP:C.Data[9].7	Decimal	BOOL	Reserved	_
	TBEN L5 16DOP:C.Data[10]	Hex	SINT	Manual reset after overcurr.	
	▶ TBEN 15 16DOP:C.Data[11]	Hex	SINT	Manual reset after overcurr.	- 1
	▶ TBEN 15 16DOP:C.Data[12]	Hex	SINT		
	A Monitor Tags (Edit Tags /	TICA .	<		>
Dearth				Communication Coffeeners DCI in Classic	

Fig. 66: Parameterizing the device



7.8.4 Going online with the PLC

- Search the network via the **Who Active** button.
- Select the PLC.
- Set the communication path via Set Project Path.
- ⇒ The communication path is set.



Fig. 67: Setting the communication path



- Select the PLC.
- Click Go online.



Fig. 68: Going online with the device

- Click **Download** in the following dialog (Connect To Go Online).
- Confirm all following messages.
- ⇒ The program is downloaded to the PLC. The online connection is established.



7.8.5 Reading process data

- Open the Controller Tags in the project tree by double-clicking the entry.
- ⇒ The access to the input data (TBEN-L5-16DOP:I) and output data (TBEN-L5-16DOP:O) is possible.

N					~
1 🖕 💾 🖶 🕹 🗗 🗂 🤊 🤊 🗌	🔄 🖌 🏂 🏂 🔎 📴 🖿 🕞 🐻 🖄 🛛 🛱 🖷 😘	~			
FILE EDIT VIEW SEARCH LOGIC COMMUNICATIONS	TOOLS WINDOW HELP				
Run Mode Controller OK Path: AB ETHIP-2\192.168.145.	241\Backplane\0* 🛸 🐣 🖩 👍)(U)(L)-		
Energy Storage OK	No Estas	s Add-On Safety	Alarms Bit Time	r/Counter Input/Output Compare Compute/I	Math Move/Logical
	P No Euros				
Patn: <none></none>					
Controller Organizer 🗸 🕂 🗙	Controller Tags - TBEN_L(controller) ×				
	Scope: TBEN_L V Show: All Tags		~]	Enter Name Filter	~
Controller Tags	Name ==	🔺 Value 🕈 Force 🗧 S	Style Da	ta Type Description	^ /2
Controller Fault Handler	▲ TBEN_L5_16DOP:O.Data[0]	0 [Decimal INT	Station Control Word	Pro
🛑 Power-Up Handler	TBEN_L5_16DOP:O.Data[0].0	0 [Decimal BO	OL Station Control Word	реп
A 🔄 Tasks	TBEN_L5_16DOP:O.Data[0].1	0	Decimal BO	OL Station Control Word	ies
A Main lask	TBEN_L5_16DOP:O.Data[0].2	0 [Decimal BO	OL Station Control Word	
Unscheduled	TBEN_L5_16DOP:O.Data[0].3	0 [Decimal BO	OL Station Control Word	
A 🔄 Motion Groups	TBEN_L5_16DOP:O.Data[0].4	1 [Decimal BO	OL Station Control Word	
Ungrouped Axes	TBEN_L5_16DOP:O.Data[0].5	1 [Decimal BO	OL Station Control Word	
The Logical Model	TBEN_L5_16DOP:O.Data[0].6	1 [Decimal BO	OL Station Control Word	
⊿ 🔄 I/O Configuration	TBEN_L5_16DOP:O.Data[0].7	0 [Decimal BO	OL Station Control Word	
▲ 📟 1756 Backplane, 1756-A7	TBEN_L5_16DOP:O.Data[0].8	0 [Decimal BO	OL Station Control Word	
[]] [0] 1/36-L/2 IBEN_L	TBEN_L5_16DOP:O.Data[0].9	0 [Decimal BO	OL Station Control Word	
⊿ 器 Ethernet	TBEN_L5_16DOP:O.Data[0].10	0 [Decimal BO	OL Station Control Word	
1756-EN2TR tben	TBEN_L5_16DOP:O.Data[0].11	0 [Decimal BO	OL Station Control Word	
ETHERNET-MODULE TBEN_L5_16DOP	TBEN_L5_16DOP:O.Data[0].12	0 [Decimal BO	OL Station Control Word	
	TBEN_L5_16DOP:O.Data[0].13	0 [Decimal BO	OL Station Control Word	
	TBEN_L5_16DOP:O.Data[0].14	0 [Decimal BO	OL Station Control Word	~
	Monitor Tags / Edit Tags /	<			>
	Errors				▼ ₽ ×
	S 0 Errors 🛕 0 Warnings 🚺	0 Messages		Search	Q
Change Filtering Option			Co	ommunication Software: RSLinx Classic	

Fig. 69: Controller Tags in the project tree



7.9 Commissioning the devices in CC-Link IE Field Basic

7.9.1 General features CC-Link IE Field Basic

CC-Link IE Field Basic works with a client/server communication model. A maximum data width of 64×64 bits is available for communication between a client station and several server stations, whereby a unit of 64 bits is referred to as an occupied station. A CC-Link Field Basic network can consist of a maximum of 64 occupied stations. I/O modules can occupy one or more of the 64 occupied stations, depending on their complexity and data width.

CC-Link IE Field Basic		
Maximum number of sta- tions in a network	max. 64 occupied stations	An I/O module can occupy several occupied stations.
Group	max. 16 occupied stations	To optimize process data traffic, devices can be combined into groups according to their function. A group can consist of a maximum of 16 occu- pied stations.
Cyclic data		Cyclical data is mapped bit by bit or word by word in registers.
	RX	Register for bit-by-bit access to digital inputs (DI)
	RY	Register for bit-by-bit access to digital outputs (DO)
	RWr	Register for word-by-word, read access to process data (e.g. IO-Link)
	RWw	Register for word-by-word, write access to process data (e.g. IO-Link)
Port numbers	61450 (cyclic data)	
	61451 (port number of serv IPAddressSet)	ver station for NodeSearch and

7.9.2 CSP+ files

The CSP+ files can be downloaded free of charge at www.turck.com.



7.9.3 Cyclic data transmission

The cyclic process image of the devices is divided into a bit area and a word area. The bit area [> 104] contains the input and output data of the digital channels. The word area does not contain any data for the digital TBEN modules.

Input data			Output data		
Bit area RX	Word area RWr	Access type	Bit area RY	Word area RWw	Access type
TBEN-L16DI					
Input data DI0DI15	-	RO	-	-	RW
TBEN-L16DO					
-	-	RO	Output data DO0 DO15	-	RW
TBEN-L8DIP-8DOP					
Input data DI0DI7	-	RO	Output data DO8DO15	-	RW
TBEN-L16DX					
Input data DXP0DXP15	-	RO	Output data DXP0DXP15	-	RW

7.9.4 Occupied Stations

Device	Occupied Stations
TBEN-L16DIP	1
TBEN-L4-16DIN	1
TBEN-L16DOP	1
TBEN-L4-16DON	1
TBEN-L16DXP	1
TBEN-L4-16DXN	1
TBEN-L8DIP-8DOP	1



7.9.5 Bit area

TBEN-L...-16DIP and TBEN-L4-16DIN

Input data

RX	Signal	
Digital channels Process input data		
RX0	DI0 C0 P4	
RX1	DI1 C0 P2	
RX2	DI2 C1 P4	
RX3	DI3 C1 P2	
RX4	DI4 C2 P4	
RX5	DI5 C2 P2	
RX6	DI6 C3 P4	
RX7	DI7 C3 P2	
RX8	DI8 C4 P4	
RX9	DI9 C4 P2	
RXA	DI10 C5 P4	
RXB	DI11 C5 P2	
RXC	DI12 C6 P4	
RXD	DI13 C6 P2	
RXE	DI14 C7 P4	
RXF	DI15 C7 P2	

C0...C7 = connector at the device, P... = pin

Output data: none



TBEN-L...-16DOP and TBEN-L4-16DON

- Input data: none
- Output data

RY	Signal	
Digital outputs Process output data		
RY0	DO0 C0 P4	
RY1	DO1 C0P2	
RY2	DO2 C1 P4	
RY3	DO3 C1 P2	
RY4	DO4 C2 P4	
RY5	DO5 C2 P2	
RY6	DO6 C3 P4	
RY7	DO7 C3P2	
RY8	DO8 C4P4	
RY9	DO9 C4P2	
RYA	DO10 C5P4	
RYB	DO11 C5 P2	
RYC	DO12 C6 P4	
RYD	DO13 C6 P2	
RYE	DO14 C7 P4	
RYF	DO15 C7 P2	
C0C7 = connector at	the device, P = pin	



TBEN-L...-16DXP and TBEN-L4-16DXN

Input data

RX	Signal	
Digital inputs Process input data		
RX0	DX0 C0 P4	
RX1	DX1 C0P2	
RX2	DX2 C1 P4	
RX3	DX3 C1 P2	
RX4	DX4 C2 P4	
RX5	DX5 C2 P2	
RX6	DX6 C3 P4	
RX7	DX7 C3 P2	
RX8	DX8 C4P4	
RX9	DX9 C4P2	
RXA	DX10 C5 P4	
RXB	DX11 C5 P2	
RXC	DX12 C6 P4	
RXD	DX13 C6 P2	
RXE	DX14 C7 P4	
RXF	DX15 C7 P2	

