

TBEN-LL(H)-4RMC Motor Controller

Instructions for Use



Table of Contents

1	About these 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
	3.2	General safety instructions	7
	3.3	Notes on UL approval	7
	3.3.1	Conditions of Acceptability	7
4	Product d	escription	8
	4.1	Device overview	8
	4.1.1	Indication elements	8
	4.1.2	Operating elements	8
	4.2	Properties and features	9
	4.3	Functional principle	9
	4.4	Functions and operating modes	10
	4.4.1	Multiprotocol technology	10
	4.4.2	Motor modes	11
	4.4.3	Reporting of motor faults	12
	4.4.4	Turck Field Logic Controller function (ELC ARGEE)	13
_	т.т.J		1.0
5	instailing		14
	5.1	Mounting onto a mounting plate	14
	5.2	Outdoor device installation	14
	5.3	Grounding the device	15
	5.3.1	Equivalent wiring diagram and shielding concept	15
	5.3.2	Shielding of the fieldbus and I/O level	15
	5.5.5	arounding clip	16
	534	Grounding the fieldbus level directly: inserting the grounding clip	16
	5.3.5	Grounding the device – mounting on a mounting plate	16
6	Connectir	Ja	17
	6.1	Connecting the device to Ethernet	17
	6.1.1	Applications with QuickConnect (QC) and Fast Start Up (FSU)	17
	6.2	Connecting the supply voltage (TBEN-LLH-4RMC)	18
	6.3	Connecting the supply voltage (TBEN-LL-4RMC)	19
	6.4	Supply concept	20
	6.5	Connecting sensors and actuators	21
	6.6	Connecting motors	22



7	Commiss	ioning	23
	7.1	Adjusting network settings and operation mode	23
	7.1.1	Adjusting network settings and operation mode via rotary coding switches	23
	7.1.2	Adjusting network settings via TAS (Turck Automation Suite)	25
	7.1.3	Adjusting network settings via the web server	27
	7.2	Commissioning the device in PROFINET	28
	7.2.1	Device model TBEN-LL(H)-4RMC, slots and sub slots	28
	7.2.2	Address setting in PROFINET	35
	7.2.3	MRP (Media Redundancy Protocol)	36
	7.2.4	Services for acyclic data	37
	7.3	Connecting the device to a Siemens PLC in PROFINET	38
	7.3.1	Installing the GSDML-file	38
	7.3.2 7.2.2	Connecting the devices to the PLC	39
	7.5.5 7.2.4	Assigning the PROFINET device name	40
	7.3.4	Configuring device functions	41 42
	736	Connecting the device online with the controller	43
	7 /	Commissioning the Device in Modbus TCP	лл
	7. 4 7.4.1	Implemented Modbus functions	
	7.4.2	Modbus registers	44
	7.4.3	Data width	47
	7.4.4	Register mapping	48
	7.4.5	Error behavior (watchdog)	52
	7.5	Commissioning the device in EtherNet/IP	53
	7.5.1	Common EtherNet/IP features	53
	7.5.2	EDS files and catalog files	53
	7.5.3	Diagnostic messages via process data	53
	7.5.4	EtherNet/IP standard classes	53
	7.5.5	Vendor Specific Classes (VSC)	63
	7.6	Connecting the Devices to a Rockwell PLC with EtherNet/IP	71
	7.6.1	Installing the EDS file	71
	7.6.2	Adding the device to the project	74
	7.6.3	Parameterizing the device	78
8	Paramete	rizing and configuring	80
	8.1	Parameters	80
	8.1.1	PROFINET parameters	88
	8.2	Configuring the motor mode	89
	8.2.1	Configuring the velocity mode	89
	8.2.2	Configuring the position mode	92
	8.2.3	Configuring the homing mode	96
	8.2.4	Configuring the digital mode	99
	8.2.5	Configuring the referencing	. 102
	8.3	Configuring the fire mode	104
9	Operating	g	106
	9.1	Process input data	106
	9.2	Process output data	109
	9.3	LED displays	112
	9.4	Software diagnostic messages	114
	9.4.1	Status- and control word	. 114
	9.4.2	Diagnostic telegram	. 115
	9.4.3	PROFINET diagnostics	. 116



10 Troubleshoo		ooting	118
	10.1	Fixing motor channel errors	118
	10.2	Reducing emitted interferences from motors (HW-Rev. 1)	118
11	Maintena	nce	119
	11.1	Updating the firmware via TAS	119
	11.2	Updating the firmware via web server	121
12	Repair		123
	12.1	Returning devices	123
13	Disposal		123
14	Fechnical data 1		124
15	Turck branches — contact data 12		



1 About these instructions

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

1.1 Target groups

These instructions are aimed at qualified personal and must be carefully read by anyone mounting, commissioning, operating, maintaining, dismantling or disposing of the device.

1.2 Explanation of symbols

The following symbols are used in these instructions:

$\mathbf{\Lambda}$	DANGER
	DANGER indicates a hazardous situation with a high level of risk, which, if not
	avoided, will result in death or serious injury.
	WARNING
	WARNING indicates a hazardous situation with a medium level of risk, which, if not
	avoided, will result in death or serious injury.
	CAUTION
	CAUTION indicates a hazardous situation with a medium level of risk, which, if not
	avoided, will result in moderate or minor injury.
	NOTICE
	CAUTION indicates a situation which, if not avoided, may cause damage to property.
	NOTE
	NOTE indicates tips, recommendations and important information about special 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

Besides this document, the following material can be found on the Internet 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

2.1 Product identification

These instructions apply to the following motor controller:

- TBEN-LL-4RMC (ID 100050634)
- TBEN-LLH-4RMC (ID 100018352)

2.2 Scope of delivery

The delivery consists of the following:

- Motor controller
- IP67 sealing caps for the I/O connectors
- Labelling 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 [> 128].



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

The multiprotocol I/O module TBEN-LL(H)-4RMC is a motor controller for connecting motors and can be used in the three Ethernet protocols PROFINET, Ethernet/IP and Modbus TCP. The module detects the bus protocol automatically during the start-up.

The module has four motor controller channels for connecting motors with a CANopen interface in accordance with the CANopen Drives profile In addition, the device has four universal DXP channels and four digital input channels to which digital sensors or actuators can be connected directly.

The TBEN-LL-4RMC is used to connect 24 V motors. The TBEN-LLH-4RMC is used to connect 24 V and 48 V motors.

The device is designed in IP67 and can be mounted directly in the field.

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.

3.2 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

• Only use the device in an area of not more than pollution degree 2.

3.3.1 Conditions of Acceptability

For use only in complete equipment where the acceptability of the combination is determined by UL LLC:

- (1) This device is to be supplied from an isolated power supply. The device is evaluated for use in Overvoltage Category II only.
- (2) This device provides overcurrent protection to each output. The protection is achieved by means of internal supplementary fuses rated 5 A DC.
- (3) This device is provided with terminals suitable for factory wiring only.
- (4) The enclosure was evaluated for Type 1.
- (5) This device does not provide internal over temperature and overload protection for the motor.
- (6) This device is not evaluated for functional safety.



4 Product description

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

The motor controller has four B-coded M12 sockets for controlling up to four 24 VDC and 48 VDC motors with CANopen interface according to the CANopen Drives profile. The motor controller channels are specially designed for connecting roller motors that support CANopen drive modes 1 (Position), 3 (Velocity) and 6 (Homing) (e.g. Interroll RollerDrive EC5000 BI).

In addition, the device provides four digital PNP inputs at four A-coded M12 sockets at slots X0 and X1 and four universal digital channels at slots X2 and X3. The DXP channels can be used as inputs and outputs without configuration. Up to eight 3-wire PNP sensors or four PNP DC actuators can be connected. The maximum output current per output is 2 A.

Two D-coded M12 sockets are available for connection to Ethernet. The TBEN-LL-4RMC is equipped with 5-pin, L-coded standard M12 connectors for connecting the supply voltage. The TBEN-LLH-4RMC is connected to the supply voltage via 5-pin M12 connectors with device-specific pin assignment due to the 48 VDC supply [] 18].

4.1 Device overview



Fig. 1: Dimensions TBEN-LL(H)-4RMC

4.1.1 Indication elements

The device is provided with the following LEDs:

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

4.1.2 Operating elements

The device has the following operating elements:

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



4.2 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 plug connector
- Integrated Ethernet-switch for building up a line-topology
- Transmission speed 10 Mbps/100 Mbps
- Separated power groups for safety shutdown
- Integrated web server
- 4 universal digital DXP channels (PNP)
- 4 digital input channels (PNP)
- 4 channels for controlling 24 V and 48 V motor rollers with CANopen interface.
- ARGEE functionality

4.3 Functional principle

The motor controller modules provide a multiprotocol Ethernet interface for Modbus TCP, EtherNet/IP and PROFINET. Via the Ethernet interface, the device is connected to an Ethernet network as Ethernet /IP device, Modbus TCP slave or PROFINET device. The motor controller channels are specially designed for the operation of roller motors. Connected motors that support the CANopen drives modes 1 (Position), 3 (Velocity) and 6 (Homing) can be operated without knowledge of the CANopen indices.

In addition the devices can process signals from up to eight sensors and actuators via eight digital channels.

The integrated FLC function allows running a control logic, such as decentralized accumulating conveyor logic, to be executed directly on the device. The programming is done via the web-based engineering ARGEE.



4.4 Functions and operating modes

4.4.1 Multiprotocol technology

The device can be used in the following Ethernet protocols:

- PROFINET
- EtherNet/IP
- Modbus TCP

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 Start Up (FSU), prioritized start-up, only digital I/O channels
- Topology detection
- Address allocation with LLDP
- Media redundancy protocol (MRP)
- S2 redundancy

EtherNet/IP

- QuickConnect (QC), only digital I/O channels
- 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



4.4.2 Motor modes

The motor control of the four motor controller channels of the device is done according to the CANopen Drives profile (object 0x6060, sub index 0x00 "Modes of operation"). The motor mode of the connected motor can be defined either via the parameter **Operation mode** [\triangleright 80] or via the process data [\triangleright 109] of the device.

The following motor modes are supported:

Motor mode	Settable via: Parameter opera-	Process data	
	tion mode	motor mode	
No change			
Position Mode	Yes	Yes	(According to CANopen Drives Profile, Ob-
Velocity mode	Yes	Yes	ject 0x6060:00)
Homing mode	Yes	Yes	
Digital mode	Yes	Yes	
Referencing	No	Yes	
Fire mode	No	No	The fire mode is activated by setting the corresponding parameters (velocity fire mode, ramp acceleration fire mode and input fire mode).

Position mode

In position mode, the connected motor moves to a defined absolute or relative target position at a defined speed (configuration example, s. "Configuring the position mode" [> 92]).

The acceleration and deceleration behavior of the motor depends on the application and is adjusted directly via the process output data.

Velocity mode

In velocity mode, the connected motor is driven at a defined velocity (configuration example, s. "Configuring the velocity mode" [> 89]).

The acceleration and deceleration behavior of the motor depends on the application and can either be defined via the Ramp acceleration and Ramp deceleration parameters or adjusted directly via the process output data.

For the configuration in PROFINET, the GSDML file provides a special velocity [30].

Homing mode

In homing mode, the position of the motor is defined as the start position. All further positions of the motor refer to this position (configuration exapmle, s. "Configuring the homing mode" [> 96].

Application example (e.g. in position mode):

Aligning the start position on the system during operation.



Referencing

In referencing mode, the connected motor moves to a defined, absolute reference position. All further positions of the motor refer to this position. The referencing mode can only be configured via the process outut data (**Motor mode**) of the device (configuration example, s. "Configuring the referencing" [\triangleright 102]).

Application example:

Single reference run (homing) after switching on the system to align the start position of the motor roller or to set the position of the motor roller as the zero position when reaching a limit switch.

The acceleration and deceleration behavior of the motor depends on the application and can be adjusted via the process output data.

Digital mode

In digital mode, the connected motor runs at one of three speeds, which are defined in the parameters **velocity 1 digital mode**, **velocity 2 digital mode** and **velocity 3 digital mode** (configuration example, s. "Configuring the digital mode" [> 99]).

It depends on the combination of the parameters **input 1 digital mode** and **input 2 digital mode** at which speed the motor runs and which signal (active high or active low signal) at which of the input channels (channel 4...channel 7 at X4...X7) activates the digital mode.

Input 1 digital mode	Input 2 digital mode	Velocity
Logic status valid	Logic status valid	
No	No	Motor standstill
Yes	No	Velocity 1 digital mode
No	Yes	Velocity 2 digital mode
Yes	Yes	Velocity 3 digital mode

The acceleration and deceleration behavior of the motor depends on the application and can be defined via the **ramp acceleration** and **ramp deceleration** parameters.

For the configuration in PROFINET, the GSDML file provides a special sub module **digital** [> 29].

Fire mode

Fire mode is an emergency mode for clearing a conveyor belt quickly and immediately if necessary (configuration example, s. "Configuring the fire mode [▶ 104]).

When fire mode is activated, the motor connected to the the respective motor channel runs immediately and continuously at a defined speed (parameter **velocity fire mode**) and ramp (parameter **ramp acceleration fire mode**). All other settings of the device will be ignored.

The fire mode is activated via an active high or an active low signal at a digital input. Which signal level at which digital input activates the fire mode, is set on the respective motor channel via the parameter **input fire mode**.

4.4.3 Reporting of motor faults

Independent of the selected operating mode, motor faults can be signaled via one or more digital outputs. Which digital output switches in the event of a motor fault is determined via the parameter **motor status output** [> 80].



4.4.4 Universal digital channels – functions

The device has four universal digital channels that can be used as inputs or outputs without configuration. Up to four 3-wire PNP sensors or four PNP DC actuators can be connected. The maximum output current per output is 2 A.

Activating outputs permanently

The outputs of the DXP channels can be switched on permanently via the **Output permanently on** parameter. Output process data no longer have any influence on the output.

Use case:

Permanent supply of stations that are connected to a port.

4.4.5 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.



5 Installing

5.1 Mounting onto a mounting plate



- 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.



Fig. 2: Mounting the device onto a mounting plate

5.2 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.



5.3 Grounding the device

5.3.1 Equivalent wiring diagram and shielding concept





5.3.2 Shielding of the fieldbus and I/O level

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



Fig. 4: 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.

- 5.3.3 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. 5: Removing the grounding clamp

- 5.3.4 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. 6: Mounting the grounding clip

5.3.5 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



NOTE

Intrusion of liquids or foreign bodies through leaking connections Loss of degree of protection IP65/IP67/IP69K, device damage possible

- ► Tighten M12 male connectors with a tightening torque of 0.6 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 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.

	0	P

Fig. 7: 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. 8: Pin assignment Ethernet connectors

- 6.1.1 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 XF1.
 - Connect outgoing Ethernet cables to XF2.



6.2 Connecting the supply voltage (TBEN-LLH-4RMC)

For the connection to the power supply, the device has two 5-pin, L coded M12 connectors. V1 and V2 are galvanically isolated. The maximum tightening torque for the M12 connectors is 0.6 Nm.



Fig. 9: M12 connector for connecting the supply voltage

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



Fig. 10: Pin assignment power supply connectors



NOTE The pin assignment of the supply voltage connectors differs from the standard pin assignment.

Connector	Function
XD1	Power feed
XD2	Continuation of the power to the next node
V1	System voltage (24 V): power supply 1 (incl. supply of electronics)
V2	Load voltage (24 V or 48 V): power supply 2



NOTE

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



6.3 Connecting the supply voltage (TBEN-LL-4RMC)

For the connection to the power supply, the device has two 5-pin, L coded M12 connectors. V1 and V2 are galvanically isolated. The maximum tightening torque is 0.6 Nm.

		<u>()</u>	Ø	P
0.000			0	0
	õ	Õ	Õ	Η

Fig. 11: M12 connector for connecting the supply voltage

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



Fig. 12: Pin assignment power supply connectors

Connector	Function
XD1	Power feed
XD2	Continuation of the power to the next node
Voltage	Function
Voltage V1	Function System voltage: power supply 1 (incl. supply of electronics)
Voltage	Function

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, the PWR LED changes from green to green flashing or red (depending on the configuration). If V1 goes below the permissible minimum, the PWR LED goes out.



6.4 Supply concept

The Device is 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)



Fig. 13: Power supply TBEN-LL(H)-4RMC



6.5 Connecting sensors and actuators

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



Fig. 14: M12 connectors for connecting digital sensors and actuators

X0... X1: Digital input channels (DIP) for connecting digital sensors

X2...X3: universal, digital channels (DXP) for connecting digital sensors and actuators

• Connect digital sensors and actuators to the device according to the pin assignment.



Fig. 15:: Connectors for digital sensors at X0...X1 – pin assignment



Fig. 16: Connectors for digital sensors and actuators at X2...X3 – pin assignment



6.6 Connecting motors

The device has four B-coded M12 sockets for connecting motors. The maximum tightening torque is 0.6 Nm.



Fig. 17: M12 connector for connecting motors

• Connect the motors to the device according to the pin assignment.

-(2 1000 3	$1 = V_{AUX}2$ 2 = CAN High 3 = GND V2
5 4	4 = CAN Low 5 = GND V2
X4X7	

Fig. 18: Pin assignment of the connectors for motor roller control, X4...X7



7 Commissioning

7.1 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.

7.1.1 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.



Fig. 19: 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-volat- ile 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.
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 Switch position 899: TBEN_899
900	Factory reset	 The factory reset resets all settings to the default values: Network setting (IP address, subnet mask, gateway) PROFINET device name Device parameters



7.1.2 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	UMENTATION	Your Global Automati	on 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
🔊 BEEP	name		
Profinet			
Diagnostics			
CODESYS			
စြာ IO-Link			
🗘 M12Plus			

Fig. 20: Home screen in TAS

 \Rightarrow TAS shows the connected devices.

TAS DESKTOP DOC	UMENTATION	TURC Your Global Automati	DIFK ion Partner
TURCK AUTOMATION SUITE	TAS DESKTOP → VIEWIFEATURE → 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		
ලි BEEP ම Profest	Actions ? Device type/feature ? IP address Adapter address Address Address ○ ◇ ◇ ○ <td< th=""><th>Subnet mask/Gateway 255.255.255.0 / 192.168.1.1</th><th>Version</th></td<>	Subnet mask/Gateway 255.255.255.0 / 192.168.1.1	Version
Diagnostics			
ල CODESYS ලි IO-Link			
分 M12Plus			

Fig. 21: Found devices in TAS

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

TAS DESKTOP DOC	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	P ?	
්ලා ARGEE බ peep	Actions ?	Device type/feature ? PN device name	IP address Adapter address	Address mode ? MAC address	Subnet mask/Gateway Version
ອີ Profinet ອີ Diagnostics	✓ @ // ∩ ○ ○ ☆ ⊗	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. 22: 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	ananga				
IP address	192.168.1.254				
Default gateway	192.168.1.1				
Subnet mask	255.255.255.0				
Take care, that the IP add	dress isn't used by any other devices or switches!				

