

BL20-E-GW-EC-20 Gateway for EtherCAT

Instructions for Use



Contents

1	About these Instructions		
	1.1	Target groups	4
	1.2	Explanation of symbols	4
	1.3	Other documents	4
	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
4	Product d	escription	8
	4.1	Device overview	8
	4.1.1	Block diagram	9
	4.1.2	Display elements	9
	4.1.3	Operating elements	9
	4.2	Properties and features	9
	4.3	Operating principle	10
	4.4	Functions and operating modes	10
	4.4.1	Module object directory	10
	4.4.2	EtherCAT functions	10
	4.5	Maximum configuration of a BL20 station with EtherCAT gateway	11
	4.6	BL20 accessories	13
5	Installing		15
	5.1	Mounting the gateway	16
	5.2	Mounting end bracket and end plate	17
6	Connectin	ng	18
	6.1	Connecting the power supply	18
	6.2	Connecting the device to the EtherCAT network	19
7	Commissi	oning	20
	7.1	Addressing a device on EtherCAT	20
	7.2	ESI files	21
	7.3	Connecting the device to an EtherCAT master with TwinCAT	21
	7.3.1	Connecting the device with the controller	22
	7.3.2	Installing ESI files	27
	7.3.3	Setting startup parameters	28
	7.3.4	Setting EtherCAT device parameters via the object dictionary	29
	/.3.5	Addressing a device via Explicit Device ID	30 21
	7.3.0 7.3.7	Addressing a device via Configured Station Alias	3 I 3 2
	1.2.1		22



	7.4	Connecting the device to an EtherCAT master with CODESYS	36	
	742	Connecting the device with the controller	38	
	7.4.3	Setting startup parameters	45	
	7.4.4	Setting EtherCAT device parameters via the object dictionary	47	
	7.4.5	Addressing a device via Explicit Device ID	49	
	7.4.6	Addressing a device via Configured Station Alias	50	
	7.5	Assigning an IP address for EoE	51	
	7.6	Loading the reference configuration into the gateway	56	
8	Paramete	rizing and Configuring	57	
	8.1	Modular device model/slot definition	57	
	8.2	Device area – Device Control (0xF200)	59	
	8.3	Device area – general device parameters (0xF800)	60	
	8.4	I/O channel parameters (Configuration Area, 0x80000x8FFF)	62	
9	Operating		63	
	9.1	Input Area, TxPDOs, 0x60000x6FFF	63	
	9.2	Output Area, RxPDOs, 0x70000x7FFF	63	
	9.3	LED displays	64	
	9.4	Device Area: Device Status (0xF100)	65	
	9.5	Device Area: Device Diagnosis (0xF110)	66	
	9.6	Diagnosis Data, 0xA0000xAFFF	66	
	9.7	Diag History Object (0x10F3)	67	
	9.8	Resetting the device (Reset)	70	
	9.8.1	Resetting the device via DIP switches	70	
	9.8.2	Resetting the device with Turck Service Tool	71	
	9.8.3	Resetting the device via Object Dictionary	71	
10	Maintena	nce	72	
	10.1	Carrying out the firmware update	72	
	10.1.1	Updating the firmware via TwinCAT	73	
	10.1.2	Updating the firmware via CODESYS	74	
11	Repair		75	
	11.1	Returning devices	75	
12	Dismount	ing the BL20 station from the DIN rail	75	
13	Disposal		75	
14	Technical	data	76	
15	Turck branches — contact data			



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.

These instructions describe the BL20 gateway for EtherCAT. The I/O modules of the BL20 system are independent of the fieldbus used and described in separate operating instructions.

1.1 Target groups

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

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

1.2 Explanation of symbols

The following symbols are used in these instructions:

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

1.3 Other documents

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

- Data sheet
- Instruction for use for BL20 I/O modules
- Declarations of conformity (current version)
- 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 second generation BL20 gateway for EtherCAT:

BL20-E-GW-EC-20 (ID 100037881)

2.2 Scope of delivery

The delivery consists of the following:

- BL20 gateway
- 2 × end bracket BL20-WEW-35/2-SW
- 1 × end plate BL20-ABPL
- Quick Start Guide

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.

The contact data for Turck branches is provided at [> 78].



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 BL20 gateway BL20-E-GW-EC-20 is part of the BL20 system. It forms the interface to an EtherCAT network and forwards the data collected from the field by BL20 I/O modules within the BL20 station to the higher-level EtherCAT master.

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.

3.3 Notes on UL approval

The connection lines must be designed for a temperature of at least 75 °C.



4 Product description

The components of the BL20 product series are designed with IP20 protection.

The BL20-E-GW-EC-20 EtherCAT gateway has two RJ45 sockets (XF1 EC IN and XF2 EC OUT) for the connection to EtherCAT. Two tension clamp terminals each are available for connecting system and load voltage.

DIP switches under the upper plug-in label of the gateway are used to set the EtherCAT device ID of the device.

4.1 Device overview



Fig. 1: Device overview BL20-E-GW-EC -20



Fig. 2: Top view BL20-E-GW-EC -20



4.1.1 Block diagram



Fig. 3: Block diagram BL20-E-GW-EC -20

4.1.2 Display elements

The device has the following LED indicators [> 64]:

- Gateway diagnostics
- I/O module diagnostics
- Station diagnostics
- EtherCAT connection

4.1.3 Operating elements

- DIP switches $2^0...2^7$ for setting the Identification Value (Device ID) [> 20]
- DIP switch "Mode" DIP switch "Mode" (in combination with DIP-switch 2⁵) for the factory reset [▶ 70]
- DIP switch "CFG" (without function)

4.2 Properties and features

- Shock and vibration tested
- Degree of protection IP20
- Gateway between BL20 system and EtherCAT
- 2 x RJ45 female connector for EtherCAT
- Push-in terminals for system and field supply
- EtherCAT slave according to Modular Device Profile
- Supported EtherCAT protocols CoE, EoE, FoE, AoE
- Transmission rate: EtherCAT standard
- Auto MDIX
- LEDs for displaying supply voltage, group and EtherCAT errors



4.3 Operating principle

BL20 gateways are the head of a BL20 station. They are used to connect the modular bus nodes to the higher-level fieldbus. All BL20 modules communicate via an internal module bus whose data is forwarded to the fieldbus via the gateway. This means that all I/O modules can be configured independently of the bus system.

The BL20 station is connected to an EtherCAT network as EtherCAT slave via the EtherCAT gateway BL20-E-GW-EC-20. During operation the process data is exchanged between EtherCAT and the BL20 system

4.4 Functions and operating modes

4.4.1 Module object directory

The object dictionary of the device contains the following object areas according to ETG 5001:

Index	Object dictionary area
0x00000x0FFF	Data Type area, according to ETG.5001.1
0x10000x1FFF	Communication area, according to ETG.5001.1
0x50000x5FFF	Configured Module ID (for internal use only, manufacturer specific)
0x60000x6FFF	Input Area (TxPDOs of the I/O modules) [63]
0x70000x7FFF	Output Area (RxPDOs of the I/O modules) [▶ 63]
0x80000x8FFF	Configuration Area (expected configuration of the I/O modules) [> 62]
0xA0000xAFFF	Diagnosis Data [🕨 66]
0xF0000xFFFF	Device Area Device Status [> 65] Device Control [> 59] Device Parameter [> 62]

4.4.2 EtherCAT functions

The device supports the following EtherCAT communication profiles:

- CoE (CAN Application Protocol over EtherCAT): The object dictionary is provided via the CoE interface. The object dictionary contains all device-specific parameters.
- EoE (Ethernet over EtherCAT): The standard Ethernet protocol is tunneled via the EoE communication protocol. An IP address for EoE can be assigned to the device so that the device can be configured via the the web server.
- FoE (File Access over EtherCAT): The firmware update is carried out via the FoE communication protocol.
- AoE (ADS over EtherCAT): The AoE communication protocol is used to read or write device data acyclically, e.g. from connected IO-Link devices.



4.5 Maximum configuration of a BL20 station with EtherCAT gateway

The following limits must be observed when configuring a BL20 station with BL20-E-GW-EC-20:

Max. station lengths (FW version V 1.0.0.0)	32 modules
Max. size of input data	1024 byte
Max. size of output data	1024 byte
Max. current consumption of the I/O modules from the module bus	700 mA (provided by the gateway)



NOTE

When operating the gateway on a TwinCAT controller:

 Observe the limitation of the maximum number of startup parameters (max. 849 entries per EtherCAT device).

The following table shows a list of I/O module data widths, the number of startup parameter bytes, and the nominal current consumption of the I/O modules from the module bus.

Module type	ID	Data width		Current	No. of start-up
		Input	Output	consumption	parameters
Digital input modules					
BL20-2DI-120/230VAC	6827011	1	-	≤ 28 mA	1
BL20-4DI-24VDC-N	6827013	1	-	≤ 28 mA	1
BL20-4DI-24VDC-P	6827012	1	-	≤ 28 mA	1
BL20-4DI-NAMUR	6827212	1	-	≤ 40 mA	33
BL20-E-8DI-24VDC-P	6827227	1	-	≤ 15 mA	1
BL20-E-16DI-24VDC-N	100000542	2	-	≤ 35 mA	1
BL20-E-16DI-24VDC-P	6727231	2	-	≤ 15 mA	1
Digital output modules					
BL20-2DO-120/230VAC-0.5A	6728137	-	1	≤ 35 mA	1
BL20-2DO-24VDC-0.5A-N	6728024	-	1	≤ 32 mA	1
BL20-2DO-24VDC-2A-P	6728026	-	1	≤ 33 mA	1
BL20-2DO-R-CO	6728030	-	1	≤ 28 mA	1
BL20-2DO-R-NO	6728029	-	1	≤ 28 mA	1
BL20-4DO-24VDC-0.5A-P	6728023	-	1	≤ 30 mA	1
BL20-E-8DO-24VDC-0.5A-P	6728226	-	1	≤ 15 mA	1
BL20-E-8DO-24VDC-0.5A-P/ET	100000400	-	1	≤ 15 mA	1
BL20-E-16DO-24VDC-0.5A-N	100000543	-	2	≤ 25 mA	1
BL20-E-16DO-24VDC-0.5A-P	6727230	-	2	≤ 25 mA	1
Analog input modules					
BL20-2AIH-I	6827331	24	-	≤ 30 mA	21
BL20-2AI-I(0/420MA)	6827021	4	-	≤ 35 mA	10
BL20-2AI-PT/NI-2/3	6827017	4	-	≤ 45 mA	14
BL20-2AI-THERMO-PI	6827020	4	-	≤ 45 mA	11
BL20-2AI-U(-10/0+10VDC)	6827022	4	-	≤ 35 mA	10
BL20-4AI-U/I	6827217	8	-	≤ 50 mA	26
BL20-E-4AI-TC	6827367	8	-	≤ 50 mA	17



Module type	ID	Data width		Current	No. of start-up
		Input	Output	consumption	parameters
BL20-E-4AI-TC/ET	100007647	8	-	≤ 50 mA	17
BL20-E-8AI-U/I-4PT/NI	6827325	16	-	≤ 35 mA	25
BL20-E-8AI-U/I-4PT/NI/ET	6827340	16	-	≤ 35 mA	25
Analog output modules					
BL20-2AOH-I	6827332	16	4	≤ 30 mA	23
BL20-2AO-I(0/420MA)	6827034	-	4	≤ 40 mA	13
BL20-2AO-U(-10/0+10VDC)	6827033	-	4	≤ 43 mA	7
BL20-E-4AO-U/I	6827328	-	8	≤ 50 mA	21
BL20-E-4AO-U//ET	6827397	-	8	≤ 50 mA	21
Technology modules					
BL20-E-1CNT	100037880	8	8	≤ 40 mA	25
BL20-1RS232	6827169	8	8	≤ 140 mA	10
BL20-1RS485/422	6827165	8	8	≤ 60 mA	11
BL20-1SSI	6827166	8	8	≤ 50 mA	7
BL20-2RFID-S	6827306	24	24	≤ 30 mA	15
BL20-E-2CNT-2PWM	6827341	24	24	≤ 50 mA	44
BL20-E-4IOL	6827385	16	16	≤ 40 mA	49
BL20-E-4IOL-10	100001334	32	32	≤ 40 mA	53
BL20-E-3EMM-CT	100027913	32	32	≤ 55 mA	50
BL20-E-3EMM-RC	100027914	32	32	≤ 55 mA	49
Power supply modules					
BL20-BR-24VDC-D	6827006	-	-	-	1
BL20-PF-120/230VAC-D	6827007	-	-	≤ 25 mA	1
BL20-PF-24VDC-D	6827008	-	-	≤ 28 mA	1
Special modules					
empty slot	-	-	-	-	1
undefined module	-	-	-	-	1
unsupported module	-	-	-	-	1