C0...C7 = connector at the device, P... = pin

Output data

RY	Signal
Digital outputs Process output data	
RY0	DX0 C0 P4
RY1	DX1 C0P2
RY2	DX2 C1 P4
RY3	DX3 C1 P2
RY4	DX4 C2 P4
RY5	DX5 C2 P2
RY6	DX6 C3 P4
RY7	DX7 C3 P2
RY8	DX8 C4P4
RY9	DX9 C4P2
RYA	DX10 C5 P4
RYB	DX11 C5 P2
RYC	DX12 C6 P4
RYD	DX13 C6 P2
RYE	DX14 C7 P4
RYF	DX15 C7 P2

 $\overline{C0...C7}$ = connector at the device, P... = pin



TBEN-L...-8DIP-8DOP

Input data

RX	Signal			
Digital inputs Process input data				
RX0	DI0 C0 P4			
RX1	DI1 C0 P2			
RX2	DI2 C1 P4			
RX3	DI3 C1 P2			
RX4	DI4 C2 P4			
RX5	DI5 C2 P2			
RX6	DI6 C3 P4			
RX7	DI7 C3 P2			
C0C7 = connector at the device, P = pin				

Output data

RY	Signal			
Digital outputs Process output data				
RY0	DO8 C4P4			
RY1	DO9 C4P2			
RY2	DO10 C5 P4			
RY3	DO11 C5 P2			
RY4	DO12 C6 P4			
RY5	DO13 C6 P2			
RY6	DO14 C7 P4			
RY7	DO15 C7 P2			

C0...C7 = connector at the device, P... = pin

7.9.6 Word area

The word area does not contain any data for the digital TBEN-L... devices.



7.9.7 Parametermapping

The chapter "Parameterizing and configuring" [▶ 125] contains a detailed parameter description.

Parameter ID	Offset	Parameter name	Channel	Value	Meaning	
B000	1.0	Invert digital input Ch0	0	0	No	
				1	Yes	
	1F	Invert digital input Ch15	15	0	No	
				1	Yes	
	2.8	Impulse stretch (*10 ms) Ch	0	0254		
	3.0		1			
	3.8		2			
	4.0		3	-		
	9.8		14			
	A.0		15			

TBEN-L...-16DIP and TBEN-L4-16DIN

TBEN-L...-16DOP and TBEN-L4-16DON

Parameter ID	Offset	Parameter name	Channel	Value	Meaning
B000	0.0	Manual output reset after overcurrent Ch0	0	0	No
				1	Yes
	0F	Manual output reset after overcurrent Ch15	15	0	No
				1	Yes


Parameter ID	Offset	Parameter name	Channel	Value	Meaning
B000	1.0	Invert digital input Ch0	0	0	No
					Yes
	1.F	Invert digital input Ch15	15	0	No
				1	Yes
	2.0	Manual output reset after overcurrent Ch0	0	0	No
				1	Yes
	2.F	Manual output reset after overcurrent Ch15	15	0	No
				1	Yes
	3.0	Activate output Ch0	0	0	No
				1	Yes
	4.8	Activate output Ch15	15	0	No
			$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1	Yes
	5.0	Impulse stretch (*10 ms) Ch	0	0254	
	5.8		1		
	B.8		14		
	C.0		15		

TBEN-L...-16DXP and TBEN-L4-16DXN

TBEN-L...-8DIP-8DOP

Parameter ID	Offset	Parameter name	Channel	Value	Meaning	
B000	0.0	Invert digital input	0	0	No	
			ChannelValueMean00NoYes70No1Yes20No1Yesent80No1Yesent150No1Yes123456767		Yes	
	0.7	Invert digital input	7	0	No	
				1	Yes	
	0.8	Manual output reset after overcurrent	8	0	No	
				1	Yes	
	0.F	Manual output reset after overcurrent	15	0	No	
				1	Yes	
	2.8	Impulse stretch (*10 ms) Ch	0	0254		
	3.0		1			
	3.8		2			
	4.0		3			
	4.8		4			
	5.0		5			
	5.8		6	1		
	6.0		7	1		



7.9.8 Acyclic communication via SLMP – supported functions

The devices support acyclical access via SLMP command Device Read (0x0401) and Device Write (0x1401).

Supported Device Codes

Device Code	Description
0x0011	Device information (vendor ID, device code, device name, etc.)
0x00AC	Acyclic communication
0x00D8	Input data
0x00D9	Output data
0x00DD	Diagnostic data

Supported End Codes

End Code	Description
0x0000	Command successfully executed
0xC059	Command/subcommand: not supported command or subcommand
0xC05C	Wrong data: data content does not fit to the command data content does not fit to the command
0xC061	Data length: data length does not fit to the command

Read device information (Device Code 0x0011)

Address (Add)	Content	Access type	Data length in word (Len)	Description
0x0001	Vendor code	ro	1	Vendor ID Turck: 0x3355
0x0002	Model code	ro	2	ID of the device
0x0003	Model name	ro	2	Device name
0x0004	FW version	ro	2	Firmware version of the device
0x0005	Stack version	ro	2	Version of the CC-Link component

Acyclic I/O communication (Device Code 0x00AC)

Address (Add)	Read access	Write access	Data length in word (Len)	Content	Description		
0xACAC	Open Connection		1	0xAD00 0xADFF, 0x0000	A read access to this address opens an acyclic connection or returns an error. A valid connection handle is 0xAD000xADFF, or 0 in case of failure.		



Address (Add)	Read access	Write access	Data length in word (Len)	Content	Description
0xACAC		Close Connection	1	0xAD00 0xADFF, 0xFFFF	Write access to this address closes an acyclic connection. Writing a previously opened connection address (0xAD000xADFF) closes this connection. If the value -1 (0xFFFF) is written, all acyclic connections opened for CC-Link are closed.
0xAD00			1240	Acyclic data	
 0xADFF					

Example access:

 Open Connection: Device Read (0x0401) Device Code = 0xAC Add = 0xACAC Len =1 Result: 0xAD00 = Connection address: must be used for the following connection accesses, like read, write and close.

2. Read Connection:

Device Read (0x0401) Device Code = 0xAC Add = 0xAD00 Len =1 Result: n words of received frame. The requested length is the maximum buffer size. If the available acyclic data does not fit in the buffer, the exceeding data is truncated.

3. Write Connection:

Device Read (0x1401) Device Code = 0xAC Add = 0xAD00 Len =1 Result: n words of data to be sent.

4. Close Connection:

Device Write (0x1401) Device Code = 0xAC Add=0xACAC, Len=1 Data: 0xADxx (address of the previously used Open Connection)



Read input data (Device Code 0x00D8)

Address (Add)	Access type	Data length in word (Len)	Description
0x0000	ro	1n	Access to all input data of the device regardless of profiles and restrictions due to the number of occupied stations, order:
			1. Data from RWr area
			2. Data from RX area
0x0001 0x00	ro	1n	Accesses the input data of one (sub)module. Data is struc- tured in the native order of that (sub)module.

Write output data (Device Code 0x00D9)

Address (Add)	Access type	Data length in word (Len)	Description
0x0000	rw	1n	Access to all output data of the device regardless of profiles and restrictions due to the number of occupied stations, order:
			1. Data from RWw area
			2. Data from RY area
0x0001 0x00	rw	1n	Accesses the output data of one (sub)module. Data is struc- tured in the native order of that (sub)module.

Read Diagnostic data data (Device Code 0x00DD)

Address (Add)	Access type	Data length in word (Len)	Description
0x0000	ro	1n	Access to all diagnostic data of the device regardless of profiles and restrictions due to the number of occupied stations
0x0001 0x00	ro	1n	Accesses the diagnostic data data of one (sub)module. Data is structured in the native order of that (sub)module.



7.10 Connecting devices to a CC-Link IE Field Basic client with GX Works3

Naming convention

Turck uses the terms "client" and "server". The following description uses the terms "Master Station" (client) and "Slave Station" (server) only because of the naming in Melsoft GX Works.

Used hardware

The following hardware components are used in this example:

- Mitsubishi MELSEC iQ-R controller
- Mitsubishi CPU 04ENCPU with local CC-Link IOs
- TBEN modules (as example)
 - TBEN-LL-8DIP-8DOP (IP address: 192.168.3.10)
 - TBEN-S2-4IOL (IP address: 192.168.3.12)

Used software

The following software tools are used in this example:

Melsoft GX Works3

Prerequisites

- The GX Works3 software is open and a new project has been created.
- The controller including CPU and local IOs is configured in GX Works3.

7.10.1 Register the CSP+ files in GXWorks3

Select and register CSP+ files via Tools → Profile Management → Register. Note: CSP+ files can only be registered in GX Works3 if no project is open.