Fig. 23: Changing network settings in TAS



7.1.3 Adjusting network settings via the web server

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



NOTE 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. 24: Web server - adjusting network settings



7.2 Commissioning the device in PROFINET

7.2.1 Device model TBEN-LL(H)-4RMC, slots and sub slots

The TBEN-LL(H)-4RMC have seven virtual slots for different device functions (DXP channels, motor channels) and diagnostics or the module status.

T	TBEN-LL-4RMC_V16 → Ungrouped devices → turck-tben-IIh-4rmc_1 [TBEN-LLH-4RMC] _ ■ ■ = ×							
				📲 Topolo	ogy view	晶 Netv	work view 🛛 🕅 D	evice view
	Devi	ce overview						
	?	Module	Rack	Slot	I address	Q address	Туре	Article no.
		 turck-tben-llh-4rmc_1 	0	0			TBEN-LLH-4RMC	100018352
		▶ PN-IO	0	0 X1			turck-tben-llh-4rmc	
		DXP_1	0	DXP			DXP	
		Velocity_1	0	Motor 1			Velocity	
		Velocity_2	0	Motor 2			Velocity	
	_	Velocity_3	0	Motor 3			Velocity	
	4	Velocity_4	0	Motor 4			Velocity	
			0	Diagnostics				
	-		0	Module status				
								-
	<							>

Fig. 25: Assignment of slots and sub slots in TIA Portal

Besides Slot 0 (DAP) all other slots of the device contain only one sub slot. For this reason slots and sub slots are described as synonyms in the following.

Slot no.	Name	Description	Pluggable sub slots
0	TBEN-LL(H)-4RMC	Device interface to PROFINET IO, Device Access Point	 Device Access Point Ethernet interface Ethernet port 0 Ethernet port 1
1	DXP	Device parameters and para- meters of digital outputs	cannot be changed
2	Motor 1	Function motor channel 1	Digital
3	Motor 2	Function motor channel 2	Velocity (default setting)
4	Motor 3	Function motor channel 3	Universal
5	Motor 4	Function motor channel 4	
6	Diagnostics	This slot is used to cyclically map diagnostic data.	Diagnostics
7	Module status	This slot is used to cyclically map device status data.	Device status



Sub module Digital

The sub module **Digital** can be plugged into slots 2...5.

Paramete	ers [▶ 80]
----------	------------

Parameter	Value	Description
Operation mode	Digital mode	Operation mode of the motor channel, pre-defined
Motor attached	Yes	Channel activated, pre-defined
Lock Motor Mode	Yes	Motor mode locked, pre-defined
Lock Ramp	Yes	Ramp acceleration and ramp deceleration locked, pre-defined
Lock Position	Yes	Position locked, pre-defined
Ramp acceleration	See parameter	rs [▶ 80]
Ramp deceleration	_	
Motor status output	-	
Input 1 digital mode		
Input 2 digital mode	-	
Velocity 1 digital mode	_	
Velocity 2 digital mode	-	
Velocity 3 digital mode	-	
Input fire mode	-	
Velocity fire mode	-	
Ramp acceleration fire mode		

Process input data [106]

Process value	Offset	Data type
Inputs	%ID0	
Motor mode – Target reached – Busy – Following error	%IB0	USINT
Diagnostics	%IB1	USINT
Generic error	%IX1.0	BOOL
Current error	%IX1.1	BOOL
Voltage error	%IX1.2	BOOL
Temperature error	%IX1.3	BOOL
Communication error	%IX1.4	BOOL
Device profile specific error	%IX1.5	BOOL
Manufacturer specific error	%IX1.7	BOOL
	%IW1	
Status	%IB2	USINT
Missing device	%IX2.0	BOOL
Velocity out of valid range	%IX2.1	BOOL
Digital mode	%IX2.2	BOOL
Connected	%IX2.4	BOOL
Enabled	%IX2.5	BOOL
Fault	%IX2.6	BOOL



Process value	Offset	Data type
Fault is pending	%IX2.7	BOOL
Reserved	%IB3	
Velocity	%IW2	INT

Process output data: none

Sub module Velocity

The sub module **Velocity** can be plugged into slots 2...5.

Parameters	[)	80]
------------	----	-----

Parameter	Value	Description
Operation mode	Velocity	Operation mode of the motor channel, pre-defined
Motor attached	Yes	Channel activated, pre-defined
Lock Motor Mode	Yes	Motor mode locked, pre-defined
Lock Ramp	Yes	Ramp acceleration and ramp deceleration locked, pre-defined
Lock Position	Yes	Position locked, pre-defined
Ramp acceleration	See parameter	rs [▶ 80]
Ramp deceleration	-	
Motor status output	-	
Input 1 digital mode	-	
Input 2 digital mode	-	
Velocity 1 digital mode	-	
Velocity 2 digital mode	-	
Velocity 3 digital mode	-	
Input fire mode	-	
Velocity fire mode	_	
Ramp acceleration fire mode	-	

Process input data [> 106]

Process value	Offset	Data type
Inputs	%IW0	
Motor mode	%IB0	USINT
Diagnostics	%IB1	USINT
Generic error	%IX1.0	BOOL
Current error	%IX1.1	BOOL
Voltage error	%IX1.2	BOOL
Temperature error	%IX1.3	BOOL
Communication error	%IX1.4	BOOL
Device profile specific error	%IX1.5	BOOL
Manufacturer specific error	%IX1.7	BOOL
	%IW1	
Status	%IB2	USINT



Process value	Offset	Data type
Missing device	%IX2.0	BOOL
Velocity out of valid range	%IX2.1	BOOL
Fire mode	%IX2.2	BOOL
Connected	%IX2.4	BOOL
Enabled	%IX2.5	BOOL
Fault	%IX2.6	BOOL
Fault is pending	%IX2.7	BOOL
Reserved	%IB3	
Velocity	%IW2	INT

Process output data [> 109]

Process value	Offset	Data type
Outputs	%QW0	
Motor mode – Enable – Fault reset – Halt – Quick Stop	%QB0	USINT
Motor (position control)	%QB1	USINT
New setpoint	%QX1.0	BOOL
Position mode	%QX1.1	BOOL
Change set immediately	%QX1.2	BOOL
Change on setpoint	%QX1.3	BOOL
Velocity	%QW1	INT



Sub module Universal

The sub module Universal can be plugged into slots 2...5.

Parameters	[▶ 80]	
rarameters	[, 00]	

Parameter	Value	Description
Operation mode	No change	Operation mode of the motor channel
	Position mode	-
	Velocity	-
	Homing	-
Motor attached	Yes	Channel activated, pre-defined
Lock Motor Mode	No	Motor mode can be changed during operation via the process output data
	Yes	Motor mode locked, pre-defined
Lock Ramp	No	Ramp acceleration and ramp deceleration can be changed during operation via the process output data
	Yes	Ramp acceleration and ramp deceleration can not be changed during operation via the process output data
Lock Position	No	Position can be changed during opera- tion via the process output data
	Yes	Position locked, pre-defined
Motor status output	See parameters	80]
Input 1 digital mode	_	
Input 2 digital mode	_	
Velocity 1 digital mode		
Velocity 2 digital mode		
Velocity 3 digital mode		
Input fire mode	_	
Velocity fire mode		
Ramp acceleration fire mode	_	
Input reference sensor	_	
Input positive limit switch	_	
Input negative limit switch		

Process input data [> 106]

Process value	Offset	Data type
Inputs	%ID0	
Motor mode – Target reached – Busy – Following error	%IB0	USINT
Diagnostics	%IB1	USINT
Generic error	%IX1.0	BOOL
Current error	%IX1.1	BOOL
Voltage error	%IX1.2	BOOL
Temperature error	%IX1.3	BOOL
Communication error	%IX1.4	BOOL



Process value	Offset	Data type
Device profile specific error	%IX1.5	BOOL
Manufacturer specific error	%IX1.7	BOOL
	%IW1	
Status	%IB2	USINT
Missing device	%IX2.0	BOOL
Velocity out of valid range	%IX2.1	BOOL
Digital mode	%IX2.2	BOOL
Connected	%IX2.4	BOOL
Enabled	%IX2.5	BOOL
Fault	%IX2.6	BOOL
Fault is pending	%IX2.7	BOOL
Reserved	%IB3	
Velocity	%IW2	INT
Position	%ID2	DINT

Process output data [> 109]

Process value	Offset	Data type
Outputs	%QD0	
	%QW0	
Motor mode – Enable – Fault reset – Halt – Quick Stop	%QB0	USINT
Motor 1	%QB1	USINT
New setpoint	%QX1.0	BOOL
Position mode	%QX1.1	BOOL
Change set immediately	%QX1.2	BOOL
Change on setpoint	%QX1.3	BOOL
Velocity	%QW1.0	INT
Position	%QD1	DINT
	%QD2	
Ramp acceleration	%QW4	UINT
Ramp deceleration	%QW5	UINT



Sub module Diagnostics

The sub module **Diagnostics** can be plugged into slot 6.

- Parameter
 - This sub module requires no configuration and has thus no parameters.
- Process input data [> 106]

Process value	Offset	Data type
Diagnostic channel – byte 0	%IB0	USINT
Overcurrent VAUX1 pin 1 X0 (Ch0/1)	%IX0.0	BOOL
Overcurrent VAUX1 pin 1 X1 (Ch2/3)	%IX0.1	BOOL
Overcurrent VAUX1 pin 1 X2 (Ch4/5)	%IX0.2	BOOL
Overcurrent VAUX1 pin 1 X3 (Ch6/7)	%IX0.3	BOOL
Diagnostic channel – byte 1	%IB1	USINT
reserved		
Diagnostic channel – byte 2	%IB2	USINT
Overcurrent output 4	%IX2.0	BOOL
Overcurrent output 5	%IX2.1	BOOL
Overcurrent output 6	%IX2.3	BOOL
Overcurrent output 7	%IX2.4	BOOL

Sub module Device status

The sub module **Device status** can be plugged into slot 7.

- Parameter
 - This sub module requires no configuration and has thus no parameters.
- Process input data [> 106]

Process value	Offset	Data type
Module state – byte 0	%IB0	USINT
Undervoltage V1	%IX0.1	BOOL
I/O-ASSISTANT Force Mode active	%IX0.6	BOOL
Module state – byte 1	%IB1	USINT
Module diagnostics pending	%IX1.0	BOOL
ARGEE program active	%IX1.1	BOOL
Undervoltage V2	%IX1.7	BOOL



7.2.2 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.



7.2.3 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.


7.2.4 Services for acyclic data

The device provides the following acyclic services in PROFINET per motor channel for mapping the CANopen objects according to the CANopen Drives profile (CiA 402 - Drives and motion control device profile, Part 2).

Index	CANopen Object	Description according to CANopen Drives Profile	Access type	Data type
0x1800	0x4048	Nominal Power	ro	UINT8
0x1801	0x6403	Motor Catalogue Number	ro	ARRAY
0x1802	0x6404	Motor Manufacturer	ro	ARRAY
0x1803	0x6091.1	Gear Ratio Motor Revolutions	ro	UINT32
0x1804	0x6091.2	Gear Ratio Motor Revolutions	ro	UINT32
0x1805	0x6092.1	Feed Constant Feed	ro	UINT32
0x1806	0x6092.2	Feed Constant Shaft Revolutions	ro	UINT32
0x1807	0x607F	Maximum Profile Velocity	ro	INT32
0x1808	0x60C5	Maximum Profile Acceleration	ro	UINT32
0x1809	0x60C6	Maximum Profile Deceleration	ro	UINT32



7.3 Connecting the device to a Siemens PLC in PROFINET

The following example describes the connection of the devices to a Siemens PLC in PROFINET by means of the programming software SIMATIC STEP7 Professional V16 (TIA-Portal).

Used hardware

The following hardware components are used in this example:

- Siemens control S7-1500
- Motor controller module TBEN-LL(H)-4RMC with Interroll RollerDrive EC5000 BI at motor channel X6 (Motor 3)

Used software

The following software tools are used in this example:

- SIMATIC STEP7 Professional V16 (TIA Portal)
- GSDML file for TBEN-LL(H)-4RMC (can be downloaded for free as part of the ZIP archive "TBEN-L_PROFINET.zip" under www.turck.com)

Prerequisites

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

7.3.1 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.
- ⇒ The device is added to the hardware catalog.

Manage genera	Manage general station description files X					
Installed GSD	GSDs in the project					
Source path:	C:\Users\Downloads\TBEN-LLH-4F	RMC-RC-2025-02	-04			
Content of imp	oorted path					
File			Version	Language	Status	
GSDML-V2.43	-Turck-TBEN_LLH_4RMC-20250204-1	33400.xml	V2.43	English, Ger	Not yet instal	
<					>	
			Delete	Install	Cancel	

Fig. 26: TIA portal Installing the GSDML-file



Connecting the devices to the PLC 7.3.2

- Select the device from the Hardware catalog and drag it into the Device & networks editor.
- Connect the devices to the PLC in the Devices & networks editor. ►

Siemens - C:\Users\testpla	atz\Do	uments\Automatisierung\TBEN-LL-4RMC\TBEN-LL-4RMC		_ 0	×
Project Edit View Insert	Onlin	e Options Tools Window Help	Totally Integrated Automatic	on	
🌁 📑 🔜 Save project 🛛 릚	χI	🗈 🗙 🎝 ± (4 ± 🖥 🛄 🗗 🖳 🧖 🖉 Go online 🖉 Go offline 🏰 🖪 🖪 🗶 🚽 🛄 <earch in="" project=""></earch>	POF	RTAL	
Project tree [TBEN-LL-4RMC → Devices & networks	Hardware catalog		
Devices		🛃 Topology view 🛛 🔒 Network view 🔢 Device view	Options	E	
		💦 Network 🔡 Connections HM connection 🔽 📅 📲 🖽 🔟 🍳 ±			Ha
irks	-	I IO system: PLC 1.PROFINET IO-System (100)	✓ Catalog		dw
💈 🔻 🛅 TBEN-LL-4RMC	^		Search		Te
Add new device					8
Devices & networ.	=	PLC_1 turck-tben-IIh	Filter Profile: <all></all>		al
▼ 📄 PLC_1 [CPU 151		olc-testab-1513	Distributed I/O		-
Device config	- 11		Field devices		
V. Online & diag	- 11		Other field devices	_	惨
Igg Software units	- 11	PLC_1.PROFINET IO-Syste	Additional Ethernet devices	- 1	Ĕ
Program blocks	- 11				ne
External cour	- 11		Drives		to
PIC tags	- 11		Encoders		s
PLC data types	- 11		Gateway		
Watch and fo			✓ 10		9
Online backups		age and a set of the s	Phoenix Contact GmbH		Tas
🕨 🔀 Traces	~		SIEMENS AG		Ś
<	>		TURCK		
✓ Details view		- 5	✓ Im Turck	L	
			Turck		FI
			▶ []] BL20		rari
			▶ □ BL67		es
Name	_		► Lim EXCOM		
			FEN20		Þ
					dd
			TRENJ 4-8101		ins
			TREN-I 5-4REID-RDXP		
			TBEN-L5-BIOL		
			TBEN-LL-4RFID-8DXP		
			TBEN-LLH-4RMC		
			TBEN-LL-8IOL		
		✓	► 🛅 TBEN-S	~	
		< IIII > 100% 💌	<	>	
<	>	🖳 Properties 🔛 Info 🔛 Diagnostics 💷 🛋 🔺	> Information		
Portal view	tt Ove	rview 📥 Devices & ne	✓ The project TBEN-LL-4RMC was saved s		

Fig. 27: TIA-Portal – Connecting the device to the PLC



7.3.3 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.

Siemens - Chosersitestplat2bocumen	tsvautomatisterun	IGHBEN-LL-4KMCHBEN-LL-4F	awic.					L
Project Edit View Insert Online Options Tools Window Help Totally Integrated Automation								
Save project	x -J = (- =		inne 😰 Goonin		Search			FORTAL
Project tree	II 🖣e	access 🕨 Intel(R) Gigabit	CT Desktop Ada	pter • Accessib	e device [00-07-4	6-8D-39-41] → Teilne	hmer [00-07-46-8D-39-41]	_ • • ×
Devices								
	🔲 🔂 🔻 D	iagnostics	Assign PROFI	VFT device name				^
ž		General	/ USIG					
🚊 🕨 🙀 Software units	▼ Fi	unctions						
🚊 🕨 🕞 Program blocks		Assign IP address		Confin	used DROFINET d			
🗟 🔹 🕨 🙀 Technology objects		Assign PROFINE I device na		Config	ured PROFINET d	evice		
2 🕨 📮 PLC tags		Reset to lactory settings		PRO	FINET device name:	turck-tben-llh-4rmc		
PLC data types					Device type:	TBEN-LLH-4RMC		
Online card data								
dt-ilabtestpc2 [192.168.144.24]								
et2005pitestiab [28-65-56-5A4	631							
scalance x216-serverraum [19	2 =							
 Accessible device [00-07-46-8] 	D							
Online & diagnostics				Device	filter			
Gigabit-Netzwerkverbindung Intel	(R)				Only show devices o	f the same type		
PC internal [Local]	100							
PLCSIM [PN/IE]	*		-		Only show devices w	vith bad parameter setting		
<	>		•		Only show devices v	vithout names		
✓ Details view								
			Acces	sible devices in the	hetwork:			
			IP ad	iress MAC ad	dress Device	PROFINET device name	Status	
Name								_
								_
								_
			<					>
						D flashes	Update list Assign r	iame
					0			
	<		<					>
			1 1			Properties	Diagnostics	
					_	roperues		
Portal view Overview	turck-tber	n-II 😵 Online & dia 🦞	Online & dia	😼 Online & dia		🔜 Х Or	line: The connection to the target	

Fig. 28: TIA-Portal: Assigning the PROFINET device name



7.3.4 Setting the IP address in TIA Portal

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

Siemens - C:\Users\testplatz\Documents\Automatis	sierung\TBEN-LL-4RMC\TBEN-LL-4R	мс		_ [JХ
Project Edit View Insert Online Options Tools	Window Help			Totally Integrated Automation	
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Project tree 🔲 🖣	TBEN-LL-4RMC ➤ Ungrouped d	levices → turck-tben-II-4rmc-4dip-	4dxp [TBEN-LL		
Devices			🚆 Topology view	Network view	
	Device overview				F
orks	PN-IO [PN-IO]		Properties	Linfo Diagnostics	dwa
TBEN-LL-4RMC	Canada IO taga Sur	tam constants Tauta			5
Add new device	General To tags Sys	tem constants Texts			ata
Devices & networks	General	Ethernet addresses			10g
C PLC_1 [CPU 1513-1 PN]	Advanced options	Interface networked with			
Online & diagnostics	Interface options	Interface networked with			Q.
Software units	Media redundancy	Subnet:	PN/IE_1	•	0
Program blocks	Real time settings		Add new subnet		lii
Technology objects	Port 1 [X1 P1 R]				e to
External source files	Port 2 [X1 P2 R]	IP protocol			sloi
PLC tags		E CONTRACTOR OF			
Util PLC data types			Set IP address in the project		
Online backups			IP address: 192 . 168 . 144 .	100	Tag
Traces			Subnet mask: 255 . 255 . 255 .	0	sks
DPC UA communication		-	Synchronize router settings with IO contro	bller	
✓ Details view			Use router		
			Router address: 0 0 0	0	ibr
	1		IP address is set directly at the device	<u> </u>	arie
Name					ŝ
		PROFINET			
					Ado
			Generate PROFINET device name automa	tically	d-in
		PROFINET device name:	turck-tben-llh-4rmc		S
		Converted name:	turck-tben-llh-4rmc		
		Device number:	1	-	
Portal view 🔀 Overview 🏪 ture	ck-tben-ll 🖞 Online & dia 🖞	Online & dia 🖳 Online & dia	т 😒 🔝	he PROFINET device name "tben-ll-4r	

Fig. 29: TIA-Portal: Assigning the IP address



7.3.5 Configuring device functions

The TBEN-LL(H)-4RMC appears as a modular slave with four configured motor controller slots. Slots 0 and **Basic** are pre-configured.