4.6 BL20 accessories

Figure	Туре	ID	Description
A Contraction of the second se	BL20-ABPL	6827123	End plate Mechanical end of BL20 station to the right, 2 pieces
8	BL20-WEW-35/2-SW	6827124	End bracket black Mechanical fixation of BL20 station, 10 pieces
	BS3511/KLBUE4-31.5	6827342	Shielding terminal
	ZBW5	6827129	Tension spring tool
	BL20-LABEL/SCHEIBE	6827070	Labels for electronic modules in slice design, $3 \times DIN A5$ sheet, slice, pre-perforated (laser printing), 3×19 labels



Figure	Туре	ID	Description
> >	BL20-ANBZ		Color coding for clear potential identification of the connection level on the base modules:
	BL20-ANBZ-BL	6827072	10 imes strip of 6, blue
<u>></u>	BL20-ANBZ-RT	6827073	$10 \times strip of 6, red$
	BL20-ANBZ-GN	6827074	10 $ imes$ strip of 6, green
	BL20-ANBZ-SW	6827075	$10 \times strip of 6$, black
	BL20-ANBZ-BR	6827076	10 × strip of 6, brown
	BL20-ANBZ-RT/BL-BED	6827077	$10 \times strip of 6, red/blue$
	BL20-ANBZ-GN/GE-BED	6827078	$10 \times strip of 6, green/yellow$
	BL20-ANBZ-WS	6827079	10 $ imes$ strip of 6, white
	BL20-QV/		Cross connector relay (QVR) For bridging the 4th connection level (14/24) for base modules for relays (10 pieces)
	BL20-QV/1	6827104	1 grid
	BL20-QV/2	6827105	2 grid
	BL20-QV/3	6827106	3 grid
	BL20-QV/4	6827107	4 grid
	BL20-QV/5	6827108	5 grid
	BL20-QV/6	6827109	6 grid
	BL20-QV/7	6827110	7 grid
	BL20-QV/8	6827111	8 grid



5 Installing



DANGER

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

- Only install the device if there is no potentially explosive atmosphere present.
- Disconnect and connect circuits only when no voltage is present.
- Only actuate the switches when there is no voltage present.
- Observe the Ex approval requirements.



WARNING

Open electrical contacts

Danger to life due to electric shock when using 120/230 V

- Cover open contacts on the last base module of each station with end plate or place a power feeding module (24 V) to form a new potential group.
- A BL20 station consists of at least one gateway and one electronic module.
- A BL20 station must be fixed securely onto the mounting rail using two end brackets (BL20-WEW-35/2-SW).
- The BL20 station can be mounted vertically or horizontally.
- For vertical installation, the gateway can be positioned either above or below. In this case, sufficient ventilation and heat dissipation must be ensured.
- Keep space to the left of the gateway free for the first end bracket.
- Mount the end plate after the last BL20 module.
- The gateway is the first electronics component on a BL20 station.
- The gateway is followed by the I/O modules in any order.
- Power Feeding and Bus Refreshing modules are used for potential separation and can be mounted between the other modules if necessary.
- If required, potential distribution modules can be used. A maximum of two potential distribution modules may be mounted directly next to each other.
- Protect the installation site against heat radiation, rapid temperature fluctuations, dust, dirt, moisture and other environmental influences.



Mounting the DIN rail

Recommendation for mounting the BL20 system on a DIN rail in the control cabinet:

Mount the DIN rail on a rust-proof, electrically conductive mounting plate. A reference potential for protective and functional earth can be established through the mounting plate.

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

- Steel and stainless steel: min. 2 mm
- Aluminum: min. 3 mm
- Fasten the DIN rail to the mounting plate using suitable rivets (A) or screws (B) as shown in the figure below. The choice of rivets or screws depends on the condition of the mounting plate.
- When mounting several DIN rails on top of each other: ensure sufficient distance between the top-hat rails (C). The arrangement of the components in the control cabinet depends on the application.
- Keep a distance of min. 10 mm to passive components.
- Keep a distance of min. 75 mm to active components.



Fig. 4: DIN rail mounting

5.1 Mounting the gateway

- The DIN rail must already be mounted.
- An end bracket must be mounted in front of the gateway. The end bracket can be mounted at the beginning or after the complete station has been mounted.
- The gateway is the first electronic element of each BL20 station.
- Hang the groove of the gateway into the DIN rail from below.
- Turn the upper end of the gateway to the rear.
- Press the gateway against the DIN rail until the latching hook audibly engages.



5.2 Mounting end bracket and end plate

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

Mounting the end bracket in front of the gateway

- ▶ If necessary, loosen the screw in the end bracket.
- Snap the end bracket onto the DIN rail on the left of the gateway.
- Push the end bracket close to the gateway.
- Screw the end bracket tight.

Mounting the end plate

- If necessary, loosen the screw in the end bracket.
- Insert the end bracket into the recess provided in the end plate.
- The end bracket and end plate should be held so that the connectors on the end plate are facing the last module of the BL20 station.
- Snap the end plate with the end bracket onto the mounting rail.
- Press the end plate with the end bracket tightly against the last module of the BL20 station.
- Insert the connectors of the end plate firmly into the recesses of the module.
- Screw the end bracket tight (through the end plate).



6 Connecting

6.1 Connecting the power supply

The device has push-in terminals for connecting the supply voltages.

The system supply U $_{\rm sys}$ supplies the gateway and the I/O modules. The field supply U $_{\rm L}$ supplies the connected sensors and actuators.



Fig. 5: Direct plug-in contacts for connecting the supply voltages

- Connect the device to the supply voltage according to the connection diagram.
- Insert the conductor into the respective contact. If rigid conductors or flexible conductors with ferrules are used, no tool is required.
- ► For flexible conductors without ferrules: Open the spring by pressing on the spring opener with the screwdriver and insert the conductor.



Fig. 6: Push-in terminals for voltage supply

Clampable conductors

Technical data			
Insulation stripping length	8 mm		
Max. clamping range	0.21.5 mm ²		
Clampable wires (cross section)			
Rigid	0.21.5 mm ²		
Flexible	0.21.5 mm ²		
Flexible with ferrule without plastic sleeve	0.21.5 mm ²		
Flexible with ferrule with plastic sleeve	0.20.75 mm ²		
Wire cross section AWG	2416		



Initial commissioning without field supply U_L

If the field supply U_L is not connected for initial commissioning of a plant, certain I/O modules (z. B. BL20-2RFID-S) are not recognized by the gateway.

▶ Read the BL20 station again after switching on U_L.

6.2 Connecting the device to the EtherCAT network

For connection to the Ethernet-based EtherCAT fieldbus system, the device has two standard RJ45 female connectors.



Fig. 7: RJ45 female connector for EtherCAT

Connect device to EtherCAT via standard Ethernet cables with RJ45 connector according to the pin assignment below.



Fig. 8: Pin assignment RJ45 female connectors



7 Commissioning

7.1 Addressing a device on EtherCAT

EtherCAT uses an implicit addressing of the network nodes. The EtherCAT master automatically addresses all connected slaves. A manual addressing or identification is only required for e.g. tool change applications (Hot Connect).

The device supports the following EtherCAT identification options for hot connect applications:

- Explicit Device Identification (ADO 0x0134): The device address (Identification Value) is set via the rotary coding switches (0...0x0FFF).
- Configured Station Alias (ADO 0x0012): The device address (Identification Value) is written via the EtherCAT master to the device.



NOTE

The device addressing is supported via a data word and not by the devices.

Explicit Device Identification

The Identification Value (Device ID) can be set via eight DIP switches $(2^0...2^7)$ and the DIP switch "Mode" = "off" on the device. The DIP-switches are located under the upper label of the gateway. In the delivery state, the DIP switches are set to switch position "0".

- Pull the upper label upwards out of the housing.
- ✓ DIP switch "Mode" is set to "off".
- Set the DIP switches to the required position. Example: Device ID 50 = 0x32 = 00110010 (2⁷...2⁰)



Fig. 9: Setting the Device ID, e.g. Device ID: 50 (0x32) 50 (0x32)

Start the device.

If the DIP switch "Mode" is set to "on" during device startup or during operation, the Device ID of the gateway is set to 0.

Configured Station Alias

The value for the Identification Value is written to the device via register 0x0012 of the Ether-CAT master.



7.2 ESI files

Depending on the used controller, different ESI files must be used.

Controller/engineering tool	ESI file
TwinCAT	Turck_BL20-E-GW-EC-20_R1_ESIxml
CODESYS	Example: Turck_BL20-E-GW-EC-20_R1_ESI_1-3_20221116_8723.xml
Sysmac Studio	Turck_BL20-E-GW-EC-20_R1_ESIomronxml Example: Turck_BL20-E-GW-EC-20_R1_ESI_1-3_omron_20221116_8723.xml

Turck provides the current ESI files for download free of charge at www.turck.com .

7.3 Connecting the device to an EtherCAT master with TwinCAT

Used hardware

The following hardware components are used in this example:

- EtherCAT PLC CX5120 from Beckhoff Automation
- BL20-E-GW-EC-20 with the following I/O module list:
 - BL20-E-16DI-24VDC-P
 - BL20-E-16DI-24VDC-N
 - BL20-E-4IOL
 - BL20-E-16DO-24VDC-0.5A-P
 - BL20-E-4AO-U/I
 - BL20-E-4AI-TC
 - BL20-E-8DO-24VDC-0.5A-P
 - BL20-E-16DI-24VDC-P
 - BL20-2AIH-I

Used Software

The following software tools are used in this example:

- TwinCAT V3.1.0
- ESI file for BL20-E-GW-EC-20 (available as a free download at www.turck.com)



7.3.1 Connecting the device with the controller

- Select used EtherCAT master as target system.
- Scanning the network for EtherCAT stations: Right-click $I/O \rightarrow Devices$.

Click Scan.	
-------------	--

Solution Explorer		-	ų×				
G O 🟠 🛗 - 🗌	`o - 🗗 🏓 🗕						
Search Solution Explorer (Ctrl+ü)							
Image: Solution 'BL20-E Image: Solution 'BL20-E-GW-E Ima	-GW-EC-20' (1 project) :C-20 CS						
▶ **• Device **• *• *•	Add New Item Add Existing Item Add New Folder	lns Shift+Alt+A					
	Export EAP Config File						
100	Scan						
â	Paste Paste with Links	Ctrl+V					

Fig. 10: Scanning for devices



- All EtherCAT nodes (master and devices) are read in and automatically added to the I/O configuration. The BL20-E-GW-EC-20 appears in the Solution Explorer under the Ether-CAT master as Box 4 (BL20-E-GW-EC-20).
- ⇒ The scanned BL20 station shows all I/O modules with process data in the order in which they are plugged into the station. Modules without process data are not listed.



Fig. 11: EtherCAT device as Box 4 in the Solution Explorer



Link at least one variable to be able to go online with the device.



Fig. 12: Example of the linking of a variable

Click the Activate configuration button.

<u>F</u> ile	<u>E</u> dit	<u>V</u> iew	<u>P</u> roject	<u>B</u> uild	<u>D</u> ebug	Т
) G	- ©	む-	*a - 當		1 X D	ĉ
i Bu	ild 4022	2.32 (Loa	ded) 🔹	÷ 🗜	*	¢.

Fig. 13: Activating the configuration

- ⇒ The device configuration is activated.
- Click the Run mode button.

<u>F</u> il	e	<u>E</u> dit	<u>V</u> iew	<u>P</u> roj	ect	<u>B</u> uild	De	ebug	Т
200	G	- 0	わ・	* <u>n</u> -	2	H 🗳	X	ŋ	ĉ
33	Bui	ld 4022.	32 (Loa	ded)	• ;	- Č 🞼	*	蓉	¢

- Fig. 14: Run mode
- ⇒ The device is connected online with the EtherCAT master.



- Double-click Box 4 (BL20-E-GW-EC-20).
- ➡ The current status (here: OP) as well as the data points and the link are shown on the Online tab.



Fig. 15: EtherCAT Device, Online tab: status display (here: Operational), data points, link



Double-clicking the EtherCAT master causes the states of all connected devices to be displayed on the **Online** tab.



Fig. 16: EtherCAT Master, Online tab: status display of all connected devices

The following states are possible:

- Init: device starts, no SDO and no PDO transfer
- Pre-operational (Pre-Op): SDO transfer, no PDO transfer
- Safe-operational (Safe-Op): SDO and PDO transfer (input data)
- The input data is updated cyclically, all outputs of the slaves are switched to the safe state.
- Operational (Op): SDO and PDO transfer, input and output data valid
- Bootstrap: Firmware update can be executed



7.3.2 Installing ESI files

The device is connected to the Beckhoff controller with an xml file, the EtherCAT Slave Information (ESI). The device description file must be saved in TwinCAT Studio V3 for the connection. The ESI file for the device is available free of charge for download from www.turck.com.