Fig. 70: Profile Management, Register Profile



7.10.2 Configuring the network settings

The network settings are configured at the CPU used under **Parameter** \rightarrow **used CPU** (here: R04ENCPU) \rightarrow **Module Parameters**.

Setting the IP address of the CPU

► Set the IP address of the CPU under **Own Node Settings** → **IP Address**.

Activate CC-Link Field Basic

The CC-Link IEF Basic protocol must be activated in the CPU.

Under CC-Link IEF Baisc Settings, set the option To Use or Not to Use CC-Link IEF Basic Setting to Use in order to activate



Fig. 71: GX Works3: Activate CC-Link IEF Basic on CPU

7.10.3 Configuring the CC-Link IE Field Basic network

Scanning the network

► Under Module Parameters → CC-Link IEF Basic Settings open the function Network Configuration Settings.



Fig. 72: GX Works3: Network Configuration Settings



Scan the CC-Link IEF Basic network under CC-Link IEF Basic Configuration via Detect Now.

8	CC-Lin	k IEF Ba	asic Configuration										×
÷ co	-Link	IEF Basi	c Configuration Edit	View Clos	e with Discarding t	the Setting Close with F	Reflecting the Set	ting					
		۵	Detect Now	Lin	Scan Setting						Module	e List	×
L.,	Conn	ected	Count 0								EF Basic S	election	• • • •
		No.	Model Name	STA	# Station Type	RX/RY Set	ting	RWw/RWr Settin	g Group No.	RSVD	<u>₽</u> 9↓		Ĩ.
T			Host Station	0	Mactor Station	Points	Start End	Points Start Er	d	STA	大陸		
I-					Master Station						E CC-L	ink IEF	Basic
L .											CC-L	ink IEF	Basic
L 1											∃ Inj	out Mo	dule
L 1											⊞ Uu ⊞ T/0	Comb	bined N
L 1											∃ Se	rvo An	nplifier
L .												rvo An	nplifier
L 1											∃ GO	T2000	Series
L 1											∃ Inv	verter	(FR-A
			1									verter	(FR-F8
												- Link a	atewa
												F Basic	Modu
Host	Station	l.									∃ IO	Link M	laster
												F Basic	Modu
ST	A#0	eterd Co.									∃ TB	EN-Ser	ies Ne
un	t:0	r e											
10	tal STA	#:0											
			<							>			
Ou	tput												×
Ľ.		_										_	
L													
L													
L													
e													

Fig. 73: GX Works3: scanning the CC-Link IEF Basic network



All CC-Link devices found in the Ethernet network are displayed in the order in which they are integrated in the network.

6-6 CC-LIII	K IEF B	asic Cor	nfiguration													—	×
CC-Link IEF Basic Configuration Edit View Close with Discarding the Setting Close with Reflecting the Setting																	
Detect Now Link Scan Setting																	
Conne	Connected Count 8																
			a dal Mana	Station Trees		RX/RY	Settir	ng		RWw,	/RWr Se	etting	Group		TD Address	Cube et Marile	MAC
	NO.	M	lodel Name	Station Type		Points		Start	End	Points	Start	End	No.	KSVD STA	IP Address	Subnet Mask	ddre:
	0	Host S	tation	Master Statior											192.168.3.39	255.255.255.0	
0.00116	1	TBEN-	LL-8IOL	Slave Station	54 (1	Occupied Sta	tion)	0000	003F	32	0000	001F	1	No Setting	192.168.145.112	255.0.0.0	:12
	2	TBEN-	S2-4IOL	Slave Station	54 (1	Occupied Sta	tion)	0040	007F	32	0020	003F	1	No Setting	192.168.3.12	255.255.255.0	:B7
	3	TBEN-	S2-4IOL	Slave Station	54 (1	Occupied Sta	tion)	0080	00BF	32	0040	005F	1	No Setting	192.168.145.121	255.255.255.0	:13
	4	TBEN-	S2-4AI	Slave Station	54 (1	Occupied Sta	tion)	00C0	00FF	32	0060	007F	1	No Setting	192.168.145.95	255.255.255.0	:68
C.m.s	5	TBEN-	LL-8DIP-8DOF	Slave Station	54 (1	Occupied Sta	tion)	0100	013F	32	0080	009F	1	No Setting	192.168.3.10	255.255.255.0	:38
C.m.	6	TBEN-	LL-16DIP	Slave Station	54 (1	Occupied Sta	tion)	0140	017F	32	00A0	00BF	1	No Setting	192.168.1.254	255.255.255.0	:95
Catting .		TBEN-	LL-8IOL	Slave Station	54 (1	Occupied Sta	tion)	0180	01BF	32	0000	OODF	1	No Setting	192.108.145.123	255.255.255.0	:61
Cetting	8	I BEN-	LL-8IOLA	Slave Station	54 (1	Occupied Sta	cion)	0100	UIFF	32	00E0	UUFF	1	No Setting	192.108.145.124	255.255.255.0	:97
<																	>
		#1	STA#2	STA#3 ST	A#4	STA#5	s	TA#6	ST	A#7	STA	#8					
											_						
Host Station		'															
		Aller	. A.S.	. 19 km	Alto	- Alto		. Alter		Alter		a Siller					
		22.2	Carteman	Same and	R.R.R.S.	A Stran		Alan	1	Arres	1.8	1.9.3					
STA#0 All Connec	ted Co		Y	Y Y		3					14						
unt:8																	
Total STA	#:8	L-8I	TBEN-S2-4I	TBEN-S2-4I TBEN	I-S2-4A	TBEN-LL-8DI	TBE	N-LL-16	TBEN	I-LL-8I	TBEN-L	L-8I					
		L	OL	OL	I	P-8DOP		DIP		OL	OL	A					
		1		_													

Fig. 74: GX Works3: Devices in the CC-Link IEF Basic network

Devices that do not match the IP address range of the controller cannot be added to the project.

- ▶ Delete the devices with an IP address outside the IP address range of the control unit by right-clicking on the device → Delete from the list of network nodes or change the devices' IP address in the IP address column.
- For devices that can be integrated with different process data variables (profiles) (here: TBEN-S2-4IOL): select the requested profile under Station Type.



Parameterizing CC-Link nodes

► Right-click on the device to be parameterized and select the device parameters via Online → Parameter Processing of Slave Station.

8	CC-Link	c IEF B	asic Co	nfiguration														- 0	×
i co	C-Link II	EF Bas	ic Conf	iguration Edit	View	Close	with Dis	carding	the Setting Clos	e with Re	flecting	the Sett	ing						
		[Detect	Now		Link S	Scan Set	ting											
	Conne	ected	Count	2															
				Mandal Manag		CTA#	Chattin		RX	'RY Setti	ng		RWw/	/RWr Se	etting	Conver No.	DOUD CTA	TD Address	rc
		NO.		Model Name		STA#	Statio	туре	Points		Start	End	Points	Start	End	Group No.	KSVD STA	IP Address	a
	839	0	Host S	Station		0	Master	Station										192.168.3.3	9 5
I	0.000	1	TBEN-	LL-8DIP-8DOP		1	Slave S	tation	54 (1 Occupied	Station)	0000	003F	32	0000	001F	1	No Setting	192.168.3.1	0 5
I		2	TBEN	S2-4IOL		2	Slaver	Com	54 (1 Occupied	Station)	0040	007F	32	0020	003F	1	No Setting	192.168.3.1	2 5
I	<							Сору											>
								Paste	-	-									
li -			#1	STA#2				Selec	t All										
							- 1	Delet	e										_
Host	Station							Mov	es Up]									
I .			100	at the second				Mov	es Below										
ST	A#0		hat	Sinne				Char	ige Module 🛛 🕨										
All un	t:2	ted Co						Chec	k 🕨										
То	tal STA#	¢:2	L-8DI	TBEN-S2-4I				Onlir	ne 🕨	De	tect Nov	v							
I			OP	OL				Prop	erties	Co	ommuni	cation S	Setting F	Reflectio	n of Sla	ve Station			
			<							Pa	rameter	Process	sing of S	Slave Sta	tion				>

Fig. 75: GX Works3: Opening parameterization

• Activate the writing of parameters via **Method selection** \rightarrow **Parameter write**.



NOTE

All parameters for one slot (in the example below: Slot 1) must be set. It is not possible to set individual parameters for a slot.