In addition, the free slots **Diagnostics** and **Device status** are available.

Slot	Meaning			
0	Main module tben-Ilh-4rmc (Defaultname) Parameterization of functions (protocol deactivation, etc.), which are valid for the whole module.			
0 X1	Parameterization of PROFINET functions (MRP etc.)			
X1 P1	Parameterization of the Ethernet port properties (topology, connection op-			
X1 P2	tions, etc.).			
DXP	Parameters and diagnostics of the DXP channels			
Motor 1	Motor controller channels, pre-set with operation mode Velocity , alternative configuration: Digital or Universal			
Motor 2				
Motor 3	_			
Motor 4	_			
Diagnostics	Optional mapping of the diagnostics into the process image of the master			
Device status	Optional mapping device status into the masters process image			

Configuring slots (example)

- ► Select **Device view** → **Device overview**.
- Configure the device per drag & drop depending on the application.
- Define the function of the four motor controller (Motor 1... Motor 4) and define the other slots by assigning the suitable sub modules.

Vîŝ	🐅 Siemens - C:\Users\testplatz\Documents\Automatisierung\TBEN-LL-4RMC\TBEN-LL-4RMC 🗕 🗆 🗙						Π×						
Pro	ject	Edit V	/iew Insert Online Opt	tions Tools	Window Help					Totally Int	egrated Autor	nation	
2	i 🔁 I	📑 Save	project 进 🐰 值 🗎	X 🎝 t C		🛛 🗛 🚿 Go d	online 🚀 🤇	Go offline 🛛 🏭 🔣			-	PORTA	L
Þ	TBEN	-LL-4RN	//C → Ungrouped devices	s 🕨 turck-t	ben-IIh-4rmc [TBE	N-LLH-4RMC]			_₽₽	× Hardw	are catalog		
						📲 Topolo	gy view	h Network view	/ IY Device view	Option	s		
		Device	overview										릴
orks	16	W	Module	Back	Slot	Laddress	O address	Type	Article no	✓ Cat	alog	ranananananana	dva
1 S			▼ turck-then-llh-4rmc	0	0	10001033	Q DODICSS	TREN-LLH-4RMC	100018352	Searc		test fast	<u> </u>
Ĕ			PN-IO	0	0.X1			turck-then-llh-4rmc	100010552				비율
8			DXP 1	0	DXP	0	0	DXP		Filte	r <all></all>	- 0	비용
<u>.</u>			Geschwindigkeit 1	0	Motor 1	1.6	1 4	Velocity			ead module		9
			Geschwindigkeit 2	0	Motor 2	712	58	Velocity		L	TBEN-L		
-			Universal 1	0	Motor 3	1322	920	Universal			TBEN-LLH-4P	MC	V .
			Universal 2	0	Motor 4	2332	2132	Universal		<u>-</u> <u>N</u>	lodule		9
	3		Diagnosen 1	0	Diagnosen	3336		Diagnostics			Device status		1
	ŝ		Geraetestatus 1	0	Modulstatus	3738		Device status		_	Diagnostics		1 to
	i i		-								Universal		10
	å 🗧										Velocity		
													ask
													S
		<				I				> <		>	
						🔍 Pro	perties	Linfo Di	agnostics	▲ > Infe	ormation		-
	↓ P	ortal vi	ew 🔛 Overview	🚠 turck	-tben 😵 Online	e & di 🖞 O	nline & di	😵 Online & di	The PROFIN	ET device na	me "tben-ll-4r		

Fig. 30: Configuring the device slots in TIA Portal



7.3.6 Connecting the device online with the controller

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



Fig. 31: TIA-Portal: Online mode



7.4 Commissioning the Device in Modbus TCP

7.4.1 Implemented Modbus functions

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

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

7.4.2 Modbus registers

Address	Access	Meaning
0x0000 0x01FF	read only	Process data of the inputs (identical to registers 0x8000 0x8400)
0x0800 0x09FF	read/write	Process data of the outputs (identical to registers 0x90000x9400)
0x1000 0x100B	read only	Module identifier, contains the first 24 characters of the device type
0x100C	read only	Module status
0x1017	read only	Register mapping revision (always 2, if not, mapping is incompat- ible 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)
0x113C 0x113D	read/write	Modbus Parameter Restore (reset of parameters to default values)
0x113E 0x113F	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
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



Address	Access	Meaning
0x2401	read only	V2 in mV: 0 at undervoltage
0x8000 0x8400	read only	Process data of the inputs (identical to registers 0x0000 0x01FF)
0x9000 0x9400	read/write	Process data of the outputs (identical to registers 0x0800 0x09FF)
0xA000 0xA400	read only	Diagnostics
0xB000 0xB400	read/write	Parameters

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

Description	Hex	Decimal	5 digit	Modicon
Process data of the inputs	0x00000x01FF	0511	4000140512	400001400512
Process data of the outputs	0x08000x09FF	20482559	4204942560	402049402560
Module identifier	0x10000x1006	40964102	4409744103	404097404103
Module status	0x100C	4108	44109	404109
Watchdog, actual time	0x1020	4128	44129	404129
Watchdog, predefined time	0x1120	4384	44385	404385
Modbus connection mode re- gister	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_OnlyOneWrite Permission	0	All Modbus connections receive the write authoriza- tion.
		1	Only one Modbus connection can receive the write permission. A write permission is opened until a dis- connect. After the disconnect the next connection which requests a write access receives the write au- thorization.
1	MB_ImmediateWrite Permission	0	With the first write access, a write authorization for the respective Modbus connection is requested. If this request fails, an exception response with excep- tion-code 0x01 is generated. If the request is accep- ted, the write access 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.
- \Rightarrow The parameters are saved.

7.4.3 Data width

Module	Process input data	Process output data	Alignment
TBEN-LL(H)-4RMC	44 byte	48 byte	Word by word



7.4.4 Register mapping

Input registers

Process input data [▶ 106]

Register	Byte	Bit no.							
no.		7	6	5	4	3	2	1	0
Digital ch	annel	s (connector X0)	(3)					·	
0x0000	0	DXP7	DXP6	DXP5	DXP4	DI3	DI2	DI1	DI0
	1	Reserved							
Motor co	ntrol –	motor 1 (connecte	or X4)						
0x0001	0	Status position				Motor m	ode		
		REFPOS_OK	F_ER	BUSY	TR				
	1	Error register							
		MSERR	-	DPSERR	COMERR	TERR	VOLTERR	CUR-	GERR
								RERR	
0x0002	2	Status	1	1			1		1
		FAULT_PENDING	FAULT	ENABLED	CON	res.	FIRMOD	VELEXC	MISDEV
	3	Reserved							
0x0003	4	Velocity							
	5								
0x0004	6	Position							
	7	_							
0x0005	8	-							
	9								
Motor co	ntrol –	motor 2 (connected	or X5)						
0x0006	09	Assignment simila	r to motor 1	l (0x00010	x0005)				
Motor co	ntrol	motor 3 (connecte	or V6)						
		Assignment simila		1 (0,0001 0	V0005)				
00000	09	Assignment sinnia		1 (0x00010	X0003)				
0x000F									
Motor co	ntrol –	motor 4 (connecte	or X7)						
0x0010	09	Assignment simila	r to motor 1	I (0x00010	x0005)				
0x0014									
Sensor su	ipply a	ind digital channel	ls (diagnost	ics)					
0x0015	0	-				VAUX1	VAUX1	VAUX1	VAUX1
						(Ch6/7)	(Ch4/5)	(Ch2/3)	(Ch0/1)
	1	-					, - ,	/	,
0x0016	2	ERR DXP7	ERR DXP6	ERR DXP5	ERR DXP4	-			
	3	-				1			
Device st	atus	1							
0x0017	0	V2	-	-	-	-	-	ARGEE	DIAG
	1	-	FCE	-	-	-	-	V1	-
	I	1		1		1	1	1	



Output registers

Process output data [> 109]

Register	Register Byte Bit no.									
no.		7	6	5	4	3	2	1	0	
Digital cl	nannels									
0x0800	0	DXP7	DXP7 DXP6 DXP5 DXP4 Reserved							
	1	Reserved								
Motor co	ntrol – mo	otor 1 (conr	nector X4)							
0x0801	0	Control				Motor mod	de (MOMOE	DE_OUT)		
		Q_STOP	HALT	FAULT_RST	ENABLE					
	1	-				Position co	ontrol (POSC	CTRL)		
						COSP	CSI	ABS_REL	NSP	
0x0802	2	Velocity								
	3									
0x0803	4	Position								
	5									
0x0804	6									
	7									
0x0805	8	Ramp acce	eleration							
	9									
0x0806	10	Ramp dec	eleration							
	11									
Motor co	ntrol – mo	otor 2 (conr	nector X5)							
0x0807	011	Assignme	nt similar to	motor 1 (0x08	3010x08	306)				
 0x080C										
Motor co	ntrol – mo	otor 3 (conr	nector X6)							
0x080D	011	Assignme	nt similar to	motor 1 (0x08	3010x08	306)				
0x0812										
Motor co	ntrol – mo	otor 4 (conr	nector X7)	. (
0x0813	011	Assignme	nt similar to	motor 1 (0x08	3010x08	306)				
 0x0818										



Diagnostic registers

Diagnostic messages [> 114]

Register	Byte	Bit no.									
no.		7	6	5	4	3	2	1	0		
Sensor su	Sensor supply and digital channels										
0xA000	0	-				VAUX1 pin1 X3 (Ch6/7)	VAUX1 pin1 X2 (Ch4/5)	VAUX1 pin1 X1 (Ch2/3)	VAUX1 pin1 X0 (Ch0/1)		
	1	-									
0xA001	0	ERR_DXP7	ERR_DXP6	ERR_DXP5	ERR_DXP4	Reserved					
	1	-									
Motor co	ntrol – mo	tor 1 (conn	ector X4)								
0xA002	0	- FAULT -					MISDEV				
	1	MSERR	-	DPSERR	COMERR	TERR	VOLTERR	CURRERR	GERR		
Motor co	ntrol – mo	tor 2 (conn	ector X5)								
0xA003	01	Assignmen	t similar to ı	motor 1 (0x/	4002)						
Motor co	ntrol – mo	tor 3 (conn	ector X6)								
0xA004	01	Assignmen	t similar to ı	motor 1 (0x/	4002)						
Motor co	ntrol – mo	tor 4 (conn	ector X7)								
0xA005	01	Assignmen	t similar to ı	motor 1 (0x/	4002)						



Parameter registers

Parameter description [80]

Register	Byte	Bit no.								
no.		7	6	5	4	3	2	1	0	
Paramete	ers – DXP	channels		·						
0xB000	0	DXP7_	DXP6_	DXP5_	DXP4_	-				
		SRO	SRO	SRO	SRO					
	1	-								
0xB001	2	DXP7_	DXP6_	DXP5_	DXP4_	-				
	-	ENDO	EN DO	EN DO	EN DO					
0.0000	3	-	DVDC	DVDE	DVD4					
0xB002	4	DXP/_	DXP6_ OPO	DXP5_	DXP4_ OPO	-				
	5	-	010		010					
Motor co	ntrol – mo	tor 1 (con	nector X4)							
						Motorm	ode			
0,000	1								ΜΟΤ ΑΤΤ	
	1					POS	RAMP	MOMO	MOT_ATT	
0xB004	2	Velocity 1	I digital mo	de		I	I			
	3									
0xB005	4	Input 1 d	igital mode							
	5	-								
0xB006	6	Velocity 2	2 digital mo	de						
	7									
0xB007	8	Input 2 d	igital mode							
	9	-								
0xB008	10	Velocity 3	3 digital mo	de						
	11									
0xB009	12	Motor sta	atus output							
	13	-								
0xB00A	14	Velocity f	ire mode							
	15									
0xB00B	16	Input fire	mode							
	17	-								
0xB00C	18	Ramp acc	celeration fi	re mode						
	19									
0xB00D		-								
0xB010										
0xB011	011 28 Ramp acceleration									
	29]								
0xB012	30	Ramp de	celeration							
	31									



Register Byte Bit no.										
no.		7	7 6 5 4 3 2 1 0							
Motor control – motor 2 (connector X5)										
0xB013		Assignmen	Assignment similar to motor 1 (0xB0000xB012)							
 0xB022										
Motor co	ntrol – mo	otor 3 (conn	ector X6)							
0xB023		Assignmen	t similar to	motor 1 (0xl	B0000xB	012)				
 0xB032										
Motor co	ntrol – mo	otor 4 (conn	ector X7)							
0xB0233		Assignmen	t similar to	motor 1 (0xl	B0000xB	012)				
0xB042										

7.4.5 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 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.



7.5 Commissioning the device in EtherNet/IP

7.5.1 Common EtherNet/IP features

Features	Description
QuickConnect	No
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

7.5.2 EDS files and catalog files

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

7.5.3 Diagnostic messages via process data

The diagnostic messages are directly mapped into the process data [106].

Additionally, the device's status word contains the module diagnostics:

7.5.4 EtherNet/IP standard classes

Assembly Object (0x04)

The Assembly Object combines attributes of several objects and allows data to be sent from one object to another or to receive data in a targeted manner

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.

Instance attributes

Attr. no.		Attribute name	Get/Set Type		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 attrib- ute 3: 256 or variable	

Common services

Service code Class		Instance	Service name				
Dec.	Hex.						
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 byte device configuration data (EtherNet/IP specific)

+ 136 Byte (parameter data, depending on device type)

The description of the parameters can be found in chapter [> 80].

Byte no.		Bit no.	Bit no.								
Dec.	Hex.	7 6	5	4	3	2	1	0			
Device Cor	nfiguration	Data									
08	0x00 0x08	Reserved	ieserved								
9	0x09	Reserved	eserved Eth2 Eth1 QuickConnect port setup port setup (not supported)								
Motor control – motor 1 (X4)											
22	0x16	Reserved			Motor mode						
23	0x17	Reserved						MOT_ATT			
24	0x18	Reserved						LOCK_MOMO			
25	0x19	Reserved						LOCK_RAMP			
26	0x1A	Reserved						LOCK_POS			
27	0x1B	Reserved									
28	0x1C	Ramp acce	leratio	n							
29	0x1D										
30	0x1E	Ramp dece	leratio	on							
31	0x1F										
32	0x20	Motor state	us outp	out							
33	0x21	Input 1 dig	ital mo	ode							
34	0x22	Input 2 dig	ital mo	ode							
35	0x23	Reserved									
36	0x24	Velocity 1 d	digital	mod	e						
37	0x25										
38	0x26	Velocity 2 d	digital	mod	e						
39	0x27										
40	0x28	Velocity 3 d	digital	mod	e						
41	0x29										
42	0x2A	Input fire n	node								
43	0x2B	Reserved									
44	0x2C	Velocity fire	e mod	e							
45	0x2D										
46	0x2E	Ramp acce	leratio	n fire	mode						
47	0x2F										
48	0x30	Input refer	ence s	enso	r						
49	0x31	Input posit	ive lim	nit sw	itch						
50	0x32	Input nega	tive lir	nit sv	vitch						



Byte no.		Bit no.									
Dec.	Hex.	7	6	5	4	3	2	1	0		
51	0x33	Reser	ved								
Motor cont	Motor control – motor 2 (X5)										
5281	0x34 0x51	Assig	signment similar to motor 1								
Motor con	trol – motor	r 3 (X6	5)								
82111	0x52 0x6F	Assig	nmen	t simi	lar to I	motor 1					
Motor cont	Motor control – motor 4 (X7)										
112141	0x70 0x8D	Assig	ssignment similar to motor 1								

Device configuration data

Parameter name	Value		Meaning	
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	

Input Assembly instance (instance 103)

The description of the input data can be found in chapter "Operating" [> 106].

Word	no.	Bit no	.														
Hex.	Dec.	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0x00	0	Statu	ıs wo	rd													
		-	FCE	-	-	-		V1	-	V2	-		-	Reserve	ed	ARGEE	DIAG
Digita	al cha	annels	S														
0x01	1	Rese	Reserved							DXP 7	DXP 6	DXP 5	DXP 4	DI3	DI2	DI1	DI0
Moto	r con	trol – motor 1 (X4)															
0x02	2	MS ERR	MS - DPS COM T VOLT CURR G ERR ERR ERR ERR ERR ER				G ERR	REF- POS_	F_ER	BUSY	TR	Motor mode					
	-	-	<u> </u>							OK							
0x03	3	Resei	served FAULT FAULT ENA CON CFG FIR VEL MIS PEN BLED ERR MOD EXC DEV														
0x04	4	Velo	city								1	1	1	1	1	1	
0x05	5	Posit	ion														
0x06	6	1															
Moto	r con	ontrol – motor 2 (X5)															
0x07 	7 11	Assig	Inmei	nt sin	nilar to	o mot	or 1										
Moto	r con	trol –	mote	or 3 ()	X6)												
0x0C	12	Assio	inmei	nt sin	nilar to	mot	or 1										
			,														
0x10	16																
Moto	r con	trol –	moto	or 4 ()	X7)												
0x11	17	Assig	Inmei	nt sin	hilar to	o mot	or 1										
0x15	21																
Senso	or sup	oply a	nd di	igital	chanı	nels (diagn	ostics)								
0x16	22	Rese	Value Value <th< td=""><td>VAUX1 pin1 X0 (Ch0/1)</td></th<>							VAUX1 pin1 X0 (Ch0/1)							
0x17	23	ERR DXP 7	RR ERR ERR ERR DXP DXP DXP 6 5 4														



Output Assembly instance (instance 104)

The description of the outout data can be found in chapter "Operating" [> 109].