Storing an xml file in the installation directory: TwinCAT \rightarrow 3.1 \rightarrow Config \rightarrow Io \rightarrow EtherCAT.

 Image: Second system
 TwinCAT ▶ 3.1 ▶ Config ▶ Io ▶ EtherCAT ▶

 Name
 Image: Second system

 Image: Second system
 Image: Second system

 Image: S

Fig. 17: TwinCAT, storing an xml file in the installation directory

- Launch TwinCAT Studio.
- Create a new project.
- ► Updating the device catalog: TwinCAT → EtherCAT Devices → Reload Device Descriptions.
- ⇒ The device description is loaded.



Fig. 18: TwinCAT, updating the device catalog



7.3.3 Setting startup parameters

Example: Deactivate load voltage diagnostics

- ▶ In the project tree double-click **Box 4 (BL20-E-GW-EC-20)**.
- Select the **Startup** tab.
- Double-click CoE index 0xF800:07 "Deactivate load voltage diagnostics".
- In the submenu Edit CANopen startup entry double click on Deactivate load voltage diagnostics.
- ▶ In the Set Value Dialog sub menu, enter the value 1 = yes.
- Confirm with **OK**.

neral E	therCAT Proces	s Data Plc	Slots Startup CoE - Online AoE - Online Diag History Online	
Transitio	n Protocol	Index	Data Comment	^
A <ip.< td=""><td>PS> AoE</td><td>1/3</td><td>05 44 C0 FC 02 08 AoE Init Cmd (download NetId)</td><td></td></ip.<>	PS> AoE	1/3	05 44 C0 FC 02 08 AoE Init Cmd (download NetId)	
C IP	CoE	0xF800:01	no (0) Deactivate all diagnostics	
CIP	CoE	0xF800:02	Set to 0 (0) Output behavior at communication loss	
CIP	CoE	0xF800:03	no (0) Deactivate Webserver	
C IP	CoE	0xF800:07	no (0) Deactivate load voltage diagnostics	
C IP	CoE	0xF800:08	Set to 0 (0) Outo. behav. if I/O config diff.	
C IP			Edit CANopen Startup Entry	
CIP				
CIP	Transition		OK	
CIP	✓ I -> P		Index (hex: f800	
CIP	PAS	DSAR	Cub Index Idea)	
CIP			Sub-Index dec): 7	
CIP	□ S -> O	🗌 0 -> S	Validate Complete Access	
CIP				
	Data (hexbin):	00	Hex Edit	
	Validate Mask:			
CIP	<u> </u>			
CIP	Lomment:	Deactivate	bad voltage diagnostics	
CIP				
CIP	Index	Name	Set Value Dialog	
CIP	Ē F800:0	Device Para		
CIP	F800:01	Deactivate .		
CIP	F800:02	Output beha		
CIP	F800:03	Deactivate ¹	Hex: 0x01 Cancel	
CIP	F800:07	Deactivate I	Enum: ues	
CIP	F800:08	Outp. behav	no 100	
CIP	F800:09	Outp. behav	yes	
CIP	F800:04	 Startup if co 	Book 0 1 Hex Edit.	
CIP	F800:00	Suppress Fc		
CIP	F800:0E) res.	Binary: 01	
CIP			Bit Size: 1 8 16 32 64 7 	
				~
Move	<		>	Edit.

Fig. 19: TwinCAT: setting startup parameters

⇒ The load voltage diagnostics are activated.



7.3.4 Setting EtherCAT device parameters via the object dictionary



Turck recommends only making changes in the startup parameters.

- ▶ In the project tree double-click **Box 4 (BL20-E-GW-EC-20)**.
- Select the **CoE Online** tab.
- ⇒ The Object Dictionary with the parameters (Configuration Data, from index 0x8020) of all BL20 I/O modules present in the BL20 station is displayed. The data appears in the order in which the I/O modules are plugged into the BL20 station

PILE EDIT VIEW PROJECT BUDD Deb00 VIENCAT TWINCAT TWINSAFE PIC PIC PICON <th>Q 👂 🗕 🗖</th> <th>Quick Launch (Ctrl+Q)</th> <th>7 8</th> <th></th> <th></th> <th></th> <th>BL20-E-GW-EC-20 - TcXaeShell</th>	Q 👂 🗕 🗖	Quick Launch (Ctrl+Q)	7 8				BL20-E-GW-EC-20 - TcXaeShell
Solution Style-F-GW-EC-20 Solution St			LP	WINDOW HELP	M SCOPE TOOLS	ISAFE PLC TEA	FILE EDIT VIEW PROJECT BUILD DEBUG TWINCAT TWIN
Build 4024.11 (Loaded) Build 4024.11 (Loaded) C Build 4024.11 (Loaded) C C Solution Explorer C Solution Explorer (Cth+u) C Solution Subce-FGW-EC-20 (1 project) Solution Build-E-GW-EC-20 Solution Build-E-GW-EC-	- 🔽 🎤	program		Attach 👻	RT (x64) 🔹 🕨	se 👻 TwinCAT	🔋 🖸 - 🖸 🔁 - 🎦 - 🔄 🔛 📲 🐰 🗗 🗂 ث - 🤆 - Releas
Solution Explorer Image BL20-E-GW-EC-20 + X MM Search Solution Explorer (Ctrl+0) Pic Advanced Advanced Advanced Solution Explorer (Ctrl+0) Pic Advanced Advanced Advanced Solution Explorer (Ctrl+0) Pic Advanced Image Image Image Solution Explorer (Ctrl+0) Pic Advanced Image Image Image Solution Explorer (Ctrl+0) Pic Advanced Image I	► = < + + + + +	0 • 1 • 🛃 🕨	BL20-E-GW-EC-20	• _₹ 8 BI	- CX-44C0FC	BL20-E-GW-EC-20	🖇 Build 4024.11 (Loaded) 🕒 🚽 🔛 🌆 📕 🥔 🔨 🛞 🙀 🏍
Search Solution Explorer (Ctrl+0) P Solution Explorer (Ctrl+0) P Search Solution Explorer (Ctrl+0) P	MAIN 🗯				+ ×	BL20-E-GW-EC-20	Solution Explorer 👻 👎 🗙
Search Solution Explorer (Ctr+=0) ♪ Solution B20-E-GW-EC-20 (1 project) Advanced MOTION SYSTEM MOTION B120-E-GW-EC-20 Project MOTION B120-E-GW-EC-20 Instance PICTask Inputs B100-E-GW-EC-20 Project MAINLbSyncVarin B100-E-GW-EC-20 Instance PICTask Outputs B100-E-GW-EC-20 Instance MOTION B100-E-GW-EC-20 Instance PICTask Outputs B100-E-GW-EC-20 Instance MOTION B100-E-GW-EC-20 Instance MOTION B100-E-GW-EC-20 Instance PICTask Outputs B100-E-GW-EC-20 Instance SAFETY Geologo Inputs B120-E-400-P 16 MOTION PICTask Outputs B100-E-400-P 16 MOTION MAINLbSyncVarin B100-E-400-P 16 MOTION MAINLOSONCUP S16 E	е	Online Diag History Online	oE - Online AoE - Onlin	lots Startup CoE	F Process Data Plc	General EtherCA	○ ○ 🏠 🛱 - [™] ⊙ - ☞ 🗲 🗕
↓ Solution 'BL20-E-GW-EC-20 ('1 project) ↓ BL20-E-GW-EC-20 ↓ SystEM △ Motion ▲ BL20-E-GW-EC-20 ↓ BL20-E-GW-EC-20 ↓ BL20-E-GW-EC-20 ↓ BL20-E-GW-EC-20 ↓ BL20-E-GW-EC-20 ↓ BL20-E-GW-EC-20 Project ↓ BL20-E-GW-EC-20 Instance ↓ PICTask Inputs ⊕ PICTask Inputs ⊕ MolNLbSyncVarin ↓ E0000 ⊕ PICTask Outputs ⊕ C++ @ ANALYTICS ↓ E0000 ↓ Device 1 (EtherCAT) ⊕ Buzote 1 (EtherCAT) <td></td> <td>_</td> <td></td> <td></td> <td></td> <td></td> <td>Search Solution Explorer (Ctrl+ü)</td>		_					Search Solution Explorer (Ctrl+ü)
Advanced		Data	te 🔄 Show Offline Data	e ⊻ Single Update	st Auto Upda	Update L	Solution 'BL20-E-GW-EC-20' (1 project)
Add to Startup Online Data Module OD (Ao E Port): Image MOTION Index Name Rags Value Unit Mallabs/ncVarin Index Store S						Advanced	A 📰 BL20-E-GW-EC-20
MOTION Index Name Flags Value Unit Image BL20-E-GW-EC-20 5060 Configured Module ID M RW 0x0003005 (19673) Image BL20-E-GW-EC-20 Instance 5060 Configured Module ID M RW 0x0003004 (19624) Image PICTask Inputs 5090 Configured Module ID M RW 0x0003004 (19624) Image PICTask Inputs 5090 Configured Module ID M RW 0x0003004 (19624) Image PICTask Inputs 5090 Configured Module ID M RW 0x0003004 (19624) Image Image Foldo Configured Module ID M RW 0x0003004 (19624) Image Image Foldo Image Image Image Foldo Image Image Image Image Image Image Image Image Image Image Image Image Image Image Image Image Image Image Image Image Image Image Image Image Image Image Image Imag		0	OD (AoE Port): 0	Module OE	un Online Data	Add to Start	SYSTEM
▲ ● PLC Name Rags Value Unit ● BL20-E-GW-EC-20 5050 Configured Module ID M RW 0x00030059 (196713) ● BL20-E-GW-EC-20 Instance 5070 Configured Module ID M RW 0x00030074 (196724) ● BL20-E-GW-EC-20 Instance 5070 Configured Module ID M RW 0x00030040 (196684) ● PLCTask Inputs ● 6000.0 Inputs BL20-E-IBD-24VDC-P > 16 <		5			orinine Data	Add to Start	MOTION
▲ Bl20-E-GW-EC-20 5060 Configured Module ID M RW 0x00030059 (196713) ▶ Bl20-E-GW-EC-20 Instance 5070 Configured Module ID M RW 0x00030030 (196556) ▲ Bl20-E-GW-EC-20 Instance 5080 Configured Module ID M RW 0x00030030 (196556) ▲ Bl20-E-GW-EC-20 Instance 5080 Configured Module ID M RW 0x00030030 (196556) ▲ Bl20-E-GW-EC-20 Instance 5080 Configured Module ID M RW 0x0003004C (196684) ■ PlcTask Inputs 5080 Configured Module ID M RW 0x0003004C (196684) ■ PlcTask Outputs ⊕ 600:00 Inputs BL20E-E16DI-24VDC-P > 16 <	Unit ^	Unit	s Value	Flags	Name	Index	PLC
→ ■ BL20-F-GW-EC-20 Project - 5000 Configured Module ID M RW 0x00030024 (196724) → ■ BL20-F-GW-EC-20 Instance - 5000 Configured Module ID M RW 0x00030024 (196724) → ■ PLCTask Inputs - 5000 Configured Module ID M RW 0x00030024 (196724) → ■ PLCTask Inputs - 5000 Configured Module ID M RW 0x00030024 (196724) → ■ PLCTask Inputs - 5000 Configured Module ID M RW 0x00030024 (196724) → ■ PLCTask Inputs - 5000 Configured Module ID M RW 0x00030024 (196724) → ■ PLCTask Inputs - 6000.0 Inputs BL20E-E16DI-24VDC-P > 16 <		169 (196712)	W 0-00020069 (M DW	Configured Medule ID	5000	BL20-E-GW-EC-20
■ BL20-E-GW-EC-20 Instance ■ Gorigued Module ID M RW Mc0003004 (196556) ■ PICTask Inputs ■ 5000 Configued Module ID M RW Mc0003004 (196556) ■ MAIN.bSyncVarin ■ 6000.0 Inputs BL20-E-I6DI-24VDC-P > 16 <		105 (196713)	W 0x00030063(MRW	Configured Module ID	5070	BL20-E-GW-EC-20 Project
→ PICTask Inputs 3000 Configuet Module ID M RW Mc0003004C (19604) → MAINLbSyncVarin ⊕ 6000.0 Inputs BL20E-16DI-24VDC.P > 16 <		120 (196656)	W 0×00030074 (MINW	Configured Module ID	5090	BL20-E-GW-EC-20 Instance
MAINJSyncVarin B 0000_0 Inputs BL20E-16D1/24VDC-P > 16 <		14C (196684)	W 0x00030030 (MRW	Configured Module ID	5090	PicTask Inputs
▶ ■ PicTask Outputs + 6010.0 inputs BL20E-16D1-24VDC-N > 16 <		10 (100004)	> 16 <	.P	Inputs BI 20-E-16DI-24VD	E 6000-0	MAIN.bSyncVarin
SAFETY ⊕ 6020.0 hputs BL20E-440L > 23 <			> 16 <	-N	Inputs BI 20-E-16DI-24VD	÷- 6010:0	PicTask Outputs
C++			> 23 <		Inputs BL20-E-4IOL	+ 6020:0	(3) SAFETY
▲ NALYTICS			>4<		Inputs BL20-E-4AI-TC	÷ 6050:0	C++
Image Image <t< td=""><td></td><td></td><td>> 16 <</td><td>-P</td><td>Inputs BL20-E-16DI-24VD</td><td></td><td></td></t<>			> 16 <	-P	Inputs BL20-E-16DI-24VD		
Image Image <t< td=""><td></td><td></td><td>> 38 <</td><td></td><td>Inputs BL20-2AIH-I</td><td></td><td></td></t<>			> 38 <		Inputs BL20-2AIH-I		
▲ ■ Device 1 (EtherCAT) ● 7030.0 Outputs BL20E-16D0-24VDC-0.5A-N > 16 <			> 16 <		Outputs BL20-E-4IOL		A C Devices
Image Image Image >7040.0 Outputs BL20-E4A0-U/l > 4 <			> 16 <	DC-0.5A-N	Outputs BL20-E-16DO-24		■ Devices
Image-Info Image-Info Outputs BL20-E8D0-24VDC-0.5A-P > 8 <			> 4 <		Outputs BL20-E-4AO-U/I		Device ((Line CAT)
Image-initio Image-initio Image-initio > 8020:0 Configuration Data BL20-E4I/0L > 48 <			> 8 <	C-0.5A-P	Outputs BL20-E-8DO-24V		t∎ Image_Info
Image: Synthetics			> 48 <	4IOL	Configuration Data BL20-E	. € 8020:0	■ mage-mo
Imputs			> 20 <	4AO-U/I	Configuration Data BL20-E	E 8040:0	b b lapute
Image: Support Image:			> 20 <	4AI-TC	Configuration Data BL20-E		P inputs
Biggi: 100 at a Biggi:			> 56 <	JH-I	Configuration Data BL20-2	8090:0	V use outputs
			no (0)	In-Ch1 RW	Deactivate channel Analo	8090:01	V i InioData
8090:02 Activate overcuir, diagn Analog In-Ch1 RW yes (1)			yes (1)	alog In-Ch1 RW	Activate overcurr. diagn A	8090:02	P = Perr 4 (PL200)
P B090:03 Activate wire break diagn. Analog In RW yes (1)			yes (1)	inalog In RW	Activate wire break diagn.	8090:03	BOX 4 (BL20-E-GW-EC-20)
BugDings		HART active (2)	420 mA HAF	h1 RW	Operation mode Analog In	8090:04	Iniappings Iniappings Iniappings
BL20-E-GW-EC-20 instance - Gerat I (EtherCAT) I - 8090/07 Activate HAR1 diagnostics Analog in RW yes (0)		(0)	yes (U)	Analog In KW	Activate HART diagnostic	8090:07	BL20-E-GW-EC-20 Instance - Gerat T (EtherCAT) T
SUSUUS Data representation Analog in-Cn 1 KW 15 bit + sgn (U)		gn (U)	15 bit + sign (L	In-Chi RW	Data representation Analo	8090:08	
8000-11 Deactivate channel Analog m-Cr2 KW no (U)			no (U)	alog lo.Ch2 RW	Activate overour dises A	8090:0F	
			yes (1)	inginituriz NW	Activate wire break disco	8000-11	
Signature and a stand a s		HART active (2)	4 20 m 4 H 4F	haogint RW	Operation mode Apalog In	8090-12	
Support S Activate HART diagnostics Analog In- RW ves (0)		in an deave (c)	ves (0)	Analog In- RW	Activate HART diagnostic	8090-15	
809-116 Data representation Analog in Ch2 W 15.6# + sice (0)		ian (0)	15 bit + sign (0	In-Ch2 RW	Data representation Analo	8090-16	
8090:1D Mapped channel VA RW channel 1(0)	~	I (0)	channel 1 (0)	RW	Mapped channel VA	8090:1D	
			2.10111011 (0)				