Set the	parameters	and store t	the settings	via Execute .
	1		<u> </u>	

ameter Processing of	Slave Station									×			
rget Module Information	: TBEN-S2-4IOL Station No.: 1									^ ~			
thod selection: Param	eter write		~	Write parame	ter to t	arget module.				<u> </u>			
Parameter Information Checked parameters a Select All	re the targets of s Cancel All Se	elected proces	ses.										
Name		Initial Value	Unit	Read Value	Unit	Write Value	Unit	Setting Dange	Description				
Slot1		Initial value	Unit	Redu value	Unit	write value	Unit	Setung Range	Description				
Manual res	et after overcurr				_	ves							
Manual reset after overcurr yes Manual reset after overcurr yes													
Manual reset after overcurr yes no													
Manual res	et after overcurr	·				ves							
Activate or	itout 1	·			_	ves							
Activate or	itout 3				-	ves							
Activate or	itout 5				_	,							
Activate or	itout 7					no							
Slot2					_					×			
Clear All	"Read Value"			Clear All "Writ	e Value	•							
Process Option			Th	ere is no option	in the s	selected process							
Process is executed to a module of "Target Module Information". The device is accessed by using "the current connection destination". Please check if there is any problem with the connection destination. For information on items not displayed on the screen, please refer to the Operating Manual.													
										Execute			

Fig. 76: GX Works3: Parameterizing the device

▶ Optional: Export the parameter settings under Method selection → Parameter read as CSV file and re-import the file under Method selection → Parameter write in order to fill the column Write Values with the actual parameter settings and then to be able to change single parameters.



Close the window CC-Link IEF Basic Configuration via Close with Reflecting the Setting and store the network structure.

8	CC-Linl	k IEF B	asic Configurat	tion															×
÷ c	C-Link II	EF Bas	ic Configuratio	n Edit View	Close	with Discarding	the Settin	g Close	with Ref	lecting	the Sett	ing							
		[Detect Now		Link :	Scan Setting													
	Conne	ected	Count 🔽	2															
		No.	Mode	el Name	STA#	Station Type		RX/R	Y Settin	lg Stort	End	RWw/	/RWr Se	etting End	Group No.	RSVD STA	IP	Address) T
▼	-	0	Host Station		0	Master Station		Points		Start	End	Points	Start	End			192	2.168.3.39) 5
	Catting	1	TBEN-LL-8DIF	P-8DOP	1	Slave Station	54 (1 O	ccupied S	tation)	0000	003F	32	0000	001F	1	No Setting	192	2.168.3.10) 5
	-	2	TBEN-S2-4IO	L	2	Slave Station	64 (1 0	ccupied s	Stat 🗸	0040	007F	32	0020	003F	1	No Setting	192	.168.3.12	? 5
	<						64 (1 0 128 (2 0	ccupied S Occupied	station) Station)				_				_	>
	111		STA#1	STA #2			256 (4 (Occupied	Station	ý									
			518#1	314#2															
Host	Station																		
				a said															
s	A#0		St. Frit	Printer .															
A	Connec it:2	ted Co																	
To	tal STA#	#:2	TBEN-LI-8DI	TBEN-S2-4I															
			P-8DOP	OL															
			<																>

Fig. 77: GX Works3: Storing the network structure

• Accept the changes in the network structure under Module Parameters with Apply.



Fig. 78: GX Works3: Module Parameters, accept changes



7.10.4 Defining the process data mapping for CC-Link devices in the network

The start addresses of the process data for the devices that follow the **Master Station (Client)** (controller + local IOs) in the network are defined under **Module Parameters** \rightarrow **CC-Link IEF Basic Settings** using the **Refresh Settings** function.

- ▶ Open the Refresh Settings function under Module Parameters → CC-Link IEF Basic Settings.
- Define the start addresses for the process data of the CC-Link devices in CPU side. Check can be used to verify whether the addresses are valid or overlap with the memory area occupied by the control unit.

📳 R04ENCPU Module Parameter 🗙											۹۵.
Setting Item List	Setting Item										
M											
		Link Side						CPU Side	1		
Basic Settings	Device Name	Points	Start	End		Target		Device Name	Points	Start	End
🔤 🛛 🖓 Own Node Settings	RX	192	00000	000BF	+	Specify Device	\sim	X ~	192	00100	001BF
CC-Link IEF Basic Setting	RY	192	00000	000BF	+	Specify Device	\sim	Y v	192	00100	001BF
External Device Configura	RWr	96	00000	0005F	+	Specify Device	\sim	- W	96	00300	0035F
	R₩w	96	00000	0005F	+	Specify Device	\sim	W ~	96	00100	0015F
	Explanation										
ttem List Find Result	Chec <u>k</u>		Re	store the	Defa <u>u</u> lt S	Gettings				ļ	
										<u>A</u> pply	

• Accept the mapping settings with **Apply**.

Fig. 79: GX Works3: Process data mapping in Refresh Settings



NOTE

Adjusting the mapping may require a voltage reset of the control unit.



7.10.5 Going online with the PLC

• Write the configuration to the PLC via **Online** \rightarrow **Write to PLC**.

MELSOFT GX Works3 C:\Users\test	nlatz\Deskton\CC	-Link IEEB.gx3 - [R04ENCPU N	lodule Parameter]	— п х
Project Edit Find/Replace Cor	ivert View On	Debug Recording	Diagnostics lool Window Hei	
L 🖻 🖩 🗇 🖉 🗍 🗶 👜		Current Connection Destin	ation 🔒 🚟 🗦 🗱	╸ᆋᆋ♥Ωᡧ
🗄 👒 💷 🥝 🥥 📫 ሞ 🗎 🗞 Ma	ix.: 🎜	Read from PLC		
		Write to PLC	R R R R .	
Navigation $ extsf{P} imes$	R04ENCF	Verify with PLC		4 ▷ 🗸
	Setting Item I	Remote Operation(S)		
Reproject		Safety PLC Operation	+	Setting A
Module Configuration		Redundant PLC Operation	(G) nge	Disable All (SLMP)
🛨 🔚 Program		CPU Memory Operation		Binary
💼 FB/FUN		Delete PLC Data		Do Not Open by Program
🗉 💼 Label	🖃 - 💽 Bas	User Data	•	
Device Device		Set Clock	nk IEF Basic Setting	Use
System Parameter		Monitor	ttings	<pre><detailed setting=""></detailed></pre>
E RO4ENCPU				<detailed setting=""></detailed>
🖉 CPU Parameter		FB Property Management (Online) on	<detailed setting=""></detailed>
🔁 Module Parameter		Watch	•	
🚆 Memory Card Parar		User Authentication	>rt UDP/IP	Use
Module Information		MELSOFT	Transmission Port TCP/IP	Use
0000;_K7/1EN/1(CC		Explanation		
10040:RG60	E Bad P	coult Check	Restore the Default	Settings
🔂 0050:RG60		esuit		
🔂 0060:RG60				Apply
🙀 Remote Password	Output			д х
Watch 1				
	A Undate			
c.	De opuare			
Watch 1 Em Progress				
		R04EN	Host-192.168.3.39	ii.

Fig. 80: GX Works3: Writing the configuration to the PLC



▶ If necessary, define which data have to be written and click Execute.

line Data Operation									-		_
isplay Setting Related Functions											
Seat		1	Verify		Delete						
Parameter + Program(F) Select All Open/Close All(T) Deselect All(N)	Legend	Built-in Me	mory	SD M	lemory Card	💼 Int	elligent Function Module				
Module Name/Data Name				Detail	Title		Last Change	Size (Byte)			^
E CC-Link IEFB											
🗄 🚯 Parameter											
System Parameter/CPU Parameter	~						27.01.2022 08:19:54	Not Calculat	ed		
- 🚳 Module Parameter	V						15.05.2024 10:48:03	Not Calculat	ed		
Memory Card Parameter							03.12.2021 08:05:49	Not Calculat	ed		
Remote Password							27.01.2022 08:19:54	Not Calculat	ed		
🗆 🏠 Global Label											
Global Label Setting	~						22.12.2021 08:37:58	Not Calculat	ed		Ľ
🖻 🔚 Program				Detail							
MAIN							14.03.2022 13:02:26	Not Calculat	ed		
				1							
MATN				Detail			27.01.2022.08+20+02	-			12
Display Memory Capacity											
Size Calculation									Free		
									157/160KB		
egend Data Memory									Free		
Used									1811/2049KE		
Increased Device/Label Memory (File Stor	rage Area) –								Free		
Decreased									192/256KB		
Free: 5% or Less SD Memory Card									Free		
									0/0KB		
								Execute		Close	•



7.10.6 Reading process data

The monitoring of process data is done in the Device/Buffer Memory Batch Monitor.

▶ Open the monitoring via **Online** → **Monitor** → **Device**/**Buffer Memory Batch Monitor**.



Fig. 82: GX Works3: Starting the monitoring of process data



► Enter the address of the process data to be read under **Device Name**. According to the defined process data mapping [▶ 121] **X100** is selected as start address.