Word n	io. Bit no.																
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Hex.	Dec.																
Contro	Control Word																
0x00	0																
Digita	Digital channels																
0x01	1	Rese	erve	d						DO7	D06	DO5	DO4	Reser	ved		
Motor	contro	ol – r	noto	or 1	(X4)												
0x02	2	Rese	Reserved COSP CSI ABS_ NSP Q_STOP HALT FAULT_ EN- Motor mode REL REL RST ABLE (MOMODE_OUT								UT)						
0x03	3	Velo	ocity	,													
0x04	4	Posi	ition	l													
0x05	5																
0x06	6	Ram	np ao	ccele	eratio	on											
0x07	7	Ram	np de	ecel	erati	on											
Motor	contro	ol – r	noto	or 2	(X5)												
0x08	8	Assi	gnm	nent	simi	lar to r	notc	or 1									
0xD	13																
Motor	contro	ol – r	noto	or 3	(X6)												
0x0E	14	Assi	gnm	nent	simi	lar to r	notc	or 1									
 0x13	19																
Motor	Notor control – motor 4 (X7)																
0x14 0x19	20 25	Assi	gnm	nent	simi	lar to r	notc	or 1									

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 code		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		



Identity Object (0x01)

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.

Attr. no. Attribute Get/Set Type Value name		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 $12_{dez} = 0x0C$
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 rep- resented 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-LLH-4RMC

Instance attributes

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 code		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		

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 ad- dress configured
		Domain name	G	UDINT	0 = no Domain Name con- figured
6	0x06	Host name	G	STRING	0 = no host name configured
12	0x0C	QuickConnect	G/S	BOOL	0 = deactivate 1 = activate

Common services

Service code		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 attrib- ute: 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 config- uration. 0 = The device shall use the interface configuration val- ues 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.



7.5.5 Vendor Specific Classes (VSC)

Gateway Class (VSC 100)

This class contains all information concerning the whole device.

Object Instance 2, Gateway Instance

Attr. no.		Designation	Get/Set	Туре	Meaning
Dec.	Hex.				
109	0x6D	Device Status	G	STRUCT	Contains the device status.
115	0x73	On IO connec- tion	G/S	ENUM USINT	Reaction when the time limit for an I/O connection is exceeded:
		timeout			0: SWITCH IO FAULTED (0): The channels are switched to substitute value.
					1: SWITCH IO OFF (1): The out- puts are switched to 0.
					2: SWITCH IO HOLD (2): No fur- ther 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. Activat- ing 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.
140	0x8C	Disable Protocols	G/S	UINT	Deactivation of the used Ether- net 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



Class 199 (0xC7) – motor 1...4

This class contains one instance per channel for motor control "motor 1...4" (connector X4... X7).

Attr. Dec.	Hex.	Meaning	Get/Set	Туре	Description
1	0x01	Operation mode	G/S	USINT	0: No change
					1: Position mode
					3: Velocity
					6: Homing
					13: Digital mode
2	0x02	Motor attached	G/S	USINT	0: No
					1: Yes
3	0x03	Lock motor mode	G/S	USINT	0: No
					1: Yes
4	0x04	Lock ramp	G/S	USINT	0: No
					1: Yes
5	0x05	Lock position	G/S	USINT	0: No
		·			1: Yes
6	0x06	Ramp accelera- tion [mm/s ²]	G/S	UINT	
7	0x07	Ramp accelera- tion [mm/s ²]	G/S	UINT	
8	0x08	Motor status output	G/S	USINT	0: not execute 1: OK-high channel 4 2: OK-high channel 5 3: OK-high channel 6 4: OK-high channel 7 5: Fault-high channel 4 6: Fault-high channel 5 7: Fault-high channel 6 8: Fault-high channel 7
9	0x09	Input 1 digital mode	G/S	USINT	0: not execute 1: Active high - channel 0 2: Active high - channel 1 3: Active high - channel 2 4: Active high - channel 3 5: Active high - channel 4 6: Active high - channel 5 7: Active high - channel 7 9: Active low - channel 7 9: Active low - channel 1 11: Active low - channel 1 11: Active low - channel 3 13: Active low - channel 4 14: Active low - channel 4 14: Active low - channel 5 15: Active low - channel 6 16: Active low - channel 7



Attr.		Meaning	Get/Set	Туре	Description
Dec.	Hex.				
10	0x0A	Input 2 digital mode	G/S	USINT	0: not execute 1: Active high - channel 0 2: Active high - channel 1 3: Active high - channel 2 4: Active high - channel 3 5: Active high - channel 4 6: Active high - channel 5 7: Active high - channel 6 8: Active high - channel 7 9: Active low - channel 7 9: Active low - channel 1 11: Active low - channel 1 11: Active low - channel 3 13: Active low - channel 4 14: Active low - channel 5 15: Active low - channel 6 16: Active low - channel 7
11	0x0B	Velocity 1 mode [mm/s]	G/S	INT	
12	0x0C	Velocity 2 mode [mm/s]	G/S	INT	
13	0x0D	Velocity 3 mode [mm/s]	G/S	INT	
14	0x0E	Input 1 digital mode	G/S	USINT	0: not execute 1: Active high - channel 0 2: Active high - channel 1 3: Active high - channel 2 4: Active high - channel 3 5: Active high - channel 4 6: Active high - channel 5 7: Active high - channel 6 8: Active high - channel 7 9: Active low - channel 7 9: Active low - channel 1 11: Active low - channel 2 12: Active low - channel 3 13: Active low - channel 4 14: Active low - channel 5 15: Active low - channel 6 16: Active low - channel 7
15	0x0F	Velocity 1 mode [mm/s]	G/S	INT	
16	0x10	Ramp accelera- tion mode[mm/s ²]	G/S	INT	



Attr.		Meaning	Get/Set	Туре	Description
Dec.	Hex.				
17	0x11	Input reference sensor	G/S	USINT	0: No reference drive 1: Neg. to pos. edge - pos. limit-switch 2: Neg. to pos. edge - neg. limit-switch 3: Positive edge - channel 0 4: Negative edge - channel 0 5: Pos. to neg. edge - channel 0 7: Positive edge - channel 1 8: Negative edge - channel 1 9: Pos. to neg. edge - channel 1 10: Neg. to pos. edge - channel 2 12: Negative edge - channel 2 13: Pos. to neg. edge - channel 2 14: Neg. to pos. edge - channel 3 16: Negative edge - channel 3 17: Pos. to neg. edge - channel 3 18: Neg. to pos. edge - channel 4 20: Negative edge - channel 4 21: Positive edge - channel 4 22: Neg. to pos. edge - channel 4 23: Positive edge - channel 5 24: Negative edge - channel 5 25: Pos. to neg. edge - channel 5 26: Neg. to pos. edge - channel 6 27: Positive edge - channel 6 28: Negative edge - channel 6 29: Pos. to neg. edge - channel 6 31: Positive edge - channel 6 31: Positive edge - channel 7 32: Negative edge - channel 7 33: Pos. to neg. edge - channel 7 34: Neg. to pos. edge - channel 7 34: Neg. to pos. edge - channel 7 32: Negative edge - channel 7 34: Neg. to pos. edge - channel 7 32: Negative edge - channel 7 34: Neg. to pos. edge - channel 7 32: Negative edge - channel 7 34: Neg. to pos. edge - channel 7 35: Pos. to neg. edge - channel 7 34: Neg. to pos. edge - channel 7 35: Pos. to neg. edge - channel 7 36: Pos. to neg. edge
Ið	UX12	input positive limit switch	۵/۵	USINI	u: n.a. 1: Channel 0 2: Channel 1 3: Channel 2 4: Channel 3 5: Channel 4 6: Channel 5 7: Channel 6 8: Channel 7



Attr.		Meaning	Get/Set	Туре	Description
Dec.	Hex.				
19	0x13	Input negative limit switch	G/S	USINT	0: n.a. 1: Channel 0 2: Channel 1 3: Channel 2 4: Channel 3 5: Channel 4 6: Channel 5 7: Channel 6 8: Channel 7
29	0x14	Missing device	G	USINT	0: -
	0.45		-		1: active
21	0x15	Fault	G	USINT	0:-
					1: active
22	0x16	Generic error	G	USINT	0:-
					1: active
23	0x17	Current error	G	USINT	0:-
					1: active
24	0x18	Voltage error	G	USINT	0: -
					1: active
25	0x19	Temperature error	G	USINT	0:-
					1: active
26	0x1A	Communication	G	USINT	0:-
					1: active
27	0x1B	Device profile	G	USINT	0:-
					1: active
28	0x1C	Manufacturer spe-	G	USINT	0:-
	0.45		6		1: active
29	OXID	Motor mode	G	USINT	0: No change
					1: Position mode
					2: reserved
					3: Velocity
					4: reserved
					5: reserved
20	0v1E	Target reached	6		
50	UXIE	Target reached	G	031111	
21	0.15	Puev	6		
21	UXIF	busy	G	031111	
22	0,20	Communication	G		
52	0X20	error	G	031111	
33	0x21	Reference posi-			
	5721	tion valid			
34	0x22	Generic error	G	USINT	0: -
					1: active



Attr. Dec.	Hex.	Meaning	Get/Set	Туре	Description
35	0x23	Current error	G	USINT	0: -
					1: active
36	0x24	Voltage error	G	USINT	0: -
		5			1: active
37	0x25	Temperature error	G	USINT	0: -
		·			1: active
38	0x26	Communication	G	USINT	0: -
		error			1: active
39	0x27	Device profile	G	USINT	0: -
		specific error			1: active
40	0x28	Manufacturer spe-	G	USINT	0: -
		cific error			1: active
41	0x29	Missing device	G	USINT	0: not active
		-			1: active
42	0x2A	Velocity out of	G	USINT	0: not active
		valid range			1: active
43	0x2B	Motor mode	G	USINT	0: not active
					1: active
44	0x2C	Configuration er-	G	USINT	0: not active
		ror			1: active
45	0x2D	Connected	G	USINT	0: no
					1: yes
46	0x2E	Enabled	G	USINT	0: no
					1: yes
47	0x2F	Fault	G	USINT	0: not active
				_	1: active
48	0x30	Fault is pending	G	USINT	0: not active
					1: active
49	0x31	Velocity [mm/s]	G	UINT	
50	0x32	Position [mm]	G	UDINT	
51	0x33	Motor mode	G/S	USINT	0: No change
					1: Position mode
					2: reserved
					3: Velocity
					4: reserved
					5: reserved
					6: Homing
52	0x34	Enable	G/S	USINT	0: no
					1: yes
53	0x35	Fault reset	G/S	USINT	0: no
					1: yes



Attr.		Meaning	Get/Set	Туре	Description
Dec.	Hex.				
54	0x36	Halt	G	USINT	0: not active
					1: active
55	0x37	Velocity [mm/s]	G/S	UINT	
56	0x38	Quick Stop	G/S	USINT	0: not active
					1: active
57	0x39	Position [mm]	G/S	UDINT	
58	0x3A	New setpoint	G/S	USINT	0: not active
					1: active
59	0x3B	Ramp accelera- tion [mm/s ²]	G/S	UINT	
60	0x3C	Positioning mode	G/S	USINT	0: absolute
					1: relative
61	0x3D	Ramp accelera- tion [mm/s ²]	G/S	UINT	
62	0x3E	Change set imme-	G/S	USINT	0: not active
		diately			1: active
63	0x3F	Change on set-	G/S	USINT	0: not active
		point			1: active

Class 191 (0xBF) – DXP

This class data and parameters for the digital channels of the device.

Attr. no.		Designation	Get/ set	Туре	Meaning
Dec.	Hex.				
Parar	neters				
1	0x01	DXP 4 – Manual reset after over-	G/S	USINT	0: No
		curr.			1: Yes
2	0x02	DXP 5 – Manual reset after over-	G/S	USINT	0: No
		curr.			1: Yes
3	0x03	DXP 6 – Manual reset after over-	G/S	USINT	0: No
	curr.				1: Yes
4	0x04	DXP 7 – Manual reset after over-	G/S	USINT	0: No
		curr.			1: Yes
5	0x05	DXP 4 - Activate output	G/S	USINT	0: No
					1: Yes
6	0x06	DXP 5 - Activate output	G/S	USINT	0: No
					1: Yes
7	0x07	DXP 6 - Activate output	G/S	USINT	0: No
					1: Yes
8	0x08	DXP 7 - Activate output	G/S	USINT	0: No
					1: Yes



Attr. no.		Designation		Туре	Meaning
Dec.	Hex.				
9	0x09	DXP 4 - Output permanently on	G/S	USINT	0: No
					1: Yes
10	0x0A	DXP 5 - Output permanently on	G/S	USINT	0: No
					1: Yes
11	0x0B	DXP 6 - Output permanently on	G/S	USINT	0: No
					1: Yes
12	0x0C	DXP 7 - Output permanently on	G/S	USINT	0: No
					1: Yes
13	0x0D	DXP - Overcurrent VAUX1 pin1 X0	G	USINT	0: -
		(Ch0/1)			1: Active
14	0x0E	DXP - Overcurrent VAUX1 pin1 X1	G	USINT	0: -
		(Ch2/3)			1: Active
15	0x0F	DXP - Overcurrent VAUX1 pin1 X2	G	USINT	0: -
		(Ch4/5)			1: Active
16	0x10	DXP - Overcurrent VAUX1 pin1 X3	G	USINT	0: -
		(Ch6/7)			1: Active
17	0x11	DXP 4 - Overcurrent output	G	USINT	0: -
					1: Active
18	0x12	DXP 5 - Overcurrent output	G	USINT	0: -
					1: Active
19	0x13	DXP 6 - Overcurrent output	G	USINT	0: -
					1: Active
20	0x14	DXP 7 - Overcurrent output	G	USINT	0: -
					1: Active
21	0x15	DXP - input value 0	G	BYTE	Bit 0: Input value DI0 Bit 1: Input value DI1 Bit 2: Input value DI2 Bit 3: Input value Ch4
22	0x16	DXP - input value 4	G	BYTE	Bit 0: Input value DI4 Bit 1: Input value DI5 Bit 2: Input value DI6 Bit 3: Input value Ch7
19	0x13	DXP – output value 4	G	BYTE	Bit 0: Output value DXP4 Bit 1: Output value DXP5 Bit 2: Output value DXP6 Bit 3: Output value Ch7



7.6 Connecting the Devices to a Rockwell PLC with EtherNet/IP

Used hardware

The following hardware components are used in this example:

- Rockwell PLC ControlLogix 1756-L72, Logix 5572
- Rockwell Scanner 1756-EN2TR
- Block module TBEN-LLH-4RMC

Used software

The following software tools are used in this example:

- Rockwell Studio5000
- Complex EDS file "TBEN-LLH-4RMC.eds" as part of the file "TBEN-L_ETHERNETIP.zip" (can be downloaded for free under www.turck.com)

Prerequisites

- A new project has been created in instance of Studio5000.
- The PLC and the Scanner mentioned above have been added

7.6.1 Installing the EDS file

▶ Open the EDS Wizard via Tools → Hardware Installation Tool.



Fig. 32: Opening the Hardware Installation Tool



Follow the instructions in the wizard to install the EDS file.

Rockwell Automation's EDS Wizard		:
Options What task do you want to complete?		A.
 Register an EDS file(s). This option will add a device(s) to our database. 		
C Unregister a device. This option will remove a device that has been registered by an EDS file from our database.		
C Create an EDS file. This option creates a new EDS file that allows our software to recognize your device.		
Upload EDS file(s) from the device. This option uploads and registers the EDS file(s) stored in the device.		
	< Zurück	Veiter > Abbrechen

Fig. 33: EDS Wizard


➡ The device is registered as a Communications Adapter and can be added to the project later as a device.

Rockwell Automation's EDS Wizard									
Change Graphic Image You can change the graphic image that is associated with a device.									
	Product Types								
Change icon	Communications Adapter	ß							
		< Zurück Weiter >	Abbrechen						

Fig. 34: Registering the device as Communications Adapter



7.6.2 Adding the device to the project

• Open the context menu by right-clicking the entry of the scanner In the project tree and select **New Module**.

Controller Organizer			• 9	×
a •				
 Controller TBEN_LU Controller Tags Controller Fault Handler Power-Up Handler Tasks Tasks MainTask MainTask MainProgram SafetyTask SafetyTask SafetyProgram Unscheduled Motion Groups Ungrouped Axes Assets Logical Model VO Configuration T756 Backplane, 1756-A17 				
[□ [0] 1756-E72 TBEN_LL	8	New Medule		
යි Ethernet	۵	Discover Modules		
	~		cha	
	њ П	Cut	Stro)+X
	1 1 1	Paste	Stro	1+℃ 1+V
		Delete	E	intf
		Cross Reference	Strg)+E
		Launch RSNetWorx		
		Audit Network		
		Export Module		
		Include in Tracking G	iroup	
		Properties Alt	+Einga	abe
		Print		•

Fig. 35: Adding the device to the project





▶ Select TBEN-LLH-4RMC and add it to the project.

Fig. 36: Selecting the device



• Enter the device name and IP address of the deviceuUnder New Module \rightarrow General.

New Module		×
General*	General	
Generation - Connection - Internet Protocol - Port Configuration	Type: 10018352 TBEN-LLH-4RMC Vendor: TURCK Parent: Scanner Name: TBEN_LLH_4RMC Description: Module Definition Revision: 2.007 Bectronic Keying: Compatible Module Connections Exclusive Owner Change]
Status: Creating	OK Cancel Help	

Fig. 37: New Module, setting name and IP address

• Optional: Set the connection parameters.