Fig. 20: CoE-Online, Object Dictionary

The display of the parameters depends on the device configuration. By double-clicking in the **Value** column, the parameters can be changed.



NOTE

The changing of parameters during the runtime can cause a faulty configuration of the device.

- Single Update (recommended): The directory is updated once if a parameter was changed.
- Auto Update: The directory is updated continuously.



7.3.5 Addressing a device via Explicit Device ID

- ► In the project tree double-click **Box 4 (BL20-E-GW-EC-20)**.
- ► Avtivate EtherCAT → Advanced settings → General → Identification → Explicit Device Identification (ADO 0x0134).
- ▶ In the Value field enter the Identification Value (hex.) which must match the rotary coding switches on the device (see [▶ 20]).
- Confirm entries with OK.
- Carry out a voltage reset.

General EtherCAT Process D Type: BL20-EC Product/Revision: 1000378 Auto Inc Addr: FFFE EtherCAT Addr: 1003 Identification Value: 0 Previous Port: Term (E	ata Pic Slots Startup CoE - Online AoE - Online Diag History Online SW-EC-20 81 / 1 Advanced Settings K1110) - B X1 OUT V
General Behavior - Timeout Settings - Identification - FMMU / SM - Init Commands Distributed Clock - ESC Access	Identification Identification ADO Configured Station Alias (ADO 0x0012) Exclicit Device Identification (ADO 0x00134) Otata Word (2 Bytes) ADO (hex): [bd0134]

Fig. 21: TwinCAT – Select Explicit Device Identification



7.3.6 Addressing a device via Configured Station Alias

- ► In the project tree double-click **Box 4 (BL20-E-GW-EC-20)**.
- Activate EtherCAT tab \rightarrow Advanced settings \rightarrow General \rightarrow Identification \rightarrow Configured Station Alias (ADO 0x0012).
- Confirm the entry with **OK**.

General EtherCAT Type: Product/Revision: Auto Inc Addr: EtherCAT Addr:	Process Data Plc Slots Startup CoE - Online AoE - Online Diag History Online BL20-E-GW-EC-20 100037881 / 1 FFFE 1003 Advanced Settings 0	
Previous Port:	Tem (EK1110) - B X1 OUT	×
General Behavior Timeout Set Identificatio FMMU / SM Init Comma ֎- Mailbox ⊕- Distributed Clou ⊕- ESC Access	Identification Indiands Ck Identification ADO Indiands Image: Configured Station Alias (ADO 0x0012) Image: Configured Station Alias (ADO 0x0134) Image: Configured Station (Alias (ADO	
		UK Abbrechen V

Fig. 22: TwinCAT – Selecting Configured Station Alias



- ► Activate EtherCAT tab → Advanced Settings → ESC Access → E²PROM → choose Configured Station Alias.
- Enter the Identification Value under New value (here: 4).
- Click Write to E²PROM.
 - ⇒ The master writes the identification value into the device.
- Confirm with OK.

General EtherCAT Pr	ocess Data	Plc SI	ots Startup	CoE - Online	AoE - Online	Diag History	Online				
Type: B	L20-E-GW-E	C-20]					
Product/Revision: 1	00037881 /	1]					
Auto Inc Addr: F	FFE										
EtherCAT Addr: 1	003	A.	Ac	dvanced Settin	gs]					
Identification Value: 4	E	•									
				Adv	anced Sett	ings				×	
General		Configu	red Station A	Alias							
	:k	Actual Va	alue (E ² PROM):	0							
ESC Access		Actual Va	lue (Register):	0							
E'PROM	red Statio	New Valu	ie:	4		Write	to E ² PROM				
Enhance	d Link De					(power cycl	e required to refresh r	egister)			
Smart Vi	ew										
- FPGA											
Memory											
L											
	>							_			_
									ОК	Abbrechen	î
🐔 IN	0x0000 (0))	- IN_FC4005	i 2.0	43.0 Ir	nput 0					
🔊 IN	0x0000 (0))	IN_FC4005	i 2.0	45.0 Ir	put 0					¥

Fig. 23: TwinCAT – Configured Station Alias: entering the Identification Value

- Carry out a voltage reset.
- ⇒ After switching on, the newly connected device is automatically recognized by the master. The status in the **Online** tab automatically changes to OP.



7.3.7 Activating HotConnect

The Hot Connect function enables devices to be replaced during ongoing plant operation (e.g. with toolchange applications). To use the Hot Connect function, a Hot Connect group must be set up.

▶ Right-click Box 4 (BL20-E-GW-EC-20) → Add to Hot Connect Group.

 I/O Devices Device 1 (EtherCAT) Image Image-Info SyncUnits Inputs InfoData Irern 1 (EK1200) 			
Box 4 (BL20-E-GW-EC-20) Inputs Device Status/Cont	*ם	Add New Item	Ins
Outputs Device Status/Cor		Insert New Item	
A 1 Module 1 (BL20-E-16DI-24		Insert Existing Item	
🔺 🛄 Inputs BL20-E-16DI-24\	x	Remove	Del
🔺 📌. IN	•		
😤 Input value Digi		Save Box 4 (BL20-E-GW-EC-20) As	
🔁 Input value Digi		Change NetId	
🔁 Input value Digi	ŋ	Сору	Ctrl+C
Input value Digit	¥	Cut	Ctrl+X
Input value Digi	A	Paste	Ctrl+V
Input value Digi		Paste with Links	Curre
Input value Digit		Paste with Links	
🔁 Input value Digi		Independent Project File	
🔁 Input value Digi	•	Disable	
🔁 Input value Digi		Change to Compatible Type	
🔁 Input value Digi		Add to HotConnect group	
🔁 Input value Digi		Poloto from HotConnect group	
🔁 Input value Digi		Delete from HotConnect group	

Fig. 24: TwinCAT: Add to HotConnect group



- Select the relevant slave in the Add Hot Connect Group window (here: BL20-E-GW-EC-20).
- Define the Identification Value (hex.) for the HotConnect group (here: 4).



Fig. 25: TwinCAT – Add to HotConnect group

➡ The device has been added to a HotConnect group, indicated by the small HC symbol at Box 1.



Fig. 26: TwinCAT: Add to HotConnect group

In order for a new device to be detected by the master, the device address (Identification Value) must either be set with Explicit Device ID or Configured Station Alias.



Devices that are part of a Hot Connect group can also be removed from it:

▶ Right-click Box 4 (BL20-E-GW-EC-20) → Delete from Hot Connect Group.

 Ivo Devices Device 1 (EtherCAT) Image Image-Info SyncUnits Inputs Outputs InfoData Term 1 (EK1200) 			
Box 4 (BL20-E-GW-EC-20)	*1	Add New Item	Ins
 Inputs Device Status/ Control Imputs Device Status/ Control 	-	Insert New Item	
Module 1 (BL20-E-16DI-24VDC-P)		Insert Existing Item	
Module 2 (BL20-E-16DI-24VDC-N)	×	Remove	Del
Module 3 (BL20-E-4IOL)			
Module 4 (BL20-E-16DO-24VDC-0.5A-N)		Save Box 4 (BL20-E-GW-EC-20) As	
Module 5 (BL20-E-4AO-U/I)		Change NetId	
Module 6 (BL20-E-4AI-TC)	Ð	Сору	Ctrl+C
↓ Module 8 (BI 20-E-600-24VDC-0.JA-P)	¥	Cut	Ctrl+X
Module 0 (BL20 - 2 AIH-I)	A	Paste	Ctrl+V
VcState		Pasta with Links	Curry
InfoData	_		
Mappings		Independent Project File	
📸 BL20-E-GW-EC-20 Instance - Gerät 1 (EtherCAT) 1	•	Disable	
		Change to Compatible Type	
		Add to HotConnect group	
	Г	Delete from HotConnect group	

Fig. 27: Delete device from Hot Connect Group



7.4 Connecting the device to an EtherCAT master with CODESYS

Used hardware

The following hardware components are used in this example:

- BL20-E-GW-EC-20 with the following I/O module list:
 - BL20-E-16DI-24VDC-P
 - BL20-E-16DI-24VDC-N
 - BL20-E-4IOL
 - BL20-E-16DO-24VDC-0.5A-P
 - BL20-E-4AO-U/I
 - BL20-E-4AI-TC
 - BL20-E-8DO-24VDC-0.5A-P
 - BL20-E-16DI-24VDC-P
 - BL20-2AIH-I

Used Software

The following software tools are used in this example:

- CODESYS 3.5. SP16 (available as a free download at www.turck.com)
- WinPLC as EtherCAT master
- ESI file for BL20-E-GW-EC-20 (available as a free download at www.turck.com)

7.4.1 Installing ESI files

The device is connected to the Beckhoff controller via an xml file, the EtherCAT Slave Information (ESI). For the connection, the device description file must be stored in CODESYS. The ESI file for the device is available free of charge for download from www.turck.com.