🔛 Module Config	urat	ion		1	[De	vic	e/B	uff	er N	/ler	nor	уB	atch	×														٩	▶ -
Device Name		X10	0									~	0)pen [Displa	y Form	at	D)etail	ed C	ondit	ions		۲	Мо	nitori	ng		
O Buffer Memory	′	Unit										~	(HEX)		Add	ress					~	DEC	2		Stop	Monit	oring		
Device Name	F	DC	в	A	9 8	7	6	5	4	3 2	1	0			Curre	nt Value					Stri	ng l							~
X100	0	0 0	0	0	0 0	0	0	0	0	0 0	1	0						2											
X110	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0	-										
X120	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0											
X130	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0				-		0											
X140	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0	-										
X150	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0	-										
X160	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0											
X170	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0											
X180	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0	-										
X190	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0											
X1AD	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0											
X180	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0	-										
X1C0	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0											
X1D0	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0											
X1E0	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0											
X1F0	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0											
X200	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0											
X210	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0	-										
X220	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0											
X230	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0											
X240	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0	-										
X250	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0	-										
X260	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0	-										
X270	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0	-										
X280	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0	-										
X290	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0	-										
X2A0	0	0 0 0	0	0	0 0	0	0	0	0	0 0	0	0						0					_						¥

Fig. 83: GX Works3: Monitoring of process data

➡ The mapping shows a signal at the 2nd Digital input of the 1st CC-Link device (station address 2, TBEN-LL-8DIP-8DOP) [▶ 115].



8 Parameterizing and configuring

- 8.1 Parameters overview
- 8.1.1 I/O channel parameters

Parameters – Digital modules

Default values are shown in **bold**.

Paramete	r name	Value Dec.	Hex.	Meaning	Description
EN DO	Activate output	0	0x00	Yes	Activates or deactivates the output function
	Ch	1	0x01	No	of the digital channel.
InvDI	Invert digital input	0	No		-
		1	Yes		The digital input signal is inverted.
IST Pulse stretching (*10 ms) SRO Manual reset after		0 254	0x00 0xFF		Configures the duration of pulse stretching of digital input edges from 10 to 2550 ms in multiples of 10 ms. 10 = pulse of 100 ms 0 = pulse stretching deactivated
SRO	Manual reset after	0	0x00	No	Defines if a manual reset is necessary after an
	overcurrent Ch	1	0x01	Yes	overcurrent occurred at the digital channel.
VAUX1/V (Ch/)	AUX2 pin1 Cx)	0	0x00	24 VDC	The 24 VDC sensor/actuator supply at pin1 of the connector is switched on.
	⊆h/)	1	0x01	switchable	The 24 VDC sensor/actuator supply at pin1 of the connector is switchable via the process data.
		2	0x02	Off	The 24 VDC sensor/actuator supply at pin1 of the connector is switched off.



8.2 PROFINET parameters

For PROFINET, a distinction must be made between the PROFINET device parameters and the parameters of the I/O channels.

PROFINET device parameters

Default values are shown in **bold**.

Parameter name	Value	Meaning	Description
Output behavior at commu- nication loss	0	Set to 0	The device switches the outputs to "0". No error information is sent.
	1	Hold current value	The device keeps the current data at the outputs.
Deactivate all diagnostics	0	No	Diagnostic and alarm messages are generated.
	1	Yes	Diagnostic and alarm messages are suppressed.
Disable output power dia-	0	No	Monitoring of voltage V2 is activated.
gnosis	1	Yes	The sending of the diagnosis is de- activated.
LED behavior (PWR) at V2 undervoltage	0	Red	The PWR LED lights up red in the event of an undervoltage at V2.
	1	Green	The PWR LED is flashes green in the event of an undervoltage at V2.
Deactivate I/O-ASSISTANT	0	No	
Force Mode	1	Yes	The Force Mode of the DTM is de- activated.
Deactivate EtherNet/IP	0	No	Explicit disabling of the Ethernet
	1	Yes	protocols or the web server
Deactivate Modbus TCP	0	No	
	1	Yes	_
Deactivate web server	0	No	_
	1	Yes	

9 Operating

9.1 Process input data

TBEN-L...-16DIP and TBEN-L4-16DIN

Word no).	Byte no	•	Bit no.							
Dec.	Hex.	Dec.	Hex.	7	6	5	4	3	2	1	0
0	0x00	0	0x00	DI7 C3 P2	DI6 C3 P4	DI5 C2 P2	DI4 C2 P4	DI3 C1 P2	DI2 C1 P4	DI1 C0 P2	DI0 C0 P4
		1	0x01	DI15 C7 P2	DI14 C7 P4	DI13 C6 P2	DI12 C6 P4	DI11 C5 P2	DI10 C5 P4	DI9 C4 P2	DI8 C4 P4

TBEN-L...-16DXP and TBEN-L4-16DXN

Word no		Byte no	•	Bit no.							
Dec.	Hex.	Dec.	Hex.	7	6	5	4	3	2	1	0
0	0x00	0	0x00	DX7 C3 P2	DX6 C3 P4	DX5 C2 P2	DX4 C2 P4	DX3 C1 P2	DX2 C1 P4	DX1 C0P2	DX0 C0 P4
		1	0x01	DX15 C7 P2	DX14 C7 P4	DX13 C6 P2	DX12 C6 P4	DX11 C5 P2	DX10 C5 P4	DX9 C4P2	DX8 C4P4

TBEN-L...-8DIP-8DOP

Word no. Byte no.		•	Bit no.								
Dec.	Hex.	Dec.	Hex.	7	6	5	4	3	2	1	0
Inputs					-						
0	0x00	0	0x00	DI7 C3 P2	DI6 C3 P4	DI5 C2 P2	DI4 C2 P4	DI3 C1 P2	DI2 C1 P4	DI1 C0 P2	DI0 C0 P4
		1	0x01	Reserved							

Meaning of process data bits

Name	Meaning
I/O data	
DI	Digital input
DO	Digital output
DX	DXP channel
Ch	Channel
P	Pin
X	Connector



9.2 Process output data

TBEN-L...-16DOP and TBEN-L4-16DON

Word no. Byte no.		Bit no.	Bit no.								
Dec.	Hex.	Dec.	Hex.	7	6	5	4	3	2	1	0
0	0x00	0	0x00	DO7 C3P2	DO6 C3 P4	DO5 C2 P2	DO4 C2 P4	DO3 C1 P2	DO2 C1 P4	DO1 C0P2	DO0 C0 P4
		1	0x01	DO15 C7 P2	DO14 C7 P4	DO13 C6 P2	DO12 C6 P4	DO11 C5 P2	DO10 C5P4	DO9 C4P2	DO8 C4P4

TBEN-L...-16DXP and TBEN-L4-16DXN

Word no. By		Byte no.		Bit no.								
Dec.	Hex.	Dec.	Hex.	7	6	5	4	3	2	1	0	
0	0x00	0	0x00	DX7 C3 P2	DX6 C3 P4	DX5 C2 P2	DX4 C2 P4	DX3 C1 P2	DX2 C1 P4	DX1 C0P2	DX0 C0 P4	
		1	0x01	DX15 C7 P2	DX14 C7 P4	DX13 C6 P2	DX12 C6 P4	DX11 C5 P2	DX10 C5 P4	DX9 C4P2	DX8 C4P4	

TBEN-L...-8DIP-8DOP

Word no. Byt		Byte no	Byte no.		Bit no.								
Dec.	Hex.	Dec.	Hex.	7	6	5	4	3	2	1	0		
0	0x00	0	0x00	DO15 C7 P2	DO14 C7 P4	DO13 C6 P2	DO12 C6 P4	DO11 C5 P2	DO10 C5P4	DO9 C4P2	DO8 C4P4		
		1	0x01	Reserved	·	·		·		·			

Name	Meaning
DO	Digital output
DX	DXP channel
P	Pin
X	Connector



LED displays 9.3

The device is provided with the following LEDs:

- Power supply voltage
- Group and bus error
- Status
- Diagnostics

BUS LED	Meaning
Off	No voltage present
Green	Connection to a master active
Flashing 3 × green in 2 s	ARGEE active
Green flashing (1 Hz)	Device is operational
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 wait for IP address allocation in DHCP or BootIP mode
ERR LED	Meaning
Off	No voltage present
Green	No diagnostics
Red	Diagnostics present
	 .
ETHT and ETH2 LEDS	Meaning
Off	No Ethernet connection
Green	Ethernet connection established, 100 Mbit/s
Green flashing	Data transfer, 100 Mbit/s
Yellow	Ethernet connection established, 10 Mbit/s
Yellow flashing	Data transfer, 10 Mbit/s
LED PWR	Meaning
Off	No voltage connected or under voltage at V1
Green	Voltage V1 and V2 OK
Green flashing	No voltage or under voltage at V2 (depending on the configuration of
Red	the parameter LED behavior (PWR) at V2 undervoltage)

Channel LEDs	Meaning (input)	Meaning (output)
Off	No input signal	Output inactive or V2 undervoltage
Green	Input signal present	Output active
Red	_	Overload or overcurrent at output
Red flashing (1 Hz)	Sensor and actuator supply overload Both connector LEDs are flashing.	