New Module					×
····· General*	Connection				
- Connection*					
Module Info Internet Protocol Port Configuration	Name	Requested Packet Interval (RPI) (ms)	Connection over EtherNet/IP	Input Trigger	
	Exclusive Owner	10.0 🜩 1.0 - 3200.0	Unicast 🗸	Cyclic	\sim
	☐ Inhibit Module ☐ Major Fault On Controller If Connection Fails While in I Module Fault	Run Mode			
Status: Creating			OK	Cancel He	lp

Fig. 38: New Module, connection parameters



⇒ The device appears as Ethernet slave in the project tree.



Fig. 39: Device in the project tree



7.6.3 Parameterizing the device

- Open the Controller Tags of the device.
- Configure the device by using the Controller Tags for configuration TBEN_LLH_4RMC:C and for process output data TBEN_LLH_4RMC:O. The chapter "Parameterizing and configuring" contains examples for configuring the device [▶ 89].

Logix Designer - TBEN_LLI n TBEN_LLH_4RMC.ACD [1756-L72 32.11]* EVE EDIT VIEW SEARCH LOCIC COMMUNICATIONS TOOLS W	NDOW HEID	×
The Edit View Scare to de commonications tools w		
RUN Yeath: <none> OK Fragy Storage I/O Offline</none>	Redundancy III () Favorites Add-On Safety Alarms E	.)- it Timer/Counter Input/Output Compare Compute/
Controller Organizer 🗸 🗸 🗙	Controller Tags - TBEN LL (controller)	R 11.001) 🔻
8 T	Scope: TETREN LL Show: All Tags	Enter Name Filter
▲ 🔄 Controller TBEN_LL		
Controller Tags	Name	The second secon
Controller Fault Handler	TBEN_LLH_4RMC/C_DXP_/_Activate_output	
✓ G Tasks	TBEN_LLH_4RMC/C DXP_4_Output_Permanently_On	
🔺 🛟 MainTask	TBEN_LLH_4RMC/C DXP_6_Output_Permanently_On	0 Decimi
P 5 MainProgram	TBEN LLH 4RMC:C.DXP 7 Output Permanently On	0 Decimi
A G Motion Groups	▶ TBEN LLH 4RMC:C.Motor 1 Operation mode	0 Decim;
Ungrouped Axes	▲ TBEN LLH 4RMC:C.Motor 1 Motor attached	1 Decim;
P Assets	TBEN LLH 4RMC:C.Motor 1 Motor attached.0	[] Decima
▲ ⊆ I/O Configuration	TBEN_LLH_4RMC:C.Motor_1_Motor_attached.1	0 Decima
🔺 🚍 1756 Backplane, 1756-A10	TBEN_LLH_4RMC:C.Motor_1_Motor_attached.2	0 Decima
[0] 1756-L72 TBEN_LL	TBEN_LLH_4RMC:C.Motor_1_Motor_attached.3	0 Decima
▲ 器 Ethernet	TBEN_LLH_4RMC:C.Motor_1_Motor_attached.4	0 Decima
1756-EN2TR Scanner	TBEN_LLH_4RMC:C.Motor_1_Motor_attached.5	0 Decima
100018352 TBEN_LLH_4RMC	TBEN_LLH_4RMC:C.Motor_1_Motor_attached.6	0 Decima
	TBEN_LLH_4RMC:C.Motor_1_Motor_attached.7	0 Decima
	TBEN_LLH_4RMC:C.Motor_1_Lock_Motor_Mode	0 Decima
	TBEN_LLH_4RMC:C.Motor_1_Lock_Ramp	0 Decim;
	B TREN II H ARMC-C Meter 1 Lock Paritien Monitor Tags / Edit Tags /	∩ Derim ¥
	Errors	▼ Ŧ ×
< >	😢 0 Errors 🛕 0 Warmings 🚺 0 Messages	Search D
Enter a tag value	Communicati	on Software: RSLinx Classic

Fig. 40: Controller Tags (parameters)





Fig. 41: Controller Tags (outputs)

8 Parameterizing and configuring

8.1 Parameters

The device has two bytes of general module parameters, six bytes of parameters for the digital channels and 32 bytes of parameters for each motor channel.

Word no. Byte no.		Bit no.									
Dec.	Hex.	Dec.	Hex.	7	6	5	4	3	2	1	0
DXP ch	annels										
0	0x00	0	0x00	DXP7_ SRO	DXP6_ SRO	DXP5_ SRO	DXP4_ SRO	Reserved			
		1	0x01	Reserved	d						
1	0x01	2	0x02	DXP7_ EN DO	DXP6_ EN DO	DXP5_ EN DO	DXP4_ EN DO	Reserved	l		
		3	0x03	Reserved	d	·	·				
2	0x03	4	0x04	DXP7_ OPO	DXP6_ OPO	DXP5_ OPO	DXP4_ OPO	Reserved			
		5	0x05	Reserved	d						
Motor	channel -	- motor	1 (X4)								
3	0x03	0	0x00	MOT AT	T Reserved	d		Operatio	n mode		
		1	0x01	Reserved	b				LOCK POS	lock Ramp	lock Momo
4	0x04	2	0x02	Velocity	1 digital n	node					
		3	0x03								
5	0x05	4	0x04	Input 1 d	digital moo	de					
		5	0x05	Reserved							
6	0x06	6	0x06	Velocity	2 digital n	node					
		7	0x07								
7	0x07	8	0x08	Input 2 d	digital moo	de					
		9	0x09	Reserved	b						
8	0x08	10	0x0A	Velocity	3 digital n	node					
		11	0x0B								
9	0x09	12	0x0C	Motor st	atus outp	ut					
		11	0x0B	Reserved	b						
10	0x0A	14	0x0E	Velocity	fire mode						
		15	0x0F								
11	0x0B	16	0x10	Input fire	e mode						
		17	0x11	Reserved	d						
12	0x0C	18	0x12	Ramp ac	celeration	n fire mode	5				
		12	0x0C								
13	0x0D	20	0x14	Input ref	ference se	nsor					
		21	0x15	Reserved	b						
14	0x0E	22	0x16	Input po	sitive limi	t switch					
		23	0x17	Input ne	gative lim	it switch					

Word no.		Byte no.		Bit no.							
Dec.	Hex.	Dec.	Hex.	7	6	5	4	3	2	1	0
15	0x0F	24	0x18	Reserved		•					
		25	0x19								
16	0x10	26	0x1A								
		27	0x1B								
17	0x11	28	0x1C	Ramp acc	eleration						
		29	0x1D								
18	0x12	30	0x1E	Ramp deo	Ramp deceleration						
		31	0x1F								
Motor c	hannel –	motor 2	(X5)								
1934	0x13 0x22	031	0x00 0x1F	Assignme	ent similar	to motor o	:hannel – I	motor 1			
Motor c	hannel –	motor 3	(X6)								
3550	0x23 0x32	031	0x00 0x1F	Assignme	ent similar	to motor o	:hannel – I	motor 1			
Motor c	hannel –	motor 4	(X7)								
5166	0x33 0x42	031	0x00 0x1F	Assignme	ent similar	to motor o	:hannel – I	motor 1			

Meaning of parameter bits

Parameter name	Data type	Value Dec.	Meaning	Description
Manual output reset after over- current (DXPSROx)	BOOL	0	No	The output switches on automatically after an overload.
		1	Yes	After an overcurrent, the output is only switched on again after the switching signal is reset and set again.
Activate output Ch (DXPENDO)	BOOL	0	No	The output at pin 2 is deactivated.
		1	Yes	The output at pin 2 is activated.
Output	BOOL	0	No	The output is triggered via the process data.
permanently on (DXPOPO)		1	Yes	The output at the channel is always switched on if activated via the "Activate output" parameter. Process data no longer have any influence on the output. Use case: Permanent supply of stations that are connected to digital output.

Parameter name	Data type	Value Dec.	Meaning	Description				
Operation mode	Selectic The mo 0x00 "M	on of the c tor mode lodes of c	perating mode (motor is defined according to peration") and depend	mode) of the channel at the start of the connected motor. o the CANopen Drives profile (object 0x6060, sub index ds on the connected motor.				
	Interrol	roll EC5000BI						
	ENUM	0	No change					
		1	Position mode	Profile position mode (acc. to the CANopen Drives profile) The connected motor moves to a defined absolute or rel- ative target position. The acceleration and deceleration behavior of the motor is defined via the ramp accelera- tion and ramp deceleration parameters and is also de- pendent on the application.				
		3	Velocity	Profile velocity mode (acc. to CANopen Drives profile) The connected motor runs at a defined speed. The accel- eration and deceleration behavior of the motor is defined via the ramp acceleration and ramp deceleration para- meters and is also dependent on the application.				
		6	Homing	Homing mode (acc. to CANopen Drives profile object) The position of the motor is defined as the reference posi- tion. All further positions of the motor refer to this posi- tion.				
		13	Digital mode	Digital mode (acc. to CANopen Drives profile) The connected motor moves depending on the status of two digital inputs.				
		14	Referencing	Single reference run (homing) after switching on the sys- tem to align the start position of the motor roller or to set the position of the motor roller as the zero position when reaching a limit switch.				
Motor attached (MOT_ATT)	BOOL	0	No	The channel is deactivated. Note: In PROFINET the default setting of parameter 1 = yes (mo- tor attached).				
		1	Yes	If this bit is set, the module expects that a motor is con- nected to the channel.				
Lock Motor Mode (LOCK_MOMO)	BOOL	0	Νο	Output data for setting the motor mode not locked. The motor mode can be changed dynamically via the process output data [> 109].				
		1	Yes	Output data for setting the motor mode locked. The configured motor mode cannot be changed dynamically via the process output data.				
Lock Ramp (LOCK_RAMP)	BOOL	0	No	Output data for ramp acceleration or ramp deceleration not locked. Ramp acceleration or ramp deceleration can be changed dynamically via the process output data [> 109].				
		1	Yes	Output data for ramp acceleration or ramp deceleration locked. Ramp acceleration and ramp deceleration cannot be changed dynamically via the process output data				

Parameter name	Data type	Value Dec.	Meaning	Description
Lock Position (Lock_POS)	BOOL	0	No	Output data for the position not locked. The position can be changed dynamically via the process output data [> 109].
		1	Yes	Output data for the position locked. The position cannot be changed dynamically via the process output data.
Ramp acceleration	UINT16	0 65535		Value for the acceleration and deceleration of the motor
Ramp deceleration	-			0 = reserved (previously saved setting is used) The unit depends on the connected motor: e.g. mm/s ² (Interroll EC5000 BI) The value can be controlled dynamically via the process output data. To prevent this, the access to the data in the process output data can be locked via the lock ramp ac- celeration (LOCK_RAMP) parameter.
Motor status output	Prerequ The "mo	iisite: otor attac	hed (MOT_ATT)" bit is s	set for the channel for motor control (X4X7).
	ENUM	0	not execute	
		1	OK-high channel 4	An active high signal at the output (X4X7) indicates
		2	OK-high channel 5	fault-free operation of the motor.
		3	OK-high channel 6	-
		4	OK-high channel 7	-
		5	Fault-high channel 4	An active high signal at the output (X4X7) indicates a
		6	Fault-high channel 5	motor fault.
		7	Fault-high channel 6	-
		8	Fault-high channel 7	-
Velocity fire mode	INT16	-3000 3000	Motor velocity in fire r	node.
Input	ENUM	0	not execute	
fire mode		1	Active high channel 0	An active high signal at the input (X0X7) activates the
			•••	fire mode with one of the 3 speeds:
		8	Active high channel 7	
		9	Active low channel 0	An active low signal at the input (X0X7) activates the
		•••		fire mode with one of the 3 speeds:
		16	Active low channel 7	
Ramp acceleration fire mode	UINT16	0 65535	Value for the acceleration 0 = reserved, the prevent the unit depends on the transformer of the value can be contributed on the value can be contributed on the second the lock ramp acceleration of the lock ramp accel	tion and deceleration of the Motor. iously saved setting is used the connected motor: e.g. mm/s ² (Interroll EC5000 BI) rolled during operation via the process output data. To so to the data in the process output data can be locked via tration (LOCK RAMP) parameter.

Parameter name	Data type	Value Dec.	Meaning	Description
Input reference	ENUM	Configu	ing mode"	
sensor		0	No reference drive	The motor does not perform a reference drive. The cur- rent position of the connected roller motor is set as the zero point (reference point).
		1	neg. to pos. edge - pos. limit switch	Reference run with limit switch at the positive end of a conveyor belt The motor moves until the limit switch is reached (negat- ive edge) and then moves back in the opposite direction until it leaves the range of the limit switch again (positive edge). If no position has been defined, the current posi- tion of the roller motor is set as the zero point (reference point). If a position has been defined, the motor first moves to this position and the position is then set as the zero point (reference point). Prerequisite:
				The limit switch must be connected and the input must be defined via the input positive limit switch parameter. If the parameter input positive limit switch is set to 0 = do not execute, the process data bit GFGERR shows a configuration error.
		2	neg. to pos. edge- neg. limit switch	Reference run with limit switch at the negative end of a conveyor belt. The motor moves until the limit switch is reached (negative edge) and then moves back in the opposite direction until it leaves the range of the limit switch again (positive edge). If no position has been defined, the current position of the roller motor is set as the zero point (reference point). If a position has been defined, the motor first moves to this position and the position is then set as the zero point (reference point). Prerequisite: The limit switch must be connected and the input must be defined via the input positive limit switch parameter. If the parameter input positive limit switch is set to 0 = do not execute, the process data bit GFGERR shows a configuration error.
		4	Positive edge – channel 0 Negative edge – channel 0	edge is detected on channel 0 and stops. If no position has been defined, the current position of the roller motor is set as the zero point (reference point). If a position has been defined, the motor first moves to this position and the position is then set as the zero point (reference point).
		5	Pos. to neg. edge – channel 0	The motor moves until a positive edge is detected on channel 0 and then reverses in the opposite direction un- til a negative edge is detected. If no position has been defined, the current position of the roller motor is set as the zero point (reference point). If a position has been defined, the motor first moves to this position and the position is then set as the zero point (reference point).

Parameter name	Data type	Value Dec.	Meaning	Description
		6	Neg. to pos. edge – channel 0	The motor moves until a negative edge is detected on channel 0 and then reverses in the opposite direction un- til a positive edge is detected. If no position has been defined, the current position of the roller motor is set as the zero point (reference point). If a position has been defined, the motor first moves to this position and the position is then set as the zero point (reference point).
		31	Positive edge – channel 7	The motor moves until a positive or respectively negative edge is detected on channel 7 and stops. If no position
		32	Negative edge – channel 7	has been defined, the current position of the roller motor is set as the zero point (reference point). If a position has been defined, the motor first moves to this position and the position is then set as the zero point (reference point).
		33	Pos. to neg. edge – channel 7	The motor moves until a positive edge is detected on channel 7 and then reverses in the opposite direction un- til a negative edge is detected. If no position has been defined, the current position of the roller motor is set as the zero point (reference point). If a position has been defined, the motor first moves to this position and the position is then set as the zero point (reference point).
		34	Neg. to pos. edge – channel 7	The motor moves until a negative edge is detected on channel 7 and then reverses in the opposite direction un- til a positive edge is detected. If no position has been defined, the current position of the roller motor is set as the zero point (reference point). If a position has been defined, the motor first moves to this position and the position is then set as the zero point (reference point).
Input positive	ENUM	0	not execute	
limit switch		1	Channel 0	Defines the channel to which the limit switch is connec-
				ted that is used for the reference run (input reference
		8	Channel 7	sensor parameter = 1 = neg. to pos. edge - pos. limit switch).
Input negative	ENUM	0	not execute	
limit switch		1	Channel 0	Defines the channel to which the limit switch is connec- ted that is used for the reference run (input reference
		8	Channel 7	<pre>sensor parameter = 2 = neg. to pos. edge - pos. limit switch)</pre>

Data type	Value Dec.	Meaning	Description
digital m	node		
INT16	-3000 3000		Motor velocity 13 in fire mode The speed at which the motor moves depends on the combination of the settings of the input 1 digital mode and input 2 digital mode parameters (see "Functions and operating modes: motor modes" [▶ 11]. The acceleration and deceleration behavior of the motor is defined via the ramp acceleration and ramp deceleration parameters and is dependent on the application. The unit depends on the connected motor: e.g. mm/ s (In- terroll EC5000 BI).
			The combination of the two parameters input 1 digital mode and input 2 digital mode defines the speed at which the motor runs in digital mode and which signal (active high or active low signal) at which of the input channels activates digital mode (see "Functions and oper- ating modes: motor modes" [> 11].
ENUM	<u>0</u> 1	_	An active high signal at the input (X0X7) activates the digital mode with one of the 3 speeds: Bit 0: not execute Bit 1: Active high channel 0 Bit 2: Active high channel 1 Bit 3: Active high channel 2 Bit 4: Active high channel 3 Bit 5: Active high channel 4 Bit 6: Active high channel 5 Bit 7: Active high channel 6 Bit 8: Active high channel 7 An active low signal at the input (X0X7) activates the digital mode with one of the 3 speeds: Bit 9: Active low channel 1 Bit 10: Active low channel 1 Bit 11: Active low channel 3 Bit 12: Active low channel 3 Bit 13: Active low channel 4 Bit 14: Active low channel 5 Bit 15: Active low channel 5 Bit 15: Active low channel 6 Bit 16: Active low channel 6 Bit 17: Active low channel 1 Bit 17: Active low channel 6 Bit 17: Active low channel 7 Bit 17: Active low channel 6 Bit 17: Active low channel 6
	Data type digital m INT16	Data typeValue Dec.ligital mode-INT16-3000 3000ENUM011	Data Value Meaning type Dec. INT16 -3000 3000

Parameter name	Data type	Value Dec.	Meaning	Description
Input 2 digital mode	ENUM	0 1	-	 An active high signal at the input (X0X7) activates the digital mode with one of the 3 speeds: Bit 0: not execute Bit 1: Active high channel 0 Bit 2: Active high channel 1 Bit 3: Active high channel 2 Bit 4: Active high channel 3 Bit 5: Active high channel 4 Bit 6: Active high channel 5 Bit 7: Active high channel 6 Bit 8: Active high channel 7
				 An active low signal at the input (X0X7) activates the digital mode with one of the 3 speeds: Bit 9: Active low channel 0 Bit 10: Active low channel 1 Bit 11: Active low channel 2 Bit 12: Active low channel 3 Bit 13: Active low channel 4 Bit 14: Active low channel 5 Bit 15: Active low channel 6 Bit 16: Active low channel 7

8.1.1 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 communication 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 dia- gnostics	0	No	Diagnostic and alarm messages are generated.
	1	Yes	Diagnostic and alarm messages are suppressed.
Disable output power	0	No	Monitoring of voltage V2 is activated.
diagnosis	1	Yes	The sending of the diagnosis is deac- tivated.
Disable output power	0	No	No function
diagnosis	1	yes	
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-ASSIST-	0	No	
ANT Force Mode	1	Yes	The Force Mode of the DTM is deactivated.
Deactivate EtherNet/IP	0	No	Explicit disabling of the Ethernet
	1	Yes	protocols or the web server
Deactivate Modbus	0	No	_
ТСР	1	Yes	_
Deactivate web server	0	No	_
	1	Yes	
Deactivate module-	0	No	PROFINET alarms are shown.
specific PROFINET alarms exclusively	1	Yes	PROFINET alarms of the slots \geq 1 are deactivated.