- Launch CODESYS.
- Click Tools \rightarrow Device Repository.



Fig. 28: Device Repository


Store the ESI file via the **Install** button.

😤 Device R	lepository					×
<u>L</u> ocation:	System Repository (C:\ProgramData\CODESYS\Dev	vices)			~	<u>E</u> dit Locations
Installed d	e <u>v</u> ice descriptions: a fulltext search	Vendor:	<all vendors=""></all>		~	<u>I</u> nstall
	liscellaneous ieldbuses M CANbus M CANopen DeviceNet M EtherCAT mat Master mat Master mat Module			Vendor		<u>U</u> ninstall <u>E</u> xport

Fig. 29: Installing a device description file

⇒ The module is displayed as an installed device description in the device repository

:			Device Repository		×
Location	System Repository (C:\ProgramData\CODESYS\D)evices)			V Edit Locations
Testallad D	Vulies Descriptions				
String for	a full text search	Vendor	<all vendors=""></all>	~	Install
Name				Vendor	Uninstall
	Hodule				- Event
	Slave				Export
	Beckhoff Automation	GmbH & Co. KG	- Drive and Axis Terminals (FL 7xxx)		
	Delta Electronics, Inc.				
	Festo Electric-Drive				Renew Device
	🖲 🧰 Hitachi Industrial Equi	pment Systems	CoLtd.		Repository
	🖳 🧾 ifm electronic - ifm ele	ctronic EtherC/	AT Devices		
	🗷 🚞 KEB Automation KG -	C6 PRO/ADVAN	ICED drive controllers		
	🗉 词 Keyence				
	🖲 🧰 Motion Terminals (R 1-	EC06xx/R1-EC	56xx)		
	🖳 🧾 Panasonic Corporatio	n, Appliances C	ompany - AC Servo Driver		Details
	🗉 🚞 Parker Hannifin - Park	er Servo Drive	1M		
	🗷 🚞 Parker Hannifin - Park	er Servo Drive	15		
	🗄 🛅 Schneider Electric - Di	rives			
	🖲 🚞 TBEC-Family				
	🖻 🗀 Turck				
	🖮 🚞 BL20				
	📕 BL20-E-GW-E	:C-20		Turck	
	🗉 📴 Yaskawa Electric Corp	oration - Servo	Drives	· · · · · · · · · · · · · · · · · · ·	
<				>	
. L. (Device "BL 20-E-GW-EC-20" in	stalled to device	e renository		
				k.	<u>.</u>
					Close

Fig. 30: Installed device description



7.4.2 Connecting the device with the controller

Prerequisites

- The used master must be EtherCAT capable.
- The programming software has been opened.
- A new project has been created.

Example: Creating a project with WinPLC

Standard F	Project		×
61	You are about objects within	t to create a new standard project. This wizard will create the following this project:	
	- One progran - A program P - A cyclic task - A reference t	nmable device as specified below LC_PRG in the language specified below which calls PLC_PRG to the newest version of the Standard library currently installed.	
	Device:	CODESYS Control RTE V3 (3S - Smart Software Solutions GmbH)	\sim
	PLC_PRG in:	Structured Text (ST)	\sim
		OK Cancel	

Fig. 31: Example: Creating a project



Adding an EtherCAT master

- Right-click **Device** \rightarrow **Add Device**.
- Select the EtherCAT master in the following window.
- Click Add Device.

۰	BL20-E-GW-EC.project* -	CODESYS			- 🗆 🛛
File Edit View Project Build Online	Debug Tools Window Help				T
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	\$ 📥 🌿 🦄 🦄 🦄 📾 🛅 - 🕤 🏙	Application	n [Device: PLC Logic] 🔹 🕻	DŞ Qğ ⊢ I	יע נַד קד קד אד
Devices	1	Ado	d Device		×
Device (CODESYS Control Win V3) Device (CODESYS Control Win V3) Device (CODESYS Control Win V3) PLC Logic Device (CODESYS Control Win V3) Device (COD	Name EtherCAT_Master Action Append device Insert device Plug	device 🔿 Upo	date device		
Task Configuration	String for a full text search	Vendor 🗸	<all vendors=""></all>		~
	Name Fieldbuses Can CANbus Data EtherCAT	Vendor		Version	Description ^
	Arit Master EtherCAT Master EtherCAT Master EtherCAT Master EtherCAT Master SoftMotion EtherNet Adapter EtherNet/IP <	3S - Smart 3S - Smart	t Software Solutions GmbH t Software Solutions GmbH	3.5.16.30 3.5.16.30	EtherCAT Master EtherCAT Master Soft V
	Group by category Display all versions of Name: EtherCAT Master Vendor: 35 - Smart Software Solutions G Categories: Master Version: 3.5.16.30 Order Number: Description: EtherCAT Master	(for experts only	y) Display outdated ve	ersions	***
	Append selected device as last child of Device (You can select another target node in the	e navigator whil	le this window is open.)		
< >> POUs Z Devices				I bbA	Device Close
	Last build: 😫 0 😗 0	Precompile	 G G	Project user: (r	iobody) 🙆 🚷 📑

Fig. 32: Adding an EtherCAT master



⇒ The EtherCAT master appears as **EtherCAT_Master (EtherCAT Master)** in the project tree.



Fig. 33: Project tree

Selecting a network adapter

- Double-click EtherCAT_Master (EtherCAT Master) in the project tree.
- ▶ In the General tab open the Select Network Adapter dialog via the Browse... button.
- Select the network adapter and confirm with **OK**.



Fig. 34: Selecting a network adapter



- ▶ In the **General** tab open the **Options** menu item.
- Select the option **Restart slaves automatically**.

EtherCAT_Master X		
General	✓ Autoconfig master/slaves	EtherCAT
Sync Unit Assignment	EtherCAT NIC Settings	
Log	Destination address (MAC) FF-FF-FF-FF-FF	ast 🗌 Redundancy
EtherCAT I/O Mapping	Source address (MAC) 68-05-CA-37-91-FC Browse	
EtherCAT IEC Objects	Select network by MAC Select network by MAC	
Status	✓ Distributed Clock	
Information	Cycle time 4000 ♀ µs □ Use LRW Sync offset 20 ♀ % Messages Sync window monitoring Sync window 1 ♀ µs	instead of LWR/LRD s pertask cally restartslaves

Fig. 35: Restart slaves automatically

- Click Online \rightarrow Login.
- ⇒ The project is written to the controller.



Adding an EtherCAT slave

- Click Online \rightarrow Logout.
- ⇒ The configuration is possible in the logged-out state.
- ▶ Right-click EtherCAT_Master (EtherCAT Master) → select Scan For Devices.



Fig. 36: Scan For Devices



Select the EtherCAT slave (here: BL20-E-GW-EC-20) in the following window and click Copy to project.

Device name	Device type	Alias Address		
BL20_E_GW_EC_20	BL20-E-GW-EC-20	4		
BL20_E_16DI_24VDC_P	BL20-E-16DI-24VDC-P			
BL20_E_16DI_24VDC_N	BL20-E-16DI-24VDC-N			
BL20_E_4IOL	BL20-E-4IOL			
BL20_E_16DO_24VDC_0_5A_N	BL20-E-16DO-24VDC-0.5A-N			
BL20_E_4AO_U_I	BL20-E-4AO-U/I			
BL20_E_4AI_TC	BL20-E-4AI-TC			
	BL20-E-8DO-24VDC-0.5A-P			
BL20_E_16DI_24VDC_P	BL20-E-16DI-24VDC-P			
···· BL20_BR_24VDC_D	BL20-BR-24VDC-D			
BL20_2AIH_I	BL20-2AIH-I			
			C Chau đi	e

Fig. 37: Copying found devices to the project

➡ The BL20 station (gateway and connected modules) appears in the project tree with the default settings from the ESI file.

Devices 👻	џ	×
BL20-E-GW-EC		•
🖹 🎬 Device (CODESYS Control Win V3)		
PLC Logic		
🖻 🧔 Application		
📶 Library Manager		
PLC_PRG (PRG)		
🖹 🎆 Task Configuration		
EtherCAT_Task (IEC-Tasks)		
🖹 🛞 MainTask (IEC-Tasks)		
PLC_PRG		
🖃 📶 EtherCAT_Master (EtherCAT Master)	_	
BL20_E_GW_EC_20 (BL20-E-GW-EC-20)		
BL20_E_16DI_24VDC_P (BL20-E-16DI-24VDC-P)	T	
BL20_E_16DI_24VDC_N (BL20-E-16DI-24VDC-N)	T	
□BL20_E_4IOL (BL20-E-4IOL)	T	
BL20_E_16DO_24VDC_0_5A_N (BL20-E-16DO-24VDC-0.5A-N)	T	
BL20_E_4AO_U_I (BL20-E-4AO-U/I)	T	
BL20_E_4AI_TC (BL20-E-4AI-TC)	T	
BL20_E_8DO_24VDC_0_5A_P (BL20-E-8DO-24VDC-0.5A-P)	T	
BL20_E_16DI_24VDC_P_1 (BL20-E-16DI-24VDC-P)	T	
	T	
POUs 🐲 Devices		

Fig. 38: BL20 station in the project tree



Connecting the device online with the controller

- Click **Online** \rightarrow **Login** and start the program.
- ⇒ The device is connected online with the PLC.
- ⇒ The green symbols in the project tree indicate the active connection.
- ► Double-click BL20_E_GW_EC_20 (BL20-E-GW-EC-20).
- ⇒ On the General tab → Diagnostics the Operational status indicates the active connection.

BL20_E_GW_EC_20 ×				-
General	Address		— Additional ————	Ethor
Process Data	AutoInc address EtherCAT address	0	Expert settings Optional	
Startup Parameters	Distributed Clock			
EoE Settings	Diagnostics	Operational		
Diagnosis History	Current State	operational		
Log				
EtherCAT I/O Mapping				
EtherCAT IEC Objects				
Status				
Inomation				
<	<u>[</u>			>

Fig. 39: Status: Operational



7.4.3 Setting startup parameters

The parameters are set in plain text either on the gateway or on the individual I/O modules of the BL20 station.

- Double-click BL20_E_GW_EC_20 (BL20-E-GW-EC-20).
- Select the Startup Parameters tab
- ➡ The parameters of the BL20 gateway (0xF800) and all I/O modules of the BL20 station are displayed. The start-up parameters of the gateway can be changed here.