Red



9.4 Software diagnostic messages

The device provides the following software diagnostic messages:

Diagnostics of the digital sensors

9.4.1 Diagnostic telegram

Diagnostic data mapping – TBEN-L...-16DIP and TBEN-L4-16DIN

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	VERR V1	VERR V1	VERR V1	VERR V1	VERR V1	VERR V1	VERR V1	VERR V1
	C7	C6	C5	C4	C3	C2	C1	C0
	Ch14Ch15	Ch12Ch13	Ch10Ch11	Ch8Ch9	Ch6Ch7	Ch4Ch5	Ch2Ch3	Ch0Ch1
1	-	-	-	-	-	-	-	-

Diagnostic data mapping – TBEN-L...-16DOP and TBEN-L4-16DON

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	VERR V2	VERR V2	VERR V2	VERR V2	VERR V2	VERR V2	VERR V2	VERR V2
	P1 C7	P1 C6	P1 C5	P1 C4	P1 C3	P1 C2	P1 C1	P1 C0
	Ch14Ch15	Ch12Ch13	Ch10Ch11	Ch8Ch9	Ch6Ch7	Ch4Ch5	Ch2Ch3	Ch0Ch1
1	ERR7	ERR6	ERR5	ERR4	ERR3	ERR2	ERR1	ERRO
2	ERR15	ERR14	ERR13	ERR12	ERR11	ERR10	ERR9	ERR8
3	-	-	-	-	-	-	-	-

Diagnostic data mapping – TBEN-L...-16DXP and TBEN-L4-16DXN

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	VERR V2	VERR V2	VERR V2	VERR V2	VERR V1	VERR V1	VERR V1	VERR V1
	P1 C7	P1 C6	P1 C5	P1 C4	C3	C2	C1	C0
	Ch14Ch15	Ch12Ch13	Ch10Ch11	Ch8Ch9	Ch6Ch7	Ch4Ch5	Ch2Ch3	Ch0Ch1
1	ERR7	ERR6	ERR5	ERR4	ERR3	ERR2	ERR1	ERRO
2	ERR15	ERR14	ERR13	ERR12	ERR11	ERR10	ERR9	ERR8
3	-	-	-	-	-	-	-	-

Diagnostic data mapping – TBEN-L...-8DIP-8DOP

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	VERR V2	VERR V2	VERR V2	VERR V2	VERR V1	VERR V1	VERR V1	VERR V1
	P1 C7	P1 C6	P1 C5	P1 C4	C3	C2	C1	C0
	Ch14Ch15	Ch12Ch13	Ch10Ch11	Ch8Ch9	Ch6Ch7	Ch4Ch5	Ch2Ch3	Ch0Ch1
1	ERR15	ERR14	ERR13	ERR12	ERR11	ERR10	ERR9	ERR8

Meaning of Diagnostic Bits

Bit	Meaning
ERR	Overcurrent output
VERR V1 X K	Overcurrent VAUX1 (pin 1) at connector/channel group
VERR V2 P1 X K	Overcurrent VAUX2 (pin 1) at connector/channel group



9.4.2 PROFINET diagnostics

TBEN-L...16DIP und TBEN-L4-16DIN

I/O diagnostics (slot 1 according to configuration tool)		PROFINET diagnostics	
Diagnostics	Connector/pin	Error code	Channel
Overcurrent supply VAUX1	_	Overcurrent VAUX1 (Cl	וyChz)
VERR V1 C0 Ch0Ch1	C0	0x0600	0
VERR V1 C1 Ch2Ch3	C1	0x0601	0
VERR V1 C2 Ch4Ch5	C2	0x0602	0
VERR V1 C3 Ch6Ch7	C3	0x0603	0
VERR V1 C4 Ch8Ch9	C4	0x0604	0
VERR V1 C5 Ch10Ch11	C5	0x0605	0
VERR V1 C6 Ch12Ch13	C6	0x0606	0
VERR V1 C7 Ch14Ch15	C7	0x0607	0

TBEN-L...-16DOP und TBEN-L4-16DON

I/O diagnostics (slot 1 according to configura	tion tool)	PROFINET diagnostics	
Diagnostics	Connector/pin	Error code	Channel
Overcurrent supply VAUX2,	pin 1	Overcurrent VAUX2 pin	1 Cx (ChyChz)
VERR V2 pin 1 C0 Ch0Ch1	C0P1	0x0630	0
VERR V2 pin 1 C1 Ch2Ch3	C1P1	0x0631	0
VERR V2 pin 1 C2 Ch4Ch5	C2P1	0x0632	0
VERR V2 pin 1 C3 Ch6Ch7	C3P1	0x0633	0
VERR V2 P1 C4 Ch8Ch9	C4P1	0x0634	0
VERR V2 P1 C5 Ch10Ch11	C5P1	0x0635	0
VERR V2 P1 C6 Ch12Ch13	C6P1	0x0636	0
VERR V2 P1 C7 Ch14Ch15	C7P1	0x0637	0
Short-circuit at output		Short-circuit	
ERRO	C0	0x0001	0
ERR1		0x0001	-
ERR14	C7	0x0001	7
ERR15		0x0001	-



TBEN-L...-16DXP und TBEN-L4-16DXN

I/O diagnostics (slot 1 according to configura	ation tool)	PROFINET diagnostics	
Diagnostics	Connector/pin	Error code	Channel
Overcurrent supply VAUX1		Overcurrent VAUX1 Cx	(ChyChz)
VERR V1 C0 Ch0Ch1	C0	0x0600	0
VERR V1 C1 Ch2Ch3	C1	0x0601	0
VERR V1 C2 Ch4Ch5	C2	0x0602	0
VERR V1 C3 Ch6Ch7	C3	0x0603	0
Overcurrent supply VAUX2,	pin 1	Overcurrent VAUX2 pir	n1 Cx (ChyChz)
VERR V2 P1 C4 Ch8Ch9	C4P1	0x0634	0
VERR V2 P1 C5 Ch10Ch11	C5P1	0x0635	0
VERR V2 P1 C6 Ch12Ch13	C6P1	0x0636	0
VERR V2 P1 C7 Ch14Ch15	C7P1	0x0637	0
Short-circuit at output		Short-circuit	
ERRO	C0	0x0001	0
ERR1	_	0x0001	_
ERR14	C7	0x0001	7
ERR15		0x0001	_



TBEN-L...-8DIP-8DOP

I/O diagnostics (slot 1 according to configur	ation tool)	PROFINET diagnost	ics
Diagnostics	Connector/pin	Error code	Channel
Overcurrent supply VAUX1		Overcurrent VAUX	1 Cx (ChyChz)
VERR V1 C0 Ch0Ch1	C0	0x0600	0
VERR V1 C1 Ch2Ch3	C1	0x0601	0
VERR V1 C2 Ch4Ch5	C2	0x0602	0
VERR V1 C3 Ch6Ch7	C3	0x0603	0
Overcurrent supply VAUX2,	, pin 1	Overcurrent VAUX2	2 pin1 Cx (ChyChz)
VERR V2 P1 C4 Ch8Ch9	C4P1	0x0634	0
VERR V2 P1 C5 Ch10Ch11	C5P1	0x0635	0
VERR V2 P1 C6 Ch12Ch13	C6P1	0x0636	0
VERR V2 P1 C7 Ch14Ch15	C7P1	0x0637	0
Short-circuit at output		Short-circuit	
ERR8	C4	0x0001	4
ERR9	_	0x0001	
ERR10	C5	0x0001	5
ERR11	_	0x0001	
ERR12	C6	0x0001	б
ERR13		0x0001	
ERR14	C7	0x0001	7
ERR15		0x0001	



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.

If the device does not work as expected, proceed as follows:

- Exclude environmental disturbances.
- Check the connections of the device for errors.
- Check device for parameterization errors.

If the malfunction persists, the device is faulty. In this case, decommission the device and replace it with a new device of the same type.



11 Maintenance

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

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

11.1 Updating the firmware via TAS

NOTICE

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

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



NOTE

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

Starting a firmware update for a device

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

TAS DESKTOP DOCUMENTATION TURCK AUTOMATION SUITE TAS DESKTOP -> VIEW/FEATURE -> NETWORK VIEW/FEATURE 0 **•** Scan network Add device Edit device Change PW FW Update Set clock ARGEE Device type/feature ? Actions ? BEEP TBEN-Profinet

Fig. 84: Firmware update network view

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

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



Starting a firmware update for multiple devices

- In the network view, check the box for all desired devices.
- Click **FW update** in the header.

TAS DESKTOP DOC	UMENTATION	
TURCK AUTOMATION SUITE	TAS DESKTOP -> VIEW/FEATURE ->	NETWORK
VIEW/FEATURE	Scan network Add device Edit device	
ලා ARGEE මා BEEP	Actions ?	Device type/feature ?
ම Profinet ම Diagnostics	 ✓ ● ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	1905-01-00P-0 1905-01-00P-0

Fig. 85: Firmware update network view multiple devices

For multiple devices of the same type, a global password can be set, which can be used to unlock all selected devices directly. This requires that all selected devices have the same device password and are in the same TCP network.

- Enter a global or device password. The default password is "password".
- Click LOG IN.
- Click SELECT FILE.
- Open the directory of the firmware file.
- Select a new firmware file and load it by clicking **Open**.
- Click **START** to start the firmware update.