8.2 Configuring the motor mode

The following sample configurations describe the handling of the different motor modes with the TBEN-LL(H)-4RMC with a connected motor "Interroll RollerDrive EC5000 BI" at slot X5 (motor 2).

The configurations are shown using the integrated web server as an example and are transferable for the Industrial Ethernet protocols PROFINET, EtherNet/IP and Modbus TCP.

NOTE

The fire mode overwrites all other motor modes. To use a different motor mode, the fire mode must be completely deactivated, i.e. all parameters (velocity fire mode, fire mode input, etc.) must be reset.

8.2.1 Configuring the velocity mode

The following parameters [> 80] and process output data [> 109] must be set for the velocity mode.

Setting parameters

- Set **Operation mode** to **Velocity** (3).
- Set Motor attached to yes (1) to activate the channel.
- Optional: Set the values for **Ramp acceleration** and **Ramp deceleration**.
- Note: Set Lock Ramp to no (0), to allow a dynamic configuration of the ramp acceleration or deceleration via the process image of the outputs. Lock Ramp = yes (1) locks the possibility to adapt g the values in the process data.
- Set Lock Position to no (0).
- Optional: Set Lock Motor Mode to yes (1), to prevent the motor mode for the relevant channel from being changed in the process output data.

START MOTOR	DOCUMENTATION	Your Global Automation Partner
TBEN-LLH-4RMC	START → LOCAL I/O → PARAMETERS	Logout
DEVICE j Info A Parameters	Reading Writing Tab view Print	
ပ္ပံ Diagnostics	4 Operation mode	Velocity
ווֹת Event log	5 Lock Motor Mode	yes v
Change password	Digital In/Out 6 Lock Ramp	no 🗸
Firmware	Digital In/Out 7 Ramp acceleration	400
LOCAL I/O 🛕 (බා Parameters	Motor 0 Motor status output	400 OK-high channel 4 ✓
တို Diagnostics	Motor 1 Input 1 digital mode	Active high - channel 1 v
ب Input م Output	Motor 2 Velocity 1 digital mode	600
	Motor 3 Velocity 3 digital mode	0
	Input fire mode	not execute
	Ramp acceleration fire mode	65535
	Input reference sensor	No reference drive
	Input positive limit-switch	n.a. 🗸
	Input negative ilmit-switch	n.a. V

• Write the values to the device using the **Write** button.

Fig. 42: Parameters for velocity mode

Setting process output data

- Set the Velocity to the desired value, here 1000 mm/s.
- Set enable to yes (1) to start the motor.
- ▶ The values are applied immediately.

SIARI MOTOR	DOCUMENTATIC	N			Your Global	Automation Partner
TBEN-LLH-4RMC	START -> LOCAL	//O → OUTPUT				Logout
TBEN-LLH-4RMC DEVICE ∫ Info Ø Parameters Ø Diagnostics Event log I Ex-/Import Ø Change password ↓ Firmware LOCAL I/O Ø Parameters Ø Diagnostics ↓ Input M Output	Tab view Print C Digital In/Out Digital In/Out Digital In/Out Digital In/Out Digital In/Out Out Digital In/Out Motor 0 Motor 1 Motor 2 Motor 3	VO → OUTPUT		1000 0 0 0 0 0 No change yes no not active not active absolute	> > > > > > > > > > > > > > > > > > >	Logout
 English v		Change set immediately Change on setpoint	보 보	not active not active	• •	•••

Fig. 43: Process output data for velocity mode

➡ The motor runs at the defined speed. In addition to the velocity, the process input data also show the current position of the motor, as well as status and error messages.

START MOTOR	DOCUMENTATION	Your Global Automation Partner
TBEN-LLH-4RMC	START → LOCAL I/O → INPUT	Logout
DEVICE (i) Info	Tab view Print Clear chart Update chart CSV Exp.	
 Parameters Diagnostics 	Digital In 0 Diagnostics	
Event log	Digital In 1 Target reached	Velocity active
<pre></pre>	Digital In 2 Following error	∠ not active
🛱 Firmware	Digital In 3 Generic error Reference positon valid	·∼ -
LOCAL I/O ැබු Parameters	Digital In/Out 4 Current error	~ -
ပို Diagnostics	Digital In/Out 5 Temperature error	~ -
Cutput	Digital In/Out 6 Device profile specific error	~ -
	Digital In/Out 7 Manufacturer specific error	<u>~</u> -
	Status Motor 0 Missing device	∠ not active
	Motor 1 Fire mode	not active
	Motor 2 Configuration error Connected	✓ not active ✓ yes
	Motor 3 Enabled Fault	✓ yes
	Diagnostic channel Fault is pending	not active
	Input values Velocity	1004

Fig. 44: Process input data data for velocity mode

8.2.2 Configuring the position mode

The following parameters [\triangleright 80] and process output data [\triangleright 109] must be set for the position mode.

Setting parameters

- Set Operation mode to position (1).
- Set Motor attached to yes (1) to activate the channel.
- Optional: Set Lock Motor Mode to yes (1), to prevent the motor mode for the relevant channel from being changed in the process output data.
- Write the values to the device using the **Write** button.

START MOT	OR DOCUMENTATI	ON	Your	IRCK
TBEN-LLH-4RMC	START → LOCAL	. I/O → PARAMETERS		Logout
DEVICE) Info) Info) Parameters) Diagnostics) Diagnostics) Change password) Change password) Change password) Firmware LOCAL I/O) Parameters) Diagnostics) Input) Output	Reading Writing Digital In/Out 4 Digital In/Out 5 Digital In/Out 6 Digital In/Out 7 Motor 0 Motor 1 Motor 2 Motor 3	7 Tab view Print Operation mode Motor attached Lock Motor Mode Lock Ramp Lock Position Motor status output Input 1 digital mode Input 2 digital mode Velocity 1 digital mode Velocity 3 digital mode Velocity 3 digital mode Velocity 3 digital mode Input fire mode Ramp acceleration fire mode Input reference sensor Input negative limit-switch	Position mode v yes v no v no v No v OK-high channel 4 v Active high - channel 1 v not execute v 600 0 0 0 not execute v 0 0 No reference drive v n.a. v	
English 🗸				

Fig. 45: Parameters for position mode

Setting process output data

- Set the Velocity to the desired value, here 1000 mm/s.
- Set the Position to the desired value, here 50000 mm
- Optional: Set Ramp acceleration and Ramp deceleration to the desired value, here 200 mm/s².
- Set Enable to yes (1).

START MOTOR	DOCUMENTATION	YURCK Your Global Automation Partner
TBEN-LLH-4RMC	START → LOCAL I/O → OUTPUT	Logout
DEVICE () Info () Parameters () Diagnostics () Event log () Ex-/Import () Change password () Firmware EUCAL I/O () Parameters () Diagnostics () Input () Output	Tab view Print Clear chart Update chart CSV Exp. Digital In/Out 4 Output values U U Digital In/Out 5 Notor Welocity W Digital In/Out 6 Ramp Acceleration W Digital In/Out 6 Control W Digital In/Out 6 Control W Digital In/Out 7 Motor mode W Motor 0 Enable W Motor 1 Halt W Motor 2 New setpoint W Motor 3 Change on setpoint W	1000 50000 200 200 200 No change ✓ yes ✓ no ✓ not active ✓
English Y		

Fig. 46: Process output data for position mode

- Set New setpoint to active $(0 \rightarrow 1)$ to accept the new position.
- Set New setpoint $(1 \rightarrow 0)$.

START	MOTOR	DOCUMENTATION			Your Globa	RCK Il Automation Partner
TBEN-LLH-4R	MC	START -> LOCAL I/O) → OUTPUT			Logout
DEVICE () Info () Parameter () Diagnostic () Event log () Ex-/Import () Change pr () Change pr () Firmware () Diagnostic () Diagnostic () Input () Output	rs assword	Tab view Pirint Cleat Digital In/Out A Digital In/Out B Digital In/Out B Digital In/Out B Motor 0 Motor 1 Motor 3 B	Control Addresses Ad	1000 50000 200 200 No change yes no not active active active active not active not active not active	v v v v v v v v v v v v v v v v v v v	
English 🗸						

Fig. 47: Accepting the setpoint for position mode

- Optional: Activate Change set immediately to start the next positioning immediately. All other positions are overwritten. Activate Change on setpoint to save an additional position that is approached after the first defined position has been reached.
- \Rightarrow The motor stops at the defined position.
- \Rightarrow Process input data: Bit **Target reached** (R) = 0, the positioning is not yet complete.

TBENLLIH-4RMC START → LOCAL I/O → NPUT Logor DEVICE () Info Info Image: Construction of the information of the info	START MOTOR	DOCUMENTATION	TURCK Your Global Automation Partner
DEVICE Info Image: Signal state	TBEN-LLH-4RMC	START → LOCAL I/O → INPUT	Logout
	DEVICE	Tab view Print Clear chart <i>Update chart</i> CSV Exp.	
Event log Digital In 1 Target reached in of active Change password Digital In 2 Change password Digital In 3 Generic error in of active Digital In 2 Following error Digital In 2 Following error Digital In 2 Reference positon valid Parameters Digital In/Out Q Digital In/Out 4 Current error input Digital In/Out 6 Digital In/Out 7 Temperature error 1 Digital In/Out 6 Digital In/Out 7 Manufacture specific error 1 Int active 0 utput Digital In/Out 6 Digital In/Out 7 Manufacture specific error 1 Int active 0 Velocity out of valid range 1 Int active 1 Fire mode 1 Fault 1 Int active 1 Fourth error 1 Fire mode 1 Prot active 1 Fire mode 1 Int active 1 Fourth error 1 Fourth error 1 Prot active	ې کې Parameters کې Diagnostics <u>۱</u>	Digital In 0 Diagnostics Motor mode	✓ Position mode
bigital In 2 Busy i active change password Digital In 2 Following error in not active bigital In 3 Generic error imot active bigital In 4 Current error imot active bigital In/Out Digital In/Out Current error imot active bigital In/Out Digital In/Out Voltage error imot active bigital In/Out Digital In/Out Current error imot active bigital In/Out Digital In/Out Communication error imot active bigital In/Out Digital In/Out Manufacturer specific error imot active bigital In/Out Motor 1 Fire mode imot active bigital In/Out Configuration error imot active bigital In/Out Configuration error imot active bigital In/Out Motor 1 Fire mode imot active bigital In/Out Configuration error </th <th>し 『 涙 Event log</th> <th>Digital In 1 Target reached</th> <th>mot active</th>	し 『 涙 Event log	Digital In 1 Target reached	mot active
Digital In 3 Genic error Digital In 3 Genic error Parameters Digital In/Out Digital In/Out Voltage error Digital In/Out Current error Digital In/Out Temperature error Digital In/Out Communication error Digital In/Out Communication error Digital In/Out Device profile specific error Digital In/Out Communication error Digital In/Out Communication error Digital In/Out Communication error Digital In/Out Configuration error Digital In/Out Motor 0 Motor 1 Fire mode Motor 2 Configuration error Motor 3 Enabled Fault yes Diagnostic Fault Channel Fault Position Position	[↓†] Ex-/Import	Digital In 2	active
Normal Parameters Digital In/Out Current error Digital In/Out Digital In/Out Digital In/Out Voltage error Digital In/Out Temperature error Digital In/Out Communication error Parameters Digital In/Out Output Motor 0 Motor 1 Fire mode Motor 2 Connected Motor 3 Enabled Paraut yes Fault mot active Diagnostic Fault is pending Charnel Position Position 90000	Firmware	Digital In 3 Generic error	~ -
Parameters Diagnostics Natural Digital In/Out 5 Imput 0 utput Digital In/Out 6 Device profile specific error 0 Digital In/Out 6 Device profile specific error 0 Digital In/Out 6 Device profile specific error 0 Digital In/Out 7 Motor 0 Missing device Velocity out of valid range Motor 2 Configuration error Motor 3 Enabled Velocity Diagnostic Channel Input values Velocity Velocity Velocity 0 Diagnostic Paulti bending Position Velocity Position		Reference positon valid	not active
Diagnostics 5 Imput Digital In/Out 6 Device profile specific error Communication error Comput Digital In/Out 6 Device profile specific error Comput Digital In/Out 7 Status Motor 0 Motor 1 Fire mode Motor 2 Configuration error Motor 3 Enabled Fault Diagnostic Charnel Imput values Velocity Velocity Velocity Position Position	Parameters	Digital In/Out Voltage error	۲
Digital In/Out 6 Device profile specific error ///// Digital In/Out 7 Partice profile specific error //// Digital In/Out 7 Status /// Motor 0 Missing device Motor 1 Fire mode Fire mode // Motor 2 Configuration error Motor 3 Enabled Fault // Diagnostic Channel Input values Velocity // 0 Position //	لم Diagnostics <u>م</u>	5 Temperature error	<u>-</u>
Digital In/Out 7 Manufacturer specific error Motor 0 Status Motor 0 Missing device Velocity out of valid range not active Motor 1 Fire mode Motor 2 Configuration error not active Motor 3 Enabled yes Fault yes Diagnostic channel Fault is pending not active Velocity not active Diagnostic channel Fault is pending Position 0	, re. Output	Digital In/Out Communication error 6 Device profile specific error	~ -
Status Instant of the second of the seco		Digital In/Out Manufacturer specific error	<u> </u>
Wotor 1 Velocity out of valid range into active Motor 1 Fire mode into active Motor 2 Configuration error into active Motor 3 Enabled yes Motor 3 Enabled yes Fault into active into active Diagnostic channel Fault spending into active Velocity into active into active Position into active into active		Status Motor 0 Missing device	✓ not active
Motor 1 Fire mode int active Motor 2 Configuration error int active Motor 3 Connected ives Motor 3 Enabled ives Fault ive int active Diagnostic channel Fault is pending int active Input values Velocity ive Velocity ive 0 Position ive 50000		Velocity out of valid range	not active
Motor 2 Connected yes Motor 3 Enabled yes Motor 3 Fault mot active Diagnostic channel Fault is pending mot active Input values Velocity Velocity 0 Position position 50000		Motor 1 Fire mode	not active
Motor 3 Enabled yes Fault mot active Diagnostic channel Fault is pending mot active Input values velocity w Velocity w 0 Position w 50000		Motor 2 Connected	Ves
Fault Image: model Diagnostic channel Fault is pending Image: model Input values Velocity Image: model Velocity Image: model Image: model Position Image: model Image: model		Motor 3 Enabled	ves
Fault is pending reactive not active Input values Velocity reactive 0 Position reactive 50000		Fault	not active
Velocity Position 50000		Channel Fault is pending	not active
Position 🗠 50000		Velocity	0
		Position	50000

Fig. 48: Position in process input data

 \Rightarrow Process input data: Bit **Target reached** (TR) = 1, a new positioning can be activated.

8.2.3 Configuring the homing mode

The following parameters [> 80] and process output data [> 109] must be set for the homing mode.

Setting parameters

- Set Operation mode to Position (1).
- Set **Motor attached** to **yes** (1) to activate the channel.
- Set Lock motor mode to no.
- Write the values to the device using the **Write** button.

START MOTOR	DOCUMENTATION	TURCK Your Global Automation Partner
TBEN-LLH-4RMC	START → LOCAL I/O → PARAMETERS	Logout
DEVICE (i) Info (ii) Parameters (ii) Discussion	Reading Writing Tab view Print Digital In/Out 4 Operation mode	Position mode
Event log	Digital In/Out 5 Lock Motor Mode	yes V no V
Change password	Digital In/Out 6 Lock Ramp Digital In/Out	no V no V
	7 Motor status output Input 1 digital mode	not execute Active high - channel 4
ැ Parameters රැµ Diagnostics <u>∧</u>	Motor 1 Input 2 digital mode Velocity 1 digital mode	not execute
ی Input م. Output	Velocity 2 digital mode Motor 2 Velocity 3 digital mode	0
	Motor 3 Velocity fire mode	not execute V
	Ramp acceleration fire mode Input reference sensor	65535 No reference drive
English ¥		

Fig. 49: Parameters for homing mode

Setting process output data

The **output values** for velocity, position etc. have no influence in homing mode.

- Set Motor mode to Homing.
- Set **Enable** bit to **yes**.
- Set **New setpoint** to **active** to define the actual position as the new zero position.

START	MOTOR	DOCUMENTATION			TURCK Your Global Automation Partner
TBEN-LLH-4R	MC	START -> LOCAL I/O			Logout
DEVICE) Info Parameter Diagnostic R Event log If Ex-/Impor Change p Change p Firmware LOCAL I/O Diagnostic Diagnostic Input Contput	rs 25 A t assword ns 25 A	Image: Construction of the construc	Control Control Control Control Control Motor mode Enable Fault reset Hait Quick Stop New setpoint Positioning mode Change set immediately	∠ 500 ∠ 5000 ∠ 200 ∠ 200 ∠ 200 ∠ 200 ∠ 100 ∠ 200 ∠ 100 ∠ 100 ∠ 100 ∠ 100 ∠ 100 ∠ 100 ∠ 100 ∠ 100 ∠ 100 ∠ 100 ∠ 100 ∠ 100 ∠ 100 ∠ 100 ∠ 100 ∠ 100	
Fnalish V		_	Change on setpoint	not active	▼
- ruguon ·					

Fig. 50: Process output data in homing mode

⇒ The actual position is set as new zero position.

- Set **New setpoint** to **not active** $(1 \rightarrow 0)$ to complete the homing.
- \Rightarrow Process input data: Bit **Target reached** (TR)= 1 \rightarrow the zero position has been set.