Line Line <thline< th=""> Line Line</thline<>	_ □	ם <u>ב</u>
Devices ▼ # 4 × Device (CODESYS Control Win V3) ▼ BL2D_E_GW_EC_20 × The Cloye Add Effect with the Code with Code with the Code with	- % (]= f] f] -	∎ +⊒
PE-GW-EC Image: CODES/S Control Win V3) Image: Code Code Code Code Code Code Code Code		
Device (CODESYS Control Win V3) Image: Control Win V3) Image: Control Win V3) IP Add Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) IP Add Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3) Image: Control Win V3)		
Image: NetCogic Line Index:Subindex Name Value Application 995 1648090:16#01 Deactivate channel Analog In-Ch1 no PLC_PRG (PRG) 95 1648090:16#01 Deactivate channel Analog In-Ch1 yes MainTask (IEC-Tasks) 95 1648090:16#02 Activate were break dagn. Analog In-Ch1 yes MainTask (IEC-Tasks) 99 1648090:16#07 Activate ware break dagn. Analog In-Ch1 yes MainTask (IEC-Tasks) 99 1648090:16#07 Activate ware break dagn. Analog In-Ch1 yes MainTask (IEC-Tasks) 99 1648090:16#07 Activate ware break dagn. Analog In-Ch1 yes MainTask (IEC-Tasks) 99 1648090:16#07 Activate ware break dagn. Analog In-Ch2 yes MainTask (IEC-Tasks) 100 1648090:16#10 Activate ware break dagn. Analog In-Ch2 yes MainTask (IEC-Tasks) 101 1648090:16#11 Activate ware break dagn. Analog In-Ch2 yes MainTask (IEC-Tasks) 103 1648090:16#11 Activate ware break dagn. Analog In-Ch2 yes MainTask (IEC-Tasks) 104 1648090:16#12 Operation mode Analog In-Ch2 yes		
 Poplication ↓ Chray Manager ↓ Chray Manager ↓ Pic PR6 (PRG) ↓ Pic PR6 ↓ Pic PR6	Bit Length	n A
Image: 96 15#8090:16#02 Activate overcur. dagn Analog In-Ch1 yes Image: 97 16#8090:16#03 Activate wire break diagn. Analog In-Ch1 yes Image: 98 16#8090:16#04 Operation mode Analog In-Ch1 yes Image: 98 16#8090:16#07 Activate wire break diagn. Analog In-Ch1 420 ma HART active Image: 99 16#8090:16#07 Activate overcur. dagn Analog In-Ch1 15 bit + sign Image: 99 16#8090:16#10 Activate overcur. dagn Analog In-Ch1 15 bit + sign Image: 101 16#8090:16#10 Activate overcur. dagn Analog In-Ch2 no Image: 16#2.0 E_160L_24WDC_P (BL20E-160L-24WDC_P) 16#8090:16#10 Activate overcur. dagn Analog In-Ch2 yes Image: 102 16#8090:16#10 Activate overcur. dagn Analog In-Ch2 yes Image: 102.0 E_160L_24WDC_P (BL20E-160L-24WDC_P) 103 16#8090:16#10 Activate HART dagnostics Analog In-Ch2 yes Image: 102.0 E_160L_24WDC_P (BL20E-160L-24WDC_P) 104 16#8090:16#10 Activate HART dagnostics Analog In-Ch2 yes Image: 102.0 E_160L_24WDC_P (BL20E-160L-24WDC_P) <td>8</td> <td></td>	8	
PLC_PRG (PRG) 97 15#8090:16#03 Activate wire break dagn. Analog In-Ch1 yes WahrTask (IEC-Tasks) 98 16#8090:16#04 Operation mode Analog In-Ch1 420 mA HART active PLC_PRG 99 16#8090:16#07 Activate WART datagnostics Analog In-Ch1 yes PLC_PRG 100 16#8090:16#07 Activate HART diagnostics Analog In-Ch1 yes PLC_PRG 101 16#8090:16#07 Activate WART datagnostics Analog In-Ch2 no PLC_PRG 101 16#8090:16#07 Activate wire break dagn. Analog In-Ch2 no PLC_PRG 101 16#8090:16#10 Activate wire break dagn. Analog In-Ch2 no PLC_PRG 102 16#8090:16#11 Activate wire break dagn. Analog In-Ch2 yes PLC_PLO (BL20_E_16DI_24WDC_P (BL20-E-16DI-24WDC) 105 16#8090:16#15 Activate HART diagnostics Analog In-Ch2 yes PLC_PLO (BL20_E_16DI_24WDC_P, SA_N (BL20-E-16DI -24WDC) 106 16#8090:16#15 Activate HART diagnostics Analog In-Ch2 yes PLC_PLO (BL20_E_16DI_24WDC_P, SA_N (BL20-E-16DI -24WDC) 106 16#8090:16#15 Activate HART diagnostics Analog In-Ch2 yes PLC_PL	8	
Image: Second	8	
EtherCAT_Task (IEC-Tasks) MainTask (IEC-Tasks) B120_E_GW_EC_20 (B120-E-GW-EC-20) Io1 16#8090:16#10 Deactivate overcurr. diagn Analog In-Ch1 ros B120_E_GW_EC_20 (B120-E-GW-EC-20) Io1 16#8090:16#10 Activate overcurr. diagn Analog In-Ch2 ves ves io2 1648090:16#10 Activate wire break diagn. Analog In-Ch2 ves vo ves io10 16#8090:16#10 Activate wire break diagn. Analog In-Ch2 ves vo ves vo vo ves vo ves ves ves ves ves ves ves ves ves ves ves ves ves ves ves	8	
MainTask (EC-Tasks) 100 16#8090:16#08 Data representation Analog In-Ch1 15 bit + sign EtherCAT_Master (EtherCAT Master) 101 16#8090:16#0F Deactivate channel Analog In-Ch2 no BL20_E_GW_EC_20 (BL20-E-GW/EC-20) 102 16#8090:16#10 Activate overcurr. diagn Analog In-Ch2 yes IB BL20_E_16DI_24VDC_P (BL20-E-16DI-24VD 103 16#8090:16#11 Activate wire break diagn. Analog In-Ch2 yes IB BL20_E_16DI_24VDC_P (BL20-E-16DI-24VD 104 16#8090:16#11 Activate Water Water Mark diagnostics Analog In-Ch2 yes IB BL20_E_16DD_24VDC_0_5A_N (BL20-E-16DI-24VD 104 16#8090:16#12 Operation mode Analog In-Ch2 yes IB BL20_E_16DD_24VDC_0_5A_N (BL20-E-16DI-24VD 104 16#8090:16#12 Activate HART diagnostics Analog In-Ch2 yes IB BL20_E_16DI_24VDC_0_5A_N (BL20-E-16DI-24VD 105 16#8090:16#23 Mapped dnamel VA PV (1st HART variable) IB BL20_E_16DI_24VDC_D_16 (BL20-BR-24VDC-D) ID 16#8090:16#24 Mapped variable VB SV (2nd HART variable) ID 106 #6809:16#31 Mapped variable VC PV (1st HART variable) 111 16#8090:16#32 Mapped variable VC PV (1st HART variable) 112 16#8090:1	8	
Image: Construction of the construle of the construction of the constructio	8	
EtherCAT_Master (EtherCAT Master) - 102 16#8090:16#10 Activate overcurr. diagn Analog In-Ch2 yes Image: BL20_E_GW_EC_20 (BL20-E-GW-EC-20) - 102 16#8090:16#11 Activate wire break diagn. Analog In-Ch2 yes Image: BL20_E_16DI_24VDC_P (BL20-E-16DI-24VD - 102 16#8090:16#12 Operation mode Analog In-Ch2 yes Image: BL20_E_16DI_24VDC_N (BL20-E-16DI-24VD - 105 16#8090:16#15 Activate WART diagnostics Analog In-Ch2 yes Image: BL20_E_16DD_24VDC_O_5A_N (BL20-E-16DI-24VD - 105 16#8090:16#15 Activate HART diagnostics Analog In-Ch2 yes Image: BL20_E_4AO_U_J (BL20-E-4AO-U/I) - 106 16#8090:16#15 Activate HART diagnostics Analog In-Ch2 yes Image: BL20_E_4AO_U_J (BL20-E-4AO-U/I) - 106 16#8090:16#23 Mapped channel VA Channel 1 Image: BL20_E_16DI_24VDC_P_1 (BL20-E-4AO-U/I) - 101 16#8090:16#23 Mapped variable VA PV (1st HART variable) Image: BL20_E_16DI_24VDC_P_1 (BL20-E-16DI-24 - 110 16#8090:16#24 Mapped variable VB SV (2nd HART variable) Image: BL20_E_16DI_24VDC_P_1 (BL20-E-16DI-24 - 111 16#8090:16#23 Mapped variable VB SV (2nd HART variable) Image: BL20_E_16DI_24VDC_P_0	8	
BL20_E_GW_EC_20 (BL20-E-GW-EC-20) -103 16#8090:16#11 Activate wire break diagn. Analog In-Ch2 yes BL20_E_16DI_24VDC_P (BL20-E-16DI-24VD -104 16#8090:16#12 Operation mode Analog In-Ch2 420 mA HART active BL20_E_16DD_24VDC_N (BL20-E-16DI-24VD -105 16#8090:16#15 Activate HART diagnostics Analog In-Ch2 yes BL20_E_400_U_J (BL20-E-400.) -106 16#8090:16#16 Data representation Analog In-Ch2 yes BL20_E_40A_U_J (BL20-E-4A0.) -106 16#8090:16#16 Data representation Analog In-Ch2 yes BL20_E_40A_U_J (BL20-E-4A0.) -106 16#8090:16#10 Mapped channel VA Channel 1 BL20_E_40A_U_J (BL20-E-4A0U/T) -108 16#8090:16#23 Mapped variable VA PV (1st HART variable) ABL20_E_16DI_24VDC_P_3A_P (BL20-E-4B0-1) -109 16#8090:16#24 Mapped variable VA SV (2nd HART variable) BL20_E_16DI_24VDC_D_5A_P (BL20-E-4B0-2) -111 16#8090:16#28 Mapped variable VC channel 1 BL20_E_18DI_24VDC_D_5A_P (BL20-E-4B0-2) -112 16#8090:16#38 Mapped variable VC channel 2 BL20_E_18DI_24VDC_D_0AP.24VDC-D -111 16#8090:16#28 Mapped variable VC pv viable VC	8	
Image: Product	8	
Image: Provide the state of the state o	8	
Image: Section 2.440 (BL20-E-4A0_U) - 106 16#8090:16#16 Data representation Analog In-Ch2 15 bit + sign Image: BL20_E_16DD_24VDC_0_SA_N (BL20-E-16C - 107 16#8090:16#1D Mapped channel VA Channel 1 Image: BL20_E_4A1_TC (BL20-E-4A0-U/I) - 108 16#8090:16#23 Mapped variable VA PV (1st HART variable) Image: BL20_E_4A0_T_1 (BL20-E-4A1-TC) - 109 16#8090:16#24 Mapped variable VB Channel 1 Image: BL20_E_16DI_24VDC_0_5A_P (BL20-E-8D0) - 110 16#8090:16#28 Mapped variable VB SV (2nd HART variable) Image: BL20_BR_24VDC_D (BL20-BR-24VDC-0) - 110 16#8090:16#28 Mapped variable VC PV (1st HART variable) Image: BL20_BR_24VDC_D (BL20-BR-24VDC-0) - 112 16#8090:16#31 Mapped variable VC PV (1st HART variable) Image: BL20_BR_24VDC_D (BL20-BR-24VDC-0) - 112 16#8090:16#33 Mapped variable VD SV (2nd HART variable) Image: BL20_BR_24VDC_D (BL20-BR-24VDC-0) - 112 16#8090:16#33 Mapped variable VD SV (2nd HART variable) Image: BL20_BR_24VDC_D (BL20-BR-24VDC-0) - 112 16#8090:16#33 Mapped variable VD SV (2nd HART variable) Image: BL20_BR_24VDC_D (BL20-BR-24VDC-0) - 113	8	
Image: Blace_ifebo_24VDC_0_5A_N (BL20=F-i6C -107 16#8090:16#1D Mapped channel VA channel 1 Image: Blace_ifebo_24VDC_0_5A_N (BL20=F-i6C -107 16#8090:16#23 Mapped variable VA PV (1st HART variable) Image: Blace_ifebo_24VDC_0_5A_P (BL20=F-i6D-24) -109 16#8090:16#24 Mapped variable VB Channel 1 Image: Blace_ifebo_24VDC_0_5A_P (BL20=F-i6D-24) -109 16#8090:16#2A Mapped variable VB SV (2nd HART variable) Image: Blace_ifebo_24VDC_0_Blace=R-24VDC-D Image: Blace_ifeboo_ifeboo Blace_ifeboo Channel VD Channel 2 Image: Blace_ifeboo Blace_ifeboo Blace=Information Blace_ifeboo Channel VD Channel 2 Image: Blace_ifeboo Blace_ifeboo Blace_ifeboo Blace_ifeboo Blace_ifeboo Channel VD Channel 2 Image: Blace_ifeboo Blace_ifeboo Blace_ifeboo Blace_ifeboo Channel VD Channel 2 Image: Blace_ifeboo Blace_ifeboo Blace_ifeboo Iffeboo Iffeboo Mapped variable VD SV (2nd HART variable) Image: Blace_ifeboo Image: Blace_ifeboo Image: Blace_ifeboo Mapped variable VD SV (2nd HART variable) Imagee: Blace_ifeboo <td< td=""><td>8</td><td></td></td<>	8	
Image: Product Stress Product Stres Product Stress P	8	
Image: Bit 20_E_4AI_TC (BL20-E-4AI-TC) - 109 16#8090:16#24 Mapped channel VB channel 1 Image: Bit 20_E_16D1_24VDC_0_5A_P (BL20-E-8D0-1) - 109 16#8090:16#28 Mapped variable VB SV (2nd HART variable Image: Bit 20_E_16D1_24VDC_P_1 (BL20-E-16DI-24 - 111 16#8090:16#28 Mapped variable VC PV (1st HART variable Image: Bit 20_EALH_J (BL20-2AIH-I) - 112 16#8090:16#32 Mapped variable VC PV (1st HART variable) Image: Bit 20_EALH_J (BL20-2AIH-I) - 113 16#8090:16#32 Mapped variable VD SV (2nd HART variable) Image: Bit 20_EALH_J (BL20-2AIH-I) - 112 16#8090:16#32 Mapped variable VD SV (2nd HART variable) Image: Bit 20_EALH_J (BL20-2AIH-I) - 114 16#8090:16#32 Mapped variable VD SV (2nd HART variable) Image: Bit 20_EALH_J (BL20-2AIH-I) - 114 16#8090:16#32 Mapped variable VD SV (2nd HART variable) Image: Bit 20_EALH_J (BL20-2AIH-I) - 114 16#8090:16#32 Mapped variable VD SV (2nd HART variable) Image: Bit 20_EALH_J (BL20-2AIH-I) - 114 16#8090:16#32 Mapped variable VD SV (2nd HART variable) Image: Bit 20_EALH_J (BL20-2AIH-I) - 114 16#8090:16#32	8	
Image: Provide the state of the state o	8	
Image: Provide the second s	8	
BL20_BR_24VDC_D (BL20-BR-24VDC-D) - 112 16#8090:16#31 Mapped variable VC PV (1st HART variable) BL20_2AIH_I (BL20-2AIH-I) - 112 16#8090:16#32 Mapped variable VD channel 2 - 113 16#8090:16#32 Mapped variable VD SV (2nd HART variable) - 114 16#8090:16#38 Mapped variable VD SV (2nd HART variable) - 115 16#F800:16#01 Deactivate all diagnostics yes - 116 16#F800:16#02 Output behavior at communication loss no - 117 16#F800:16#03 Deactivate Webserver VES - 118 16#F800:16#03 Deactivate load voltage diagnostics no - 119 16#F800:16#03 Outp. behav. if I/O config diff. Set to 0 - 120 16#F800:16#04 Outp. behav. if a module is wrong Set to 0 - 121 16#F800:16#0A Startup if config not matching no - 122 16#F800:16#0A Startup if config not matching no	8	
BL20_2AIH_I (BL20-2AIH-I) - 113 16#8090:16#32 Mapped channel VD channel 2 - 114 16#8090:16#38 Mapped variable VD SV (2nd HART variable - 115 16#F800:16#01 Deactivate all diagnostics yes - 116 16#F800:16#02 Output behavior at communication loss no - 117 16#F800:16#03 Deactivate Webserver VES - 118 16#F800:16#07 Deactivate load voltage diagnostics no - 119 16#F800:16#08 Output behavior if I/O config diff. Set to 0 - 120 16#F800:16#04 Startup if config not matching no - 121 16#F800:16#04 Startup if config not matching no	8	
114 16#8090:16#38 Mapped variable VD SV (2nd HART variable 115 16#F800:16#01 Deactivate all diagnostics yes 116 16#F800:16#02 Output behavior at communication loss no 117 16#F800:16#03 Deactivate Webserver Yes 118 16#F800:16#07 Deactivate load voltage diagnostics no 119 16#F800:16#08 Outp. behav. if I/O config diff. Set to 0 120 16#F800:16#0A Startup if config not matching no 121 16#F800:16#0A Startup if config not matching no	8	
115 16#F800:16#01 Deactivate all diagnostics yes 116 16#F800:16#02 Output behavior at communication loss no 117 16#F800:16#03 Deactivate Webserver Ves 118 16#F800:16#07 Deactivate load voltage diagnostics no 119 16#F800:16#07 Outp. behav. if I/O config diff. Set to 0 120 16#F800:16#08 Outp. behav. if a module is wrong Set to 0 121 16#F800:16#0A Startup if config not matching no 122 16#F800:16#0C Suppress Force Mode no	8	
116 16#F800:16#02 Output behavior at communication loss no 117 16#F800:16#03 Deactivate Webserver Yes 118 16#F800:16#07 Deactivate Webserver Yes 119 16#F800:16#07 Deactivate load voltage diagnostics no 119 16#F800:16#08 Outp. behav. if I/O config diff. Set to 0 120 16#F800:16#09 Outp. behav. if a module is wrong Set to 0 121 16#F800:16#0A Startup if config not matching no 122 16#F800:16#0C Suppress Force Mode no	¥ 8	
117 16#F800:16#03 Deactivate Webserver Ves 118 16#F800:16#07 Deactivate load voltage diagnostics no 119 16#F800:16#08 Outp. behav. if I/O config diff. Set to 0 120 16#F800:16#09 Outp. behav. if a module is wrong Set to 0 121 16#F800:16#0A Startup if config not matching no 122 16#F800:16#0C Supress Force Mode no	8	
118 16#F800:16#07 Deactivate load voltage diagnostics no 119 16#F800:16#08 Outp. behav. if I/O config diff. Set to 0 120 16#F800:16#09 Outp. behav. if a module is wrong Set to 0 121 16#F800:16#0A Startup if config not matching no 122 16#F800:16#0C Supress Force Mode no	8	
119 16#F800:16#08 Outp. behav. if I/O config diff. Set to 0 120 16#F800:16#09 Outp. behav. if a module is wrong Set to 0 121 16#F800:16#0A Startup if config not matching no 122 16#F800:16#0C Suppress Force Mode no	8	
120 16#F800:16#09 Outp. behav. if a module is wrong Set to 0 121 16#F800:16#0A Startup if config not matching no 122 16#F800:16#0C Suppress Force Mode no	8	
121 16#F800:16#0A Startup if config not matching no 122 16#F800:16#0C Suppress Force Mode no	8	
122 16#F800:16#0C Suppress Force Mode no	8	
	8	