Please enter dev	ice passw	vord for each	n device or s	et as global devi	ce password.
Global passwo	rd		۲	LOGIN	
192.168.1.254			•	Switching To B	ootloader • • •
192.168.1.254 Do not close the Interrupting the lo	current br oading pro	owser windo ocess can re	ow until the f esult in dama	Switching To B irmware update i ge to the equipm	sootloader •o•
192.168.1.254 Do not close the Interrupting the le Firmware file:	current br oading pro	owser windo ocess can re	ow until the feasult in dama	Switching To B irmware update i ige to the equipm dat	sootloader ∙∍∙ is complete. nent.

Fig. 86: Firmware update progress

⇒ The progress of the firmware update is displayed.



11.2 Updating the firmware via web server



NOTICE

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

- Do not interrupt the power supply during the firmware update.
- During the firmware update do not reset the power supply.
- ▶ Do not interrupt the Ethernet connection during the firmware update.
- Open the web server.
- Log on to the device as administrator. The default password for the web server is "password".
- Click Firmware \rightarrow SELECT FIRMWARE FILE.
- Select the new firmware file and load it via **Open**.

TBEN-L5-8IOL ① Info 승장 Parameter	TBEN Gateway - Firmware SELECT FIRMWARE FILE	
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	> This PC > Desktop > FW_Update ew folder # # # # # # # # # # # # # # # #	v ð Search "FW_Update" € v 1
한국 Imput 소금 Output	V File <u>n</u> ame: TBENVbdat	 ✓ All files Qpen Cancel

Fig. 87: Webserver - Selecting the firmware file



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

			TURCK
MAIN	DOCUMENTATION	IODD CONFIGURATOR	LOGOUT
TEE ① 袋 图 冬 卫 S ① LOC 公 袋 图 芬 子	EN) Info Parameter Diagnosis Event log Ex- / Import Change Password Firmware CAL I/O Parameter Diagnosis Input Output	TEEN Gateway - Info SELECT FIRMWARE FILE File TBENVbdat selected UPDATE FIRMWARE	

Fig. 88: Webserver – Starting the firmware update

⇒ The progress of the firmware update is displayed.

		TURC
MAIN DOCUMENTATION	IODD CONFIGURATOR	LOGOUT
TBEN	TBEN	
	SELECT FIRMWARE FILE	
	Write block 568 of 1793 UPDATE FIRMWARE	
	· · · · ·	
	Flashing	

- Fig. 89: Webserver Firmware update running
 - Restart the device after the update process has been completed.



12 Repair

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

12.1 Returning devices

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

13 Disposal



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



14 Technical data

14.1 General technical data

Technical data	
Supply	
Supply voltage	24 VDC
Permissible range	1830 VDC
Total current	Max. 9 A per voltage group
Total current V1 + V2	Max. 11 A
Ex derating	S. document "Notes on Use in Ex zone 2 and 22" (ID 100022986)
Threshold for undervoltage diagnostics V1 and V2 (if used in device)	18 V
Potential isolation	Galvanic isolation of V1 and V2 voltage groups
Connectors	
Ethernet	$2 \times M12$, 4 pin, D coded
Supply	
■ TBEN-L4	X1: 7/8" male connector, 4-pinX2: 7/8" female connector, 4-pin
■ TBEN-L5	 X1: 7/8" male connector, 5-pin X2: 7/8" female connector, 5-pin
Digital in-/outputs	8× M12, 5-pin, A-coded
Permissible torques Ethernet I/O channels/supply Mounting (M6 screws) 	0.6 Nm 0.8 Nm 1 5 Nm
Max cable length	
Ethernet	100 m (per segment)
Isolation voltages	
V1 to V2	≥ 500 VAC
V1/V2 to the fieldbus	≥ 500 VAC
System data	
Transmission rate	10 Mbps/100 Mbps
Protocol detection	Automatic
Web server	Integrated, default IP: 192.168.1.254
Service interface	Ethernet via P1 or P2
Field Logic Controller (FLC)	
Supported from firmware version	3.2.9.0
Released as of ARGEE version	2.0.45.0



Technical data	
Modbus TCP	
Address assignment	Static IP, BOOTP, DHCP
Supported function codes	FC3, FC4, FC6, FC16, FC23
Number of TCP connections	8
Input register, start address	0 (0x0000)
Output register, start address	2048 (0x0800)
Local port	Port 502, fix setting
EtherNet/IP	
Address assignment	According to EtherNet/IP standard
Device Level Ring (DLR)	Supported
Quick Connect (QC)	< 150 ms
Number of Class 3 connections (TCP)	3
Number of Class 1 connections (CIP)	10
Input Assembly Instances	101
Output Assembly Instances	102
Configuration Assembly Instance	106
PROFINET	
Address assignment	DCP
MinCycle Time	1 ms
Conformity class	B (RT)
System redundancy	S2
Network load class	3
Fast Start Up (FSU)	< 150 ms
Diagnostics	According to PROFINET alarm handling
Automatic address setting	Supported
Media Redundancy Protocol (MRP)	Supported
Standard/directive conformity	
Vibration test	According to EN 60068-2-6
Acceleration	Up to 20 g
Shock test	According to EN 60068-2-27
Drop and topple	According to IEC 60068-2-31/IEC 60068-2-32
Electromagnetic compatibility	According to EN 61131-2
Approvals and certificates	CE, FCC, UKCA UV-resistant according to DIN EN ISO 4892-2A (2013)
UL cond.	cULus LISTED 21 W2, Encl.Type 1 IND.CONT.EQ
General information	
Dimensions (w \times l \times h)	60.4 × 230.5 × 38.8 mm
Operating temperature	-40+70 °C
Storage temperature	-40+85 °C
Operating height	Max. 5000 m
Degree of protection	IP65/IP67/IP69K (not evaluated by UL)
Housing material	PA6-GF30



Technical data	
Housing color	Black
Material screw	303 stainless steel
Material label	Polycarbonate
Halogen free	Yes
Mounting	2 mounting holes, Ø 6.3 mm

Note on FCC



NOTE

This device complies with the limit values for a Class A digital device in accordance with Part 15 of the FCC regulations. Operation of this device in a residential area may cause harmful interference. In this case users must rectify the interference at their own cost.

14.2 Technical data TBEN-L...-16DIP

Technical data	
Supply	
Sensor/actuator supply V _{AUX1}	Supply connectors C0C7 from V1, short-circuit proof, 120 mA per connector
Power loss, typical	≤ 5 W
Digital inputs	
No. of channels	16
Input type	PNP
Type of input diagnostics	Channel diagnostics
Switching threshold	EN 61131-2 type 3, PNP
Signal voltage, low level	< 5 V
Signal voltage, high level	> 11 V
Signal current, low level	< 1.5 mA
Signal current, high level	> 2 mA
Max input frequency	100 Hz (for fieldbus communication)
Input delay	2.5 ms
Input resistance	4 kΩ
Potential isolation	Galvanic isolation to fieldbus, voltage proof up to 500 VDC
General information	
MTTF	205 years acc. to SN 29500 (Ed. 99) 20 °C



14.3 Technical data TBEN-L4-16DIN

Technical data	
Supply	
Sensor/actuator supply V _{AUX1}	Supply connectors C0C7 from V1, short-circuit proof, 120 mA per connector
Power loss, typical	≤ 5 W
Digital inputs	
No. of channels	16
Input type	NPN
Type of input diagnostics	Channel diagnostics
Switching threshold	Für NPN-Geräte nicht spezifiziert
Signal voltage, low level	> (supply voltage - 5 V)
Signal voltage, high level	< (supply voltage - 11 V)
Signal current, low level	< 1.5 mA
Signal current, high level	> 2 mA
Max input frequency	100 Hz (for fieldbus communication)
Input delay	2.5 ms
Potential isolation	Galvanic isolation to fieldbus, voltage proof up to 500 VDC
General information	
MTTF	158 years acc. to SN 29500 (Ed. 99) 20 °C

14.4 Technical data TBEN-L...-16DOP

Technical data	
Supply	
Sensor/actuator supply V _{AUX2}	Supply connectors C0C7 from V1, short-circuit proof, 120 mA per connector
Power loss, typical	≤ 10 W
Digital outputs	
No. of channels	16
Output type	PNP
Type of output diagnostics	Channel diagnostics
Output voltage	24 VDC from potential group
Output current per channel	2 A, short-circuit proof, max. 2 A per connector
Output delay	1.3 ms
Load type	EN 60947-5-1: DC-13
Load type (UL)	Resistive, coil
Short-circuit protection	Yes
Potential isolation	Galvanic isolation to fieldbus, voltage proof up to 500 VDC
General information	
MTTF	165 years acc. to SN 29500 (Ed. 99) 20 °C