START MOTOR	DOCUMENTATION TURCH							
TBEN-LLH-4RMC	START → LOCAL I/O → INPUT	Logout						
DEVICE) Info) Parameters) Diagnostics) Event log (If) Ex-/Import	Image: Constraint of the second se	Homing Active Active						
	Following error Digital In 3 Generic error Reference positon valid	∠ not active ∠ - not active						
LOCAL I/O 🔥 ن Parameters ب Diagnostics	Digital In/Out 4 Current error Digital In/Out 5 Temperature error							
ے Input روح Output	Digital In/Out 6 Device profile specific error Digital In/Out Manufacturer specific error							
	Motor 0 Missing device	not active						
	Motor 1 Fire mode	 ∠ not active ∠ not active 						
	Motor 2 Configuration error Connected	l≁ not active yes						
	Motor 3 Enabled Fault Diagnostic	yes ∠ not active						
	channel Fault is pending Input values Velocity Position	└ not active └ 0						
English ~		•••						

Fig. 51: Process input data with new zero position

8.2.4 Configuring the digital mode

In digital mode, the speed at which the motor runs depends on the parameters **Input 1 digital mode** and **Input 2 digital mode**.

Example	Input 1 digital mode	Value at channel	Input 2 digital mode	Value at channel	Velocity
1	Active high –	0	Not execute	Not relevant	Motor standstill
	channel 5	1	_		Velocity 1
2	Not execute	lot execute Not relevant		0	Motor standstill
			channel 6	1	Velocity 2
3	Active high –	0	Active high –	0	Motor standstill
	channel 5	1	channel 6	0	Velocity 1
		1	_	1	Velocity 3
4	Active high –	0	Active Low –	0	Velocity 2
С	channel 5	1	channel 6	0	Velocity 3
		1	_	1	Velocity 1

Example configuration

The following parameters [> 80] must be set for the digital mode.

Setting parameters (for example 1)

- Set **Operation mode** to **Digital mode** (13).
- Set **Motor attached** to **yes** (1) to activate the channel.
- Set the values for Ramp acceleration and Ramp deceleration. In digital mode, the ramps cannot be adapted dynamically via the process data.
- Optional: Set Lock Motor Mode to yes (1), to prevent the motor mode for the relevant channel from being changed in the process output data.
- Optional: Define the output **Motor status output** via which the motor status is reported.
- Use Input 1 digital mode and Input 2 digital mode to define which signal at which input of the device starts the digital mode and at what speed Velocity ... digital mode the motor runs in digital mode [> 12]. In the following example, the motor starts with a positive signal on channel 5 and runs at the speed Velocity 1 digital mode (600 mm/s).
- Write the values to the device using the **Write** button.

START MOTOR	DOCUMENTATION		Your Global Automation Partner
TBEN-LLH-4RMC	START → LOCAL I/O → PARAMETERS		Logout
DEVICE j Info Recomposition	Reading Writing Tab view Print		
Co Diagnostics	4 Operation mode Digital In/Out 5 Lock Motor Mode	Digital Mode V yes V no V	
(박) Ex-/Import / Change password (그) Firmware	Digital In/Out 6 Lock Ramp Digital In/Out 7 Ramp acceleration	no 🗸	
LOCAL I/O	Motor 0 Ramp deceleration Motor status output	200 not execute	
ပြာ Diagnostics ခြ Input က Output	Motor 1 Input 2 digital mode Motor 2 Velocity 1 digital mode	not execute v	
	Motor 3 Velocity 2 digital mode Velocity 3 digital mode Input fire mode	1000 200 not execute	
	Velocity fire mode Ramp acceleration fire m Input reference sensor	ode 0 0 Vorteseter v	
	Input positive limit-switch Input negative limit-switch	n.a. V	
English Y			

Fig. 52: Parameters for velocity mode

⇒ With a positive signal on channel 5, the motor starts immediately with the speed Velocity
 1 digital mode (600 mm/s).

START	MOTOR	DOCUMENTATI	DN .	YOURCEK Your Global Automation Partner
TBEN-LLH-4R	мс	START → LOCAL	I/O → OUTPUT	Logout
DEVICE		Tab view Print	Clear chart Update chart CSV Exp.	
බ Paramete ට Diagnosti	rs cs	Digital In/Out 4	Output value	3
Event log		Digital In/Out 5		
Ex-/Impor	t assword	Digital In/Out 6		
G Firmware		Digital In/Out 7		
LOCAL I/O	rs	Motor 0		
Diagnosti		Motor 1		
ے Input روح Output		Motor 2		
		Motor 3		

Fig. 53: Active high signal at channel 5

START MOTOR	DOCUMENTATION	TURCK Your Global Automation Partner
TBEN-LLH-4RMC	START → LOCAL I/O → INPUT	Logout
DEVICE j) Info	Tab view Print Clear chart Update chart CSV Ex	ip.
Parameters	Digital In 0 Diagnostics	
Concentration Diagnostics	Motor mode Digital In 1 Target reached	∠ Digital Mode ∠ active
[^{나†}] Ex-/Import	Digital In 2 Following error	Image: mot active Image: mot active
Firmware	Digital In 3 Generic error	-
COCAL I/O	Reference positon valid Digital In/Out 4 Current error	∠ not active
	Digital In/Out Voltage error	<u>۲</u>
🔁 Input	Digital In/Out Communication error	
产 Output	6 Device profile specific erro	и —
	Digital In/Out 7 Manufacturer specific error	r 🗠 -
	Status Motor 0 Missing device	∠ not active
	Velocity out of valid range	I not active
	Fire mode	mot active
	Motor 2	mot active
	Enabled	
	Motor 3 Fault	not active
	Diagnostic channel Fault is pending	Interior in the second
	Input values Velocity Position	 ∠ 600 ∠ 442247
English 🗸	i i i i i i i i i i i i i i i i i i i	

Fig. 54: Process input data for digital mode

8.2.5 Configuring the referencing

Referencing is used in positioning mode, for example, to perform a reference run during operation.

Setting parameters

- Operation mode Position mode.
- Set Motor attached to yes (1) to activate the channel.
- Set Lock Motor Mode auf no (0) to allow referencing to be started via the process output data.
- Use Input reference sensor to define how referencing is started (here: Positive edge channel 5, i.e. referencing is performed on a positive edge on channel 5).
- Optional: Specify the channels to which the limit switches are connected under Input positive/negative limit switch.
- Write the values to the device using the Write button.

START MOTOR	DOCUMENTATION	YOURCK Your Global Automation Partner
TBEN-LLH-4RMC	START → LOCAL I/O → PARAMETERS	Logout
DEVICE i Info Parameters	Reading Writing Tab view Print	
Op Diagnostics	4 Operation mode Digital In/Out Motor attached	Position mode V yes V
Lit Ex-/Import	Digital In/Out 6	
Firmware	Digital In/Out 7 Motor status output	no V not execute V
LOCAL I/O	Motor 0 Input 2 digital mode	not execute
🖓 Diagnostics ဥ Input	Motor 1 Velocity 1 digital mode Velocity 2 digital mode	0
🛃 Output	Motor 2 Velocity 3 digital mode Input fire mode	0 not execute
	Ramp acceleration fire mode	0
	Input reference sensor Input positive limit-switch	Positive edge - channel 5 V n.a. V
	Input negative limit-switch	na. 🗸
English 🗸		

Fig. 55: Parameters for referencing

Setting process output data

- Set Motor mode to Referencing.
- Define the Velocity here 200 mm/s.
- Optional: Enter a reference position to which the motor should move after reaching the limit switch (here: 200) under **Position**.
- Optional: Set the values for **Ramp acceleration** and **Ramp deceleration**.
- The values are applied immediately.
- Set New setpoint to active to start the referencing. Note: If the New setpoint bit is reset before referencing is completed, referencing is canceled.

START	MOTOR	DOCUMENTATION	DOCUMENTATION						
TBEN-LLH-4RM	NC	START -> LOCAL I/O	START → LOCAL I/O → OUTPUT						
DEVICE ∫ Info Parameter Vo Diagnostic R Event log I Ex-Import Change pa ← Firmware LOCAL I/O Ø Parameter Vo Diagnostic → Input	s s ssword s	Tab view Print Clear Digital In/Out Digital In/Out Digital In/Out Digital In/Out Digital In/Out Motor 0 Motor 1	Control Motor mode Enable Fault reset Halt	⊻ 200 ∠ 200 ∠ 50 ∠ 50 ∠ 50 ∠ 50 ∠ 70 ∠ no ∠ no ∠ no ∠ no ∠ no ∠ no ∠ not act	incing V				
🕑 input		Motor 2	New setpoint	inot active	ive V				
		Motor 3	Positioning mode Change set immediately Change on setpoint	I∠ absolu I∠ not act I∠ not act	te v tive v tive v				
English 🗸									

Fig. 56: Process output data for position mode

- ➡ The position of the motor is set to 0 as soon as a positive edge is detected at the reference sensor. The motor then moves on to the defined absolute **Position**, in this case: 200.
- ⇒ When this position is reached, the position is reset to 0 and immediately serves as the new reference position.

8.3 Configuring the fire mode

The fire mode overwrites all other motor modes when activated. The following parameters [> 80] must be set for fire mode Motor modes: fire mode

Setting parameters

- Set Motor attached to yes (1) to activate the channel.
- Define Velocity fire mode as well as ramp acceleration fire mode .
- Define the digital input and the signal level that activate the fire mode (here: active high signal on channel 5) under Input fire mode.
- Write the values to the device using the **Write** button.

START MOTOR	DOCUMENTATION	Your Global Automation Partner
TBEN-LLH-4RMC	START → LOCAL I/O → PARAMETERS	Logout
DEVICE (i) Info Parameters Diagnostics Event log Local I/O Parameters Parameters Diagnostics Parameters	Digital In/Out Operation mode Digital In/Out Digital In/Out 4 Operation mode Digital In/Out Digital In/Out 4 Operation mode Digital In/Out Digital In/Out 5 Lock Motor Mode no Digital In/Out 6 Lock Ramp no Digital In/Out 6 Lock Position no Motor 0 Ramp acceleration 0 0 Motor 0 Motor status output not exee	Vode Vode Vode Vode Vode Vode Vode Vode Vode
© Diagnostics	Motor 1 Input 1 digital mode not exe Input 2 digital mode not exe Motor 2 Velocity 1 digital mode 0 Motor 3 Velocity 2 digital mode 0 Motor 3 Velocity 3 digital mode 0 Input fire mode Active t Velocity fire mode 1000 Bamp acceleration fire mode 200 1000 1000	cute
	Input reference sensor No refe Input positive limit-switch n.a. Input negative limit-switch n.a.	rence drive
English Y		

Fig. 57: Parameters for fire mode

An active high signal on channel 5 immediately activates the fire mode, i.e. the motor starts immediately with the specified speed and the defined acceleration. All other settings of will be ignored.

START MOTOR	DOCUMENTATION	Your Global Automation Partner
TBEN-LLH-4RMC	START → LOCAL I/O → INPUT	Logout
DEVICE (i) Info	Tab view Print Clear chart Update chart CSV Exp.	
O Parameters	Digital In 0 Diagnostics	
ි Diagnostics	Motor mode	Fire mode
🞼 Event log	Digital In 1 Target reached	∠ active
^{[1†}] Ex-/Import	Digital In 2 Busy	∠ not active
Change password	Following error	inot active
🛱 Firmware	Digital In 3 Generic error	<u>~</u> -
	Reference positon valid	→ not active
Co Parameters	Digital In/Out 4 Current error	<u>~</u>
	Digital In/Out Voltage error	<u>~</u> -
Up Diagnostics	5 Temperature error	<u>~</u> -
	Digital In/Out Communication error	<u>~</u>
🔥 Output	6 Device profile specific error	<u>~</u> -
	Digital In/Out Manufacturer specific error	-
	Status	
	Motor 0 Missing device	∠ not active
	Velocity out of valid range	∠ not active
	Motor 1 Fire mode	∠ active
	Configuration error	✓ not active
	Connected	🗠 yes
	Motor 3 Enabled	l∼ yes
	Fault	∠ not active
	Diagnostic channel Fault is pending	∠ not active
	Input values	
	Velocity	1000
	Position	4701
English 🗸		•••

Fig. 58: Process input data for fire mode

NOTE

To switch from fire mode back to another motor mode, the fire mode has to be deactivated, i.e. the parameter **Input fire mode** must be deactivated (not execute) or the **Velocity fire mode** must be 0.

9 Operating

9.1 Process input data

Word no	ord no. Byte no.			Bit no.							
Dec.	Hex.	Dec.	Hex.	7	6	5	4	3	2	1	0
Digital o	hannels	(connect	tor X0	(3)							
0	0x00	0	0x00	DXP7	DXP6	DXP5	DXP4	DI3	DI2	DI1	DI0
		1	0x01	Reserved	Reserved						
Motor c	ontrol – ı	motor 1 (connect	or X4)							
1	0x01	0	0x00	Status pos	sition			Motor m	ode		
				REF- POS_OK	F_ER	BUSY	TR				
		1	0x01	Diagnosti	cs – Errc	or Register	•				
				MSERR	-	DPSERR	COM ERR	TERR	VOLT ERR	CURR ERR	GERR
2	0x02	2	0x02	Status			1		1	1	
				FAULT_ PENDING	FAULT	ENABLED	CON	CFGERR	FIRMOD	VELEXC	MISDEV
		3	0x03	Reserved							
3	0x03	4	0x04	Velocity							
		5	0x05	-							
4	0x04	6	0x06	Position	Position						
		7	0x07								
5	5 0x05 8 0		0x08								
		9	0x09								
Motor c	ontrol – ı	motor 2 (connect	or X5)							
610	0x06 0x0A	09	0x00 0x09	Assignme	Assignment similar to motor 1 (0x010x05)						
Motor c	ontrol – ı	motor 3 (connect	or X6)							
1115	0x0B 0x0F	09	0x00 0x09	Assignme	nt simila	ar to motor	1 (0x01	0x05)			
Motor c	ontrol – ı	motor 4 (connect	or X7)							
1620	0x10 0x14	09	0x00 0x09	Assignme	nt simila	ar to motor	1 (0x01	0x05)			
Sensor s	supply ar	nd digita	l channe	ls (diagnos	stics)						
21	0x15	0	0x00	ReservedVAUX1VAUX1VAUX1VAUX1pin1 X3pin1 X2pin1 X1pin1 X0(Cb6/7)(Cb4/5)(Cb2/3)(Cb0/1)			VAUX1 pin1 X0 (Ch0/1)				
		1	0x01	Reserved					.1		
22	0x16	0	0x00	ERR DXP7	ERR DXP6	ERR DXP5	ERR DXP4	Reserved			
		1	0x01	Reserved	I	1	1				
Module	status (d	levice sta	itus)	1							
23	0x17	0	0x00	-	FCE	-	-	-		V1	-
		1	0x01	V2	-		-	-		ARGEE	DIAG

Meaning of the process data bits

Name	Value	Meaning		
DI	Digital input			
	0	No signal at DI (pin 4, SIO)		
	1	Signal at DI (pin 4, SIO)		
DXP	Configurable	digital channel (DXP channel)		
	0	No input signal at DXP channel (pin 2)		
	1	Input signal at DXP channel (pin 2)		
Motor mode	Currently par	rameterized and active motor mode [] 80]		
	0	No change		
	1	Position mode		
	3	Velocity		
	б	Homing		
	13	Digital mode		
Status position (only for motor r	node positior	h)		
Target reached TR	0	Target not reached.		
	1	Target reached: The motor has reached the defined target position. The bit is only set (1) when the process output data bit NSP (New Setpoint) has been reset after a positioning.		
BUSY		The bit corresponds to the Set-point acknowledge bit in the CANopen status word (object 0x6041) of the device profile.		
	0	0 = new position accepted		
	1	1 = new position not accepted		
Following error (F_ER)	0	No error		
	1	Following error according to "CANopen – Drives and Motion Control Device Profile" The actual value of the position is outside the permissible range		
Reference position valid REF-	0	Referenzierung operation not yet completed		
POS_OK	1	Referencing successful The bit is reset to 0 as soon as a new reference movement is started.		
Error register		The error register corresponds to the CANopen Error Register		
Generic error (GERR)		(Object 0x1001) according to "CANopen - Drives and Motion Con-		
Current Error (CURRERR)		Trol Device Profile". The errors are generated by the connected CANopen device. Their		
Voltage error (VOLTERR)		meaning depends on the connected device.		
Temperature error (TERR)				
Communication error (COMERR)		-		
Device profile specific error (DPSERR)		_		
Manufacturer specific error (MSERR)				

Name	Value	Meaning
Status		
Missing device (MISDEV)	0	No error
	1	Parameter Motor attached [> 80] at the channel is set, but no motor is detected.
Velocity out of valid range	0	No error
(VELEXC) 1		The velocity defined in the output data exceeds the maximum velocity of the connected motor.
Fire mode (FIRMOD)	0	No error
	1	Fire mode at morot channel
Connected (CON)	0	No error
	1	Motor connected to channel and in Operational state (acc. to CANopen basic profile), CANopen communication established, PDO transfer taking place, CANopen Drives profile not yet activated
Configuration error (CFGERR)	0	No error
	1	Reference run with limit switch selected (input reference sensor parameter = 1 = Neg. to pos. edge – pos. limit switch or 2 = Neg. to pos. edge - neg. limit switch [▶ 80]), but no input for the limit switch parameterized (parameter Input positive limit switch Or Input negative limit switch). Prerequisite: The referencing has been started by a positive edge in bit NSP (New setpoint) [▶ 109].
ENABLED	0	No error
	1	Connected motor ready for operation, CANopen communication running Prerequisite: ENABLE The bit in the process output data is set. Motor error-free, input bit FAULT = 0.
Error (FAULT)	0	No error
	1	CANopen Drives error (Drive in Fault State) Motor in the FAULT state. Possible causes: Drive blocked Load on drive too high
		The FAULT state can only be reset via an error acknowledgment with the FAULT_RST output if the cause of the error has been eliminated.
FAULT_PENDING	0	No error
	1	Specific for Interroll RollerDrive EC5000 BI: Cause of error not yet eliminated, error cannot be reset.
Velocity		Current speed
Position		Current position
Sensor supply and digital chanr gnostics)	nels (dia-	[▶ 114]
Module status		Status word Status and control word