Fig. 40: Start-up parameters of the BL20 gateway





The startup parameters of the I/O modules are set at the respective module.

Fig. 41: CODESYS: Setting the start-up parameters at the BL20 I/O module



7.4.4 Setting EtherCAT device parameters via the object dictionary



Turck recommends only making changes in the startup parameters.

► In the project tree double-click BL20_E_GW_EC_20 (BL20-E-GW-EC-20).

In the **General** tab activate the **Expert Settings** option.

BL20_E_GW_EC_20 X				-
General	Address		Additional	[there area
Expert Process Data	AutoInc address EtherCAT address	0	Expert settings	Euler CAI
Process Data	Distributed Clock	· · ·		
Startup Parameters	> Startup Checking		> Timeouts	
EoE Settings	DC Cyclic Unit Con	trol: Assign to Local µ(
Log	Identification			
EtherCAT I/O Mapping	Disabled			
EtherCAT IEC Objects	Configured station	alias (ADO 0x0012)	Value	4
Status	C Explicit device ident	ification (ADO 0x0134)		
Information	Data Word (2 Bytes)	ADO (hex)	16#0
<				>

Fig. 42: Activate expert settings



- Click Online \rightarrow Login.
- Select the **CoE Online** tab.
- ⇒ The object dictionary of the device is displayed with all device-specific parameters.

iile <u>E</u> dit <u>V</u> iew <u>P</u> roject <u>B</u> uild <u>O</u> nline <u>D</u> ebug <u>T</u> ools <u>V</u> ☞ 등 ⊜ ∽ ∝ χ ⊨ ⊫ ≈ × ♠ ∿₀ ♠ ∿₀ ↓ , , ,	<u>/</u> indow <u>H</u> elp 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Application [Device: PLC Logic] 🔹	o; o; ,	■ % 〔=	Fi ti
vices - 4 X 120-E-GW-EC -	BL20_E_GW_E	C_20 X			
[j] Device [connected] (CODESYS Control Win V3) [j] PLC Logic [Comparison [run] [f] Library Manager	Index:Subindex	Name Inputs BL20-2AIH-I	m ESI file C) Online from o	levice Value
PLC_PRG (PRG) Gash Configuration Gash EtherCAT_Task (IEC-Tasks) Gash Gash MainTask (IEC-Tasks)	 16#7020:16#00 16#7030:16#00 16#7040:16#00 16#7060:16#00 	Outputs BL20-E-41OL Outputs BL20-E-16DO-24VDC-0.5A-N Outputs BL20-E-4AO-U/I Outputs BL20-E-4AO-U/I Outputs BL20-E-8DO-24VDC-0.5A-P			
	 16#8020:16#00 16#8040:16#00 16#8050:16#00 16#8090:16#00 16#8090:16#00 	Configuration Data BL20-E-4IOL Configuration Data BL20-E-4AO-U/I Configuration Data BL20-E-4AI-TC Configuration Data BL20-2AIH-I Diagnosis Data BL20-2AIH-I Diagnosis Data BL20-E-4IOL			
 ↓ BL20_E_16DI_24VDC_N (BL20-E-16DI-24VDC-N) ↓ BL20_E_41OL (BL20-E-41OL) ↓ BL20_E_16DO_24VDC_0_5A_N (BL20-E-16DO-24VDC-0.5A- ↓ BL20_E_16DO_24VDC_0_5A_N (BL20-E-16DO-24VDC-0.5A- ↓ BL20_E_14AO_U/I (BL20-E-4AO-U/I) 	 16#A040:16#00 16#A050:16#00 16#A080:16#00 16#A080:16#00 	Diagnosis Data BL20-E-4AO-U/I Diagnosis Data BL20-E-4AI-TC Diagnosis Data BL20-BR-24VDC-D Diagnosis Data BL20-2AIH-I			
	■ 16#F000:16#00 ■ 16#F030:16#00 ■ 16#F050:16#00 ■ 16#F050:16#00	Modular Device Profile Configured Module Ident List Detected Module Ident List Device Status			
	■ 16#F110:16#00 ■ 16#F200:16#00 ■ 16#F800:16#00	Device Diagnosis Device Control Device Parameter			
	:16#01 :16#02 :16#03 :16#07	Deactivate all diagnostics Output behavior at communication loss Deactivate Webserver Deactivate load voltage diagnostics	RW RW RW RW	BOOL USINT BOOL BOOL	yes Set to no no
	.10400		014	LICTAT	C-11-

Fig. 43: CODESYS: Object Dictionary

The display of the parameters depends on the device configuration. The parameters can be changed in the object dictionary.



NOTE

The changing of parameters during the runtime can cause a faulty configuration of the device.



7.4.5 Addressing a device via Explicit Device ID

- ▶ In the project tree double-click BL20_E_GW_EC_20 (BL20-E-GW-EC-20).
- ▶ In the General tab activate the Optional checkbox.
- ► General → Identification → Explicit Device Identification (ADO 0x0134): In the Value field enter the Identification Value (hex.) corresponding to the position of the rotary coding switches on the device.

BL20_E_GW_EC_20 ×		
Address	Additional	
AutoInc address 0	Expert settings	Ether CAT
EtherCAT address 1001	Optional	
Distributed Clock		
> Startup Checking	Dimeouts	
DC Cyclic Unit Control: Assign	to Local µC	
> Watchdog		
Identification		
Disabled		
Configured station alias (ADO 0x	0012) Value	4
Explicit device identification (AD)	0 0x0134)	
🔵 Data Word (2 Bytes)	ADO (hex)	16#134

Fig. 44: CODESYS: Explicit Device ID: entering the Identification Value

• Click Online \rightarrow Login.



7.4.6 Addressing a device via Configured Station Alias

- ► In the project tree double-click BL20_E_GW_EC_20 (BL20-E-GW-EC-20).
- Click Online \rightarrow Login.
- On the General tab activate the Configured Station Alias (ADO 0x0012) option under Identification.
- ▶ In the Value field enter the Identification Value.
- Click Write to EEPROM.

	Address	Additional	
General	AutoInc address 0	Expert settings	EtherCAT
Expert Process Data	EtherCAT address	✓ Optional	
Process Data	Distributed Clock		
Startup Parameters	Diagnostics		
Online	Current State Operational		
CoE Online	> Startup Checking	─ ▷ Timeouts ────	
EoE Settings	 DC Cyclic Unit Control: Assign to Loca Watchdog 	Ι μC	
Diagnosis History	Identification		
Log	Disabled Configured station alias (ADO 0x0012)	Value	4
EtherCAT I/O Mapping	Write to EEprom	Actual address	4
EtherCAT IEC Objects	Explicit device identification (ADO 0x0134))	
Status	🔵 Data Word (2 Bytes)	ADO (hex)	16#12
Information			
			1

Fig. 45: CODESYS: Configured Station Alias: entering the Identification Value



Confirm	tho	folle	wina	nolcib	with	OK
Commin	uie	10110	Jwing	ulaiog	VVILII	UR.

Identification —				
 Disabled 				
Configured Statio	n Alias (ADO 0x0012)	Value	8	*
Write to EEpror	n	Actual address	6	
O Explicit Device Ide	entification (ADO 0x0134)			
🔿 Data Word (2 Byte	es)	ADO (hex)	16#12	* *
	CODESYS After writing the is necessary. Pla	ne EEprom alias address a reboo ease switch off and on again!	ot of the device	×
			ОК	

Fig. 46: CODESYS: Restart required

- ⇒ The Identification Value is written to the device.
- Carry out a voltage reset.
- ⇒ After switching on, the newly connected device is automatically recognized by the master. The status in the **Online** tab automatically changes to OP.

7.5 Assigning an IP address for EoE

The normal Ethernet protocol is tunneled via the EoE communication protocol. An IP address for EoE can be assigned to the device so that the device can be configured via the the web server or the DTM. Requirement: The set EtherCAT master supports the EoE function.

Activating EoE in TwinCAT



NOTE

In the following example, the communication between EtherCAT and standard Ethernet network is realized via a special Ethernet switch port terminal (e.g. EL6601) from Beckhoff Automation.

The following steps are required to activate the EoE function:

- activating EoE in EtherCAT master
- activating EoE in the switch port terminal
- activating EoE in EtherCAT slave

Activating EoE in the EtherCAT master:

- Double-click Master (EtherCAT) in the project tree in TwinCAT.
- ► Click EtherCAT tab → Advanced Settings.
- ▶ In the Advanced Settings window select EoE Support on the left.
- At Virtual Ethernet Switch activate the Enable option and the Connect to TCP/IP Stack option at Windows Network.
- ⇒ The EoE function is activated in the master.



Activating EoE in the switch port terminal (EL6601):

- Double-click the Ethernet switch port terminal (EL6601) in the project tree in TwinCAT.
- ► Click EtherCAT tab → Advanced Settings.
- In the Advanced Settings window select Mailbox \rightarrow EoE on the left.
- Enter the IP Address, Subnet Mask and Default Gateway.
- ⇒ The EoE function is activated in the Ethernet switch port terminal.

General EtherCAT	Process Data	Startup	CoE - Online	Online	1				
Type:	Type: EL6601 1 Port Switch (Ethemet, CoE)								
Auto Inc Addr:	FFFE]							
EtherCAT Addr:	1003 *			Advanc	ced Settings				
Previous Port:	Term 2 (EK110	0) - B			~				
Advanced Setting	gs	EoE							
Ma → Esc Access → Esc Access	Settings tion SM mands		Airtual Ethemed al MAC Id: Switch Port DHCP IP Address Subnet Mas Default Gate DNS Server DNS Name:	t Port — sk: eway: r: equested	02 01 05 10 03 eb 192.168.122. 1 255.255.255. 0 192.168.122. 1 				

Fig. 47: TwinCAT – Activating EoE in switch port terminal



Activating EoE in EtherCAT slave:

- ► In the project tree double-click **Box 4 (BL20-E-GW-EC-20)**.
- ► Click EtherCAT tab → Advanced Settings.
- In the Advanced Settings window select Mailbox \rightarrow EoE on the left.
- Enter the IP Address, Subnet Mask and Default Gateway.
- ⇒ The EoE function is activated in the EtherCAT slave.

Type: BLQE-EGW-EC-20 Product/Revision: 100037881 / 1 Auto Inc Add: FFFE BrencAT Add: 1000 Automatic Advanced Settings Identification Value: 4 Previous Pot: Hot Connect' any pot Advanced Settings	General EtherCAT	Process Data	Plc	Hot Connect	Slots	Startup	CoE - Online	AoE - Online	Diag History	Online			
Product/Revision: 100037881/1 Auto Inc Add: FFFE EtherCAT Add: 0 Advanced Settings decritication Value: 4 Previous Pot: Hot Connect'-any pot Connect'-any pot Connec	Type:	BL20-E-GW-	EC-20]					
Adv Inc Add: EtherCAT Addr: Identification Value: 4 Previous Pot: Hot Connect - any pot Coce Foe Distributed Clock Assign to local µC ESC Access DIS Server: DNS Name: DNS Name: The Stamp Requested OK Abbrechem	Product/Revision:	100037881 /	/1]					
EtherCAT Add: 1003 Identification Value: 4 Previous Port: Het Connect'- any port	Auto Inc Addr:	FFFE											
dertification Value: 4 Previous Port: Hot Connect'- any port Advanced Settings CoE Oracle Oracle <td>EtherCAT Addr:</td> <td>1003</td> <td>*</td> <td></td> <td>Advan</td> <td>iced Setting</td> <td>js</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	EtherCAT Addr:	1003	*		Advan	iced Setting	js						
Previous Port: Not Connect - arry pot Advanced Settings Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect - arry pot Image: Connect -	Identification Value:	4	-										
Advanced Settings General Mailbox CoE FoE Witual Bhemet Pot Vitual MAC (d: © Distributed Clock Assign to local µC Lach B ESC Access DNS Server: DNS Server: DNS Server: DNS Name: DNS Name: DNS Name: DNS Name: DNS Name: DNS Name:	Previous Port:	'Hot Connect	t' - any poi	t			\sim						
Advanced Settings												~	n I
 General Mailbox CoE FoE BoE Witual Ethemet Pot Vitual MAC Id: © 201051003eb Switch Pot Switch Pot DHCP P Pot DHCP Subnet Mask: 255.255.0 Default Gateway: 192.168.122.65 DNS Server: DNS Name: Time Stamp Requested 						Adv	anced Sett	ings				^	1
OK Abbrechen	 General Mailbox CoE FoE EoE Distributed CI Latch ⊕ ESC Access 	ock Jocal µC		Virtual Ethernet F val MAC Id: Switch Port P Port DHCP IP Address Subnet Mask: Default Gatew DNS Server: DNS Name: Time Stamp Reg	Port	02 01 05 1 192.168 255.255 192.168	10 03 eb 122.0 .255.0 .122.65						
											ОК	Abbrechen	

Fig. 48: TwinCAT: activating EoE in EtherCAT slave



NOTE DHCP is not support by BL20-E-GW-EC-20.



Activating EoE in CODESYS

In CODESYS, EoE is activated in the EtherCAT master by default.

Activating EoE in EtherCAT slave:

- ► In the project tree double-click BL20_E_GW_EC_20 (BL20-E-GW-EC-20).
- Select the **EoE Settings** tab.
- Enter the IP Address, Subnet Mask and Default Gateway.
- ⇒ The EoE function is activated in the EtherCAT slave.

BL20_E_GW_EC_20 ×		
General	Settings	
Expert Process Data	Virtual MAC ID	02-01-05-10-03- E 9
Process Data	 Switch port 	◉ IP port
Startup Parameters	IP Settings	
EoE Settings	Subnet mask	192 . 168 . 145 . 68 255 . 255 . 255 . 0
Log	Default gateway	192 . 168 . 145 . 65
EtherCAT I/O Mapping	DNS server	0.0.0.0
EtherCAT IEC Objects	DNS name	BL20_E_GW_EC_20
Status		
Information		
<		>

Fig. 49: CODESYS: activating EoE in EtherCAT slave



Configuring the device

After EoE was activated in the EtherCAT master and in the EtherCAT slave, the device can be configured in the web server.

Configuring the device in the web server

Requirement: The BL20-E-GW-EC-20 already has an IP address.

- Access the web server by entering the IP address in the web browser.
- Log in to the device's web server.
- Configure the device and send the changes to the device via Write.

			URCK
MAIN IODD CONFIGURATOR	DOCUMENTATION		LOGOUT
BL20-E-GW-EC-20	BL20-E-GW-EC-20 - Gateway - Par	ameter	
ji Info र्हुट्रे: Parameter	Read Write Tab view Print Data format		
🕑 Diagnosis 🦺	Device		A
Event log	Deactivate WEB server	no 🗸	
Change Password	EtherCAT configuration Deactivate all diagnostics	yes 🗸 🏅 🥐	
SLOT 1: E-16DI-24VDC-P	Deactivate load voltage diagnostics	no ?	
SLOT 2: E-16DI-24VDC-N	Output on fieldbus error	set to 0 🔹 🤨	
SLOT 3: E-4IOL 🚹	Deactivate I/O-ASSISTANT Force Mode	set to 0 set substitute value	
SLOT 4: E-16DO-24VDC-0.5A-N	Output behavior at differing I/O configuration	hold current value ?	
SLOT 5: E-4AO-U/I	Output behavior if a module is wrong	set to 0 🗸	
SLOT 6: E-4AI-TC	Startup even if configuration does not match	no 🗸	
နှိ်} Parameter	Resets Reboot	EXECUTE REBOOT	
তিৣ Diagnosis <u>↑</u> ⊋৺্র Input	Factory reset and reboot	EXECUTE RESET	- 1
SLOT 7: E-8DO-24VDC-0.5A-P	Special device properties	55 44 02 04 00 00 4d 41 52 4b 55 53 00 (
SLOT 8: E-16DI-24VDC-P	Version code	MARKUS	-

Fig. 50: Web server: configuring the device



7.6 Loading the reference configuration into the gateway

The station configuration (module list) configured in the Engineering Tool is stored as reference configuration in the volatile memory of the gateway when the PLC is started or when the connected EtherCAT slaves are read (scanned).



8 Parameterizing and Configuring

8.1 Modular device model/slot definition

The BL20-E-GW-EC-20 appears in the configuration software as a modular EtherCAT slave with 32 configurable slots (**Terminals**). The slots are configured by adding/plugging predefined EtherCAT modules.

The following table shows a list of supported I/O module types.

Module type	EtherCAT module ID	
Digital input modules		
BL20-2DI-120/230VAC	0x00030056	
BL20-4DI-24VDC-N	0x00030062	
BL20-4DI-24VDC-P	0x0003005C	
BL20-4DI-NAMUR	0x00030032	
BL20-E-8DI-24VDC-P	0x0003006A	
BL20-E-16DI-24VDC-N	0x00030076	
BL20-E-16DI-24VDC-P	0x00030074	
Digital output modules		
BL20-2DO-120/230VAC-0.5A	0x00030059	
BL20-2DO-24VDC-0.5A-N	0x00030053	
BL20-2DO-24VDC-2A-P	0x00030057	
BL20-2DO-R-CO	0x00030045	
BL20-2DO-R-NO	0x00030050	
BL20-4DO-24VDC-0.5A-P	0x00030031	
BL20-E-8DO-24VDC-0.5A-P/ET	0x00030069	
BL20-E-16DO-24VDC-0.5A-N	0x00030075	
BL20-E-16DO-24VDC-0.5A-P	0x00030073	
Analog input modules		
BL20-2AIH-I	0x0003004C	
BL20-2AI-I(0/420MA)	0x00030054	
BL20-2AI-PT/NI-2/3	0x0003004A	
BL20-2AI-THERMO-PI	0x00030049	
BL20-2AI-U(-10/0+10VDC)	0x00030058	
BL20-4AI-U/I	0x0003005F	
BL20-E-4AI-TC(/ET)	0x00030063	
BL20-E-8AI-U/I-4PT/NI(/ET)	0x0003006D	
Analog output modules		
BL20-2AOH-I	0x0003004F	
BL20-2AO-I(0/420MA)	0x00030052	
BL20-2AO-U(-10/0+10VDC)	0x00030047	
BL20-E-4AO-U/I(/ET)	0x00030060	
Technology modules		
BL20-E-1CNT	0x00030034	
BL20-1RS232	0x00030033	



Module type	EtherCAT module ID
BL20-1RS485/422	0x0003003F
BL20-1SSI	0x00030041
BL20-2RFID-S	0x0003004D
BL20-E-2CNT-2PWM	0x0003003B
BL20-E-4IOL	0x0003005A
BL20-E-4IOL-10	0x0003005B
BL20-E-3EMM-CT	0x0003007D
BL20-E-3EMM-RC	0x0003007C
Power supply modules	
BL20-BR-24VDC-D	0x00030030
BL20-PF-120/230VAC-D	0x00030042
BL20-PF-24VDC-D	0x0003003E
Special modules	
empty slot	0x00030078
undefined module	0x0003007A
unsupported module	0x00030079



8.2 Device area – Device Control (0xF200)

Device Control

Device Control can be accessed via the process data if the module "Device Status/Control" is plugged.

СоЕ	CoE sub index	Byte no.	Bit	it						
index			7	6	5	4	3	2	1	0
0xF200	0x080x01	0	-	-	-	-	-	-	-	Wink
	0x100x09	1	-	-	-	-	-	-	-	-

Meaning of the device control bits

CoE index	CoE sub index	Designation	Meaning
0xF200	0x01	Wink	0: no 1: yes, activates the Wink command (only set- table in Status "Pre-OP")



СоЕ	Sub	Byte	Bit									
index	index	no.	7	6	5	4	3	2	1	0		
0xF800	0x07 0x01	0	Deactivate load voltage diagnostics	-	-	-	Deact. web server	Output behavior at communica- tion loss		Deactivate