14.5 Technical data TBEN-L4-16DIN

Technical data	
Supply	
Sensor/actuator supply V _{AUX2}	Supply connectors C0C7 from V1, short-circuit proof, 120 mA per connector
Power loss, typical	≤ 10 W
Digital outputs	
No. of channels	16
Output type	NPN
Type of output diagnostics	Channel diagnostics
Output voltage	24 VDC from potential group
Output current per channel	1 A, short-circuit proof, 2 A per connector
Output delay	1.3 ms
Load type	EN 60947-5-1: DC-13
Load type (UL)	Resistive, coil
Short-circuit protection	Yes
Potential isolation	Galvanic isolation to fieldbus, voltage proof up to 500 VDC
General information	
MTTF	135 years acc. to SN 29500 (Ed. 99) 20 °C


14.6 Technical data TBEN-L...-16DXP

Technical data	
Supply	
Sensor/actuator supply V _{AUX1}	Supply connectors C0C3 from V1, short-circuit proof, 120 mA per connector
Sensor/actuator supply V _{AUX2}	Supply connectors C4C7 from V1, short-circuit proof, 120 mA per connector
Power loss, typical	≤ 10 W
Digital inputs	
No. of channels	16
Input type	PNP
Type of input diagnostics	Group diagnostics
Switching threshold	EN 61131-2 type 3, PNP
Signal voltage, low level	< 5 V
Signal voltage, high level	> 11 V
Signal current, low level	< 1.5 mA
Signal current, high level	> 2 mA
Input resistance	4 kΩ
Max input frequency	100 Hz (for fieldbus communication)
Input delay	2.5 ms
Potential isolation	Galvanic isolation to fieldbus, voltage proof up to 500 VDC
Digital outputs	
No. of channels	16
Output type	PNP
Type of output diagnostics	Channel diagnostics
Output voltage	24 VDC from potential group
Output current per channel	2 A, short-circuit proof, 2 A per connector
Output delay	1.3 ms
Load type	EN 60947-5-1: DC-13
Load type (UL)	Resistive, coil
Short-circuit protection	Yes
Potential isolation	Galvanic isolation to fieldbus, voltage proof up to 500 VDC
General information	
MTTF	148 years acc. to SN 29500 (Ed. 99) 20 °C



14.7 Technical data TBEN-L4-16DXN

Technical data		
Supply		
Sensor/actuator supply V _{AUX1}	Supply connectors C0C3 from V1, short-circuit proof, 120 mA per connector	
Sensor/actuator supply V _{AUX2}	Supply connectors C4C7 from V1, short-circuit proof, 120 mA per connector	
Power loss, typical	≤ 10 W	
Digital inputs		
No. of channels	16	
Input type	NPN	
Type of input diagnostics	Group diagnostics	
Switching threshold	EN 61131-2 type 3, NPN	
Signal voltage, low level	> (supply voltage - 5 V)	
Signal voltage, high level	< (supply voltage - 11 V)	
Signal current, low level	< 1.5 mA	
Signal current, high level	> 2 mA	
Input resistance	4 kΩ	
Max input frequency	100 Hz (for fieldbus communication)	
Input delay	2.5 ms	
Potential isolation	Galvanic isolation to fieldbus, voltage proof up to 500 VDC	
Digital outputs		
No. of channels	16	
Output type	NPN	
Type of output diagnostics	Channel diagnostics	
Output voltage	24 VDC from potential group	
Output current per channel	1 A, short-circuit proof, 2 A per connector	
Output delay	1.3 ms	
Load type	EN 60947-5-1: DC-13	
Load type (UL)	Resistive, coil	
Short-circuit protection	Yes	
Potential isolation	Galvanic isolation to fieldbus voltage proof up to 500 VDC	
General information		
MTTF	125 years acc. to SN 29500 (Ed. 99) 20 °C	



14.8 Technical data TBEN-L...-8DIP-8DOP

Technical data	
Supply	
Sensor/actuator supply V _{AUX1}	Supply connectors C0C3 from V1, short-circuit proof, 120 mA per connector
Sensor/actuator supply V _{AUX2}	Supply connectors C4C7 from V1, short-circuit proof, 120 mA per connector
Power loss, typical	≤ 8 W
Digital inputs	
No. of channels	8
Input type	PNP
Type of input diagnostics	Group diagnostics
Switching threshold	EN 61131-2 type 3, PNP
Signal voltage, low level	< 5 V
Signal voltage, high level	> 11 V
Signal current, low level	< 1.5 mA
Input resistance	4 kΩ
Signal current, high level	> 2 mA
Max input frequency	100 Hz (for fieldbus communication)
Input delay	2.5 ms
Potential isolation	Galvanic isolation to fieldbus, voltage proof up to 500 VDC
Digital outputs	
No. of channels	8
Output type	PNP
Type of output diagnostics	Channel diagnostics
Output voltage	24 VDC from potential group
Output current per channel	2 A, short-circuit proof, 2 A per connector
Output delay	1.3 ms
Load type	EN 60947-5-1: DC-13
Load type (UL)	Resistive, coil
Short-circuit protection	Yes
Potential isolation	Galvanic isolation to fieldbus, voltage proof up to 500 VDC
General information	
MTTF	205 years acc. to SN 29500 (Ed. 99) 20 °C



15 Turck branches — contact data

Germany	Hans Turck GmbH & Co. KG Witzlebenstraße 7, 45472 Mülheim an der Ruhr www.turck.de
Australia	Turck Australia Pty Ltd Building 4, 19-25 Duerdin Street, Notting Hill, 3168 Victoria www.turck.com.au
Austria	Turck GmbH Graumanngasse 7/A5-1, A-1150 Vienna www.turck.at
Belgium	TURCK MULTIPROX Lion d'Orweg 12, B-9300 Aalst www.multiprox.be
Brazil	Turck do Brasil Automação Ltda. Rua Anjo Custódio Nr. 42, Jardim Anália Franco, CEP 03358-040 São Paulo www.turck.com.br
Canada	Turck Canada Inc. 140 Duffield Drive, CDN-Markham, Ontario L6G 1B5 www.turck.ca
China	Turck (Tianjin) Sensor Co. Ltd. 18,4th Xinghuazhi Road, Xiqing Economic Development Area, 300381 Tianjin www.turck.com.cn
Czech Republic	TURCK s.r.o. Na Brne 2065, CZ-500 06 Hradec Králové www.turck.cz
France	TURCK BANNER S.A.S. 11 rue de Courtalin Bat C, Magny Le Hongre, F-77703 MARNE LA VALLEE Cedex 4 www.turckbanner.fr
Hungary	TURCK Hungary kft. Árpád fejedelem útja 26-28., Óbuda Gate, 2. em., H-1023 Budapest www.turck.hu
India	TURCK India Automation Pvt. Ltd. 401-403 Aurum Avenue, Survey. No 109 /4, Near Cummins Complex, Baner-Balewadi Link Rd., 411045 Pune - Maharashtra www.turck.co.in
Italy	TURCK BANNER S.R.L. Via San Domenico 5, IT-20008 Bareggio (MI) www.turckbanner.it
Japan	TURCK Japan Corporation ISM Akihabara 1F, 1-24-2, Taito, Taito-ku, 110-0016 Tokyo www.turck.jp



Korea	Turck Korea Co, Ltd. A605, 43, Iljik-ro, Gwangmyeong-si 14353 Gyeonggi-do www.turck.kr
Malaysia	Turck Banner Malaysia Sdn Bhd Unit A-23A-08, Tower A, Pinnacle Petaling Jaya, Jalan Utara C, 46200 Petaling Jaya Selangor www.turckbanner.my
Mexico	Turck Comercial, S. de RL de CV Blvd. Campestre No. 100, Parque Industrial SERVER, C.P. 25350 Arteaga, Coahuila www.turck.com.mx
Netherlands	Turck B. V. Ruiterlaan 7, NL-8019 BN Zwolle www.turck.nl
Poland	TURCK sp.z.o.o. Wroclawska 115, PL-45-836 Opole www.turck.pl
Romania	Turck Automation Romania SRL Str. Siriului nr. 6-8, Sector 1, RO-014354 Bucuresti www.turck.ro
Sweden	Turck AB Fabriksstråket 9, 433 76 Jonsered www.turck.se
Singapore	TURCK BANNER Singapore Pte. Ltd. 25 International Business Park, #04-75/77 (West Wing) German Centre, 609916 Singapore www.turckbanner.sg
South Africa	Turck Banner (Pty) Ltd Boeing Road East, Bedfordview, ZA-2007 Johannesburg www.turckbanner.co.za
Turkey	Turck Otomasyon Ticaret Limited Sirketi Inönü mah. Kayisdagi c., Yesil Konak Evleri No: 178, A Blok D:4, 34755 Kadiköy/ Istanbul www.turck.com.tr
United Kingdom	TURCK BANNER LIMITED Blenheim House, Hurricane Way, GB-SS11 8YT Wickford, Essex www.turckbanner.co.uk
USA	Turck Inc. 3000 Campus Drive, USA-MN 55441 Minneapolis www.turck.us





104

www.turck.com