9.2 Process output data

Word no.		Byte no.		Bit no.							
Dec.	Hex.	Dec.	Hex.	7	6	5	4	3	2	1	0
Digital	channels (connec	tor X0	X3)		1		-	1	1	1
0	0x00	0	0x00	DXP7	DXP6	DXP5	DXP4	Reserve	ed		
		1	0x01	Reserved							
Motor o	control – n	notor 1	(connect	or X4)							
1	0x01	0	0x00	Motor co	ntrol			Motor	mode		
				Q_STOP	HALT	FAULT_RST	ENABLE				
		1	0x01	Reserved	-			Positio	n control (POSCTRL)	
								COSP	CSI	ABS_REL	NSP
2	0x02	2	0x02	Velocity				1	1	1	1
		3	0x03								
3	0x03	4	0x04	Position							
		5	0x05								
4	0x04	6	0x06	-							
		7	0x07								
5	0x05	8	0x08	Ramp acc	eleratio	n					
		9	0x09								
6	0x06	10	0x0A	Ramp deceleration							
		11	0x0B								
Motor o	control – n	notor 2	(connect	or X5)							
712	0x07 0x0C	011	0x00 0x0B	Assignment similar to motor 1 (0x08010x0806)							
Motor o	control – n	notor 3	(connect	or X6)							
1318	0x0D 0x12	011	0x00 0x0B	Assignment similar to motor 1 (0x08010x0806)							
Motor o	control – n	notor 4	(connect	or X7)							
1924	0x13 0x18	011	0x00 0x0B	Assignme	ent simil	ar to motor 1	(0x0801	.0x0806	5)		

Meaning of the process data bits

Name	Data type	Value	Meaning	Comment					
DXP	Configurable digital channel (DXP channel)								
	BOOL	0	Output inactive						
		1	Output active, max. output current 2 A						
Motor mode	Defines th The motor this is not ARRAY of bits	e desire r mode o locked v 0 1 3 6 13	d motor mode during operation. can only be changed during runtime if <i>r</i> ia the Lock Motor Mode . parameter. No change Position mode Velocity Homing Digital mode	Whether the connected motor ad- opts the specified mode immedi- ately depends on the device. Prerequesite for Interroll EC5000 Bl: Mode change only at standstill, - HALT bit must be set.					
		14	Referencing	_					



		V 1	aa •	
Name	Data type	Value	Meaning	Comment
Velocity	INT16		Reference value for the velocity at which the motor is to run. Default: 0	unit: mm/s (Interroll EC5000 BI)
			 The meaning of the entered values depends on the connected motor. Mapping (e. g. for motor 1): PROFINET: byte 0x02 (high byte) byte 0x03 (low byte) Modbus TCP and EtherNet/IP: byte 0x03 (high byte) byte 0x02 (low byte) 	Prerequisite: Motor in motor mode velocity
Position	INT32		Reference value for the position to which the motor is to move.	unit: mm (Interroll EC5000 BI)
			The positioning is absolute or relative to the current position of the motor, depending on the setting in the process data bit Positioning mode (ABS_REL) . In homing mode the absolute position defined there is valid as reference posi- tion Default: 0 The meaning of the entered values depends on the connected motor. Mapping (e. g. for motor 1): PROFINET: byte 0x04 (high byte) byte 0x07 (low byte) Modbus TCP and EtherNet/IP: byte 0x07 (high byte)	Prerequisite: Motor in motor mode position
Pamp	LICINIT16		Values for the ramp acceleration and	unit
acceleration	0311110		ramp deceleration of the connected	mm ² (Interroll EC5000 BI)
Ramp	USINT16		motor	· · · · · · · · · · · · · · · · · · ·
deceleration			Default: 65535 0 = reserved, the previously saved setting is used The meaning of the entered values depends on the connected motor.	
Motor contr	ol			
ENABLE	BOOL	1	The motor roller controller attempts to set the connected motor to the Operational Enabled state (according to the CANopen Drives profile). The bit should always be set during operation.	 Prerequisites: Motor connected, input bit CON (Connected) = 1 No error at the connected motor, input bit FAULT = 0
Fault reset (FAULT_	BOOL	1	The bit is set to acknowledge an error (FAULT = 1).	Prerequisite: Error cause eliminated
KSI)				The bit corresponds to the FR bit (bit 7) in the CANopen control word (object 0x6040) of the device profile.



Name Data type Value Meaning		Meaning	Comment			
HALT	BOOL	1	The motor is stopped with the configured ramp deceleration.	The bit corresponds to the HALT bit (bit 8) in the CANopen control word (object 0x6040) of the device profile.		
Quick Stop (Q_STOP)	BOOL	1	The motor is stopped immediately withour ramp.	The bit corresponds to the QS bit (bit 2) in the CANopen control word (object 0x6040) of the device profile.		
Position con	trol (POSC	TRL)				
New Set Point (NSP)	BOOL	1	Edge signal $(0 \rightarrow 1 \rightarrow 0)$ A positive edge $(0 \rightarrow 1)$ starts the positioning. The bit must be reset after the start of positioning $(1 \rightarrow 0)$. Only then the process input data bits BUSY = 0 and TR (Target Reached) = 1 are set and a new positioning can be triggered.	The bit corresponds to the New Setpoint bit (bit 4) in the CANopen control word (object 0x6040) of the device profile, if the position mode is activated.		
Position mode	BOOL	0	Absolute positioning mode activated. The target position is an absolute value.	The bit corresponds to the Abs/Rel bit (bit 6) in the CANopen control		
(ABS_REL)		1	Relative positioning mode activated. The target position is a relative value.	word (object 0x6040) of the device profile, if the position mode is activated.		
Change set immediately (CSI)	BOOL	1	Immediately starts the next positioning. A previously written position is overwrit- ten.	The bit corresponds to the Change set immediately bit (bit 5) in the CANopen control word (object 0x6040) of the device profile, if the position mode is activated.		
Change on setpoint (COSP)	BOOL	1	The last defined position is approached. A new position is stored and approached after the first position has been reached.	The bit corresponds to the Change on setpoint bit (bit 9) in the CANopen control word (object 0x6040) of the device profile, if the position mode is activated.		

The units and the maximum values for speed, position, ramp acceleration and ramp deceleration depend on the connected motor.

• Observe the documentation of the connected motor.

9.3 LED displays

The device has the following LED indicators:

- Supply voltage (PWR)
- Group and bus errors (BUS)
- Ethernet status (L/A)
- I/O status (channel LEDs)
- Diagnostics (ERR)

Red

Localization (WINK)

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 configura-
Red	tion of the parameter LED behavior (PWR) at V2 undervoltage)

BUS LED	Meaning
Off	No voltage present
Green	Connection to a master active
Flashing $3 \times$ 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

The Ethernet ports XF1 and XF2 each have an LED L/A.

Diagnostics present

LED L/A	Meaning					
Off	No Ethernet connection					
Green	Ethernet connection established, 100 Mbps					
Yellow	Ethernet connection established, 10 Mbps					
Green flashing	Data transfer, 100 Mbps					
Yellow flashing	Data transfer, 10 Mbps					
DIP/DXP channel LEDs	Meaning (input)	Meaning (output)				
Off	Input not active	Output not active				
Green	Input active	Output active (max. 2 A)				
Red	_	Actuator overload				
Red flashing (1 Hz)	Short-circuit at the supply voltag Both connector LEDs are flashing	e for the respective connector.				

RM channel LEDs	Meaning (input)				
LED 8, 10, 12, 14					
Off	No motor connected				
Green	Motor connected, CANopen PDO transfer running				
Green flashing	Motor parameterized but not connected or ready				
Red	Motor reports an error				
Red flashing (1 Hz)	Overload motor				
LED 9, 11, 13, 15					
Off	Motor at standstill				
Green	Motor ready, CANopen communication acc. To CANopen Device Profile				
Green blinking	Motor in motion				
LED WINK (without designation on the device)	Meaning				
White flashing	Wink command active				



9.4 Software diagnostic messages

The device provides the following diagnostics:

- Diagnostics of the digital channels (DIP and DXP)
- General module diagnostics

9.4.1 Status- and control word

Status word

Ether- Net/IP/ Modbus	PROFINE T	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 0	Byte 1	V2	-	-	-	-	-	ARGEE	DIAG
Byte 1	Byte 0	-	FCE	-	-	-	-	V1	-
Bit 7	Bit 7 Description								
ARGEE ARGEE program running									
DIAG Diagnostic message at the device									
FCE	CE The DTM force mode is activated, the output states may no longer co								naer cor-

FCE	The DTM force mode is activated, the output states may no longer cor-
	respond to the specifications sent by the fieldbus.
V1	V1 or V2 too low
V2	

The status word is mapped into the module's process data.



NOTE

In EtherNet/IP the mapping can be deactivated via the Gateway Class (VSC 100). Activating or deactivating the status and control word modifies the process data mapping.

Control Word

The control word has no function.



9.4.2 Diagnostic telegram

Word no.		Byte no.		Bit no.								
Dec.	Hex.	Dec.	Hex.	7	6	5	4	3	2	1	0	
0	0x00	0	0x00	Reserved	Reserved			VAUX1	VAUX1	VAUX1	VAUX1	
								pin1 X3	pin1 X2	pin1 X1	pin1 X0	
								(Ch6/7)	(Ch4/5)	(Ch2/3)	(Ch0/1)	
		1	0x01	Reserved								
1	0x01	2	0x02	ERR_DXP7	ERR_DXP6	ERR_DXP5	ERR_DXP4	Reserved				
		3	0x03	Reserved								
Error	Error register (only Modbus and EtherNet/IP)											
2	0x02	4	0x04	MSERR	-	DPSERR	COMERR	TERR	VOL-	CURRERR	GERR	
									TERR			
		5	0x05	Reserved		eserved						

Meaning of diagnostic bits

Diagnostics	Meaning	Comment
VAUX1 pin1 Xx Slot Ch (y/z)	Overcurrent VAUX1 (pin1) at connector (channel group)	
ERR_DXP	Overcurrent at output	DXP channel used as output
Error register	See Process input data [> 106]	



9.4.3 PROFINET diagnostics

Module diagnostics (slot 0, according to co	nfiguratio	n tool)	PROFINET diagnostics	
	Connec	tor	Error code	Channel
Undervoltage V1	-		0x0002	0
Undervoltage V2	-		0x0002	0
DXP Diagnostics			PROFINET diagnostics	
	Channe	I Connector	Error code	Channel
Overcurrent output	DXP4	X2	0x0001	4
	DXP5	_	0x0001	5

0x0001

0x0001

6

7

DXP6

DXP7

Х3

VAUX1 diagnostics	Connector	PROFINET diagnostics		
		Error code	Channel	
Overcurrent VAUX1 (pin 1) at X0, ch 0/1	X0	0x0600	0	
Overcurrent VAUX1 (pin 1) at X1, ch 2/3	X1	0x0601		
Overcurrent VAUX1 (pin 1) at X2, ch 4/5	X2	0x0602		
Overcurrent VAUX1 (pin 1) at X3, ch 6/7	Х3	0x0603		

Motor channel diagnostics	PROFINET diagnostics	
Error description, s. [115] Connector	Error code	Channel



Motor channel diagnos	stics		PROFINET diagnostics
Motor 1			0
Generic error (GERR)	CANopen, generic error	X4	1600 (0x0640)
Current Error (CURRERR)	CANopen, current error	_	1601 (0x0641)
Voltage error (VOLTERR)	CANopen, voltage error	_	1602 (0x0642)
Communication error (COMERR)	CANopen, communication error	_	1603 (0x0643)
Temperature error (TERR)	CANopen, temperature error	_	1604 (0x0644)
Device profile specific error (DPSERR)	CANopen, profile specific error	_	1605 (0x0645)
Manufacturer specific error (MSERR)	CANopen, manufacturer specific error	_	1606 (0x0646)
Fault	There is a CANopen Drives error.	_	1607 (0x0647)
Missing device (MISDEV)	The configured motor is not connected.	_	1608 (0x0648)
Motor 2		X5	
similar to port 1			
Motor 3		X6	
similar to port 1			
Motor 4		X7	
similar to port 1			



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.

10.1 Fixing motor channel errors

If a connected motor cannot be switched on:

- Check the power supply. The TBEN-LL(H)-4RMC must be supplied with both V1 and V2
 [18].
- Check the configuration of the motor channel.
 The parameter Motor attached (MOT_ATT) [> 80] has to be set at the motor channel.
 Additionally, the motor channel has to be activated via the ENABLE bit in the process output data [> 109].
- Check the connected motor.
- ➡ If the connected motor has no defect and does not switch on despite correct supply and configuration, the motor channel may be defective.

Checking the motor channel

The motor supply of each motor channel is protected by a Littlefuse E10480 fuse (rated, 5 A). The fuse is designed for rated currents of up to 5 A and starting currents of up to 10 A (max. 20 s). Continuous overcurrent or short circuit can cause the fuse to trip.

- Check the power supply. If the supply is correct, either 24 VDC or 48 VDC (depending on the V2 supply for the motor) can be measured between pin 1 (Vaux2) and pin 3 (GND V2) on the motor channel.
- ➡ If no voltage can be measured between pin 1 and pin 3 of the motor channel although the power supply has been applied correctly, the fuse on the channel has probably tripped. The fuse cannot be replaced. Operation of a motor on this channel is no longer possible if the fuse has tripped.

10.2 Reducing emitted interferences from motors (HW-Rev. 1)

Connected motors can cause EMC interference in devices with hardware revision 1 (device printing: HW: 1) when the motor is at active standstill (HALT state).

To reduce interference emissions:

Provide motor cables with folding ferrites at one cable end.

Tested and recommended folding ferrites:

- Würth STAR-TEC Snap-on 74271132
- KEMET ESD-SR-H/HL Snap-on ESD-SR-S12



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. 59: 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	Change PW FW Update
්ලා ARGEE ලි BEEP	Actions ?	Device type/feature ?
ProfinetDiagnostics	 ✓ ● ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ <	190% 51-40P-0 190% 51-40P-0

Fig. 60: 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 devi	ce passwo	rd for each	device or s	et as global device password	
Global passwor	ď		۲	LOGIN	
192.168.1.254				Switching To Bootloader	
Do not close the c	urrent bro	wser windov	w until the f	firmware update is complete.	
Do not close the c Interrupting the lo	current bro ading proc	wser windov ess can res	w until the f ult in dama	firmware update is complete. age to the equipment.	
Do not close the c Interrupting the lo Firmware file:	current bro ading proc	wser windov æss can res	w until the f ult in dama	firmware update is complete. age to the equipment. dat	

Fig. 61: 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 (j) Info (☆) Parameter	TBEN Gateway - Firmware SELECT FIRMWARE FILE	
\bigcirc Diagnosis \bigcirc Open \oint Event log \leftarrow \rightarrow \uparrow	> This PC > Desktop > FW_Update	✓ ♂ Search "FW_Update"
Change Pa	* * * * * * * * * * * * * * * * * * *	
	File <u>n</u> ame: TBENVbdat	All files Qpen Canc

Fig. 62: 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. 63: 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	
⁴ 관 Output		

- Fig. 64: 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

Technical data	
Supply	
Supply voltage	
■ TBEN-LLH-4RMC	V1: 24 VDC V2: 24 VDC/48 VDC
TBEN-LL-4RMC	V1 and V2: 24 VDC
Permissible range	
■ TBEN-LLH-4RMC	V1: 1830 VDC V2: 1856 VDC
TBEN-LL-4RMC	V1 and V2: 1830 VDC
Current feedthrough XD1 to XD2	max. 16 A per voltage group
Threshold or undervoltage diagnostics V1 and V2	According to IEC 61131 24 VDC - 15 %, with an accuracy of 5 %
Power consumption	

Operating current (at 24 VDC nominal voltage) < 120 mA (outputs inactive)

Operating current	■ V1: 120180 mA
	V2: 9040 mA
	At 20 °C (operating temperature)
	V1: 24 VDC, 80 mA
	V2: 48 VDC, 20 mA
	V2: 24 VDC, 40 mA
	Operating conditions:
	All outputs active, no load
	Ethernet connection active
Sensor/actuator supply V _{AUX1}	X0X3: Supply from V1 short-circuit proof,
	120 mA per connector
Sensor/actuator supply V _{AUX2}	X4X7: Supply from V2 short-circuit proof, ir-
	reversible (melting fuse),
	rated current 5 A,
	tripping delay at 10 A: approx. 20 s
Potential isolation	Galvanic isolation from V1 and V2 voltage
	group, voltage proof up to 500 VDC
Connectors	
Power supply	M12, 5-pin, L coded
Ethernet	M12, 4-pin, D coded
Digital in-/outputs	M12, 5-pin, A coded
Motor channels	M12, 5-pin, B coded
Permissible torques	
Ethernet	0.6 Nm
I/O channels/supply	0.8 Nm
Mounting (M6 screws)	1.5 Nm
Max. line length	
Ethernet	100 m (per segment)



Technical data	
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, 192.168.1.254
Service interface	Ethernet via XF1 or XF2
Field Logic Controller (FLC)	
Released as of ARGEE version	3.2.217.0
Modbus TCP	
Address assignment	Static IP, 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 (TCP) connections	3
Number of Class 1 (CIP) connections	10
Input Assembly Instances	103
Output Assembly Instances	104
Configuration Assembly Instance	106
PROFINET	
PROFINET specification	V 2.35
Conformance Class	B (RT)
Address assignment	DCP
MinCycle Time	1 ms
Fast Start Up (FSU)	< 150 ms
Diagnostics	According to PROFINET alarm handling
Topology detection	Supported
Automatic address setting	Supported
Media Redundancy Protocol (MRP)	Supported
Network load class	3
Motor channels	
Number of channels	4
Interface	Interroll RollerDrive EC5000 BI (from firmware version V1.00.8)
Profile	CANopen Drives Profile



Technical data	
Digital inputs	
Number of channels	8
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 field bus communication)
Input delay	0.05 ms
Potential isolation	Galvanic isolation to P1/P2 voltage proof up to 500 VAC
Digital outputs	
Number of channels	4
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. 2.0 A per con- nector
Load type	EN 60947-5-1: DC-13
Potential isolation	Galvanic isolation to P1/P2 voltage proof up to 500 VAC
Mounting	
Type of mounting	Via 2 mounting holes, Ø 6.3 mm
Mounting distance (device to device)	 ≥ 50 mm Valid for operation in the ambient temperatures mentioned below, with sufficient ventilation as well as maximum load (horizontal mounting). At ambient temperatures of < 30 °C, the devices can also be mounted directly next to each other.
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



Technical data	
UL certificate	cURus Recognized Component E517268, IND.CONT.EQ For installation and use see "Conditions of Ac- ceptability".
General Information	
Dimensions (w \times l \times h)	60.4 × 230.4 × 39 mm
Operating temperature	-40 +70 °C
Storage temperature	-40 +85 °C
Operating height	Max. 5000 m
Degree of protection	IP65/IP67/IP69K
MTTF	130 years acc. to SN 29500 (Ed. 99) 20 °C
Housing material	PA6-GF30
Housing color	Black
Material window	Lexan
Material label	Polycarbonate
Halogen free	Yes

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.



15 Turck branches — contact data

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104

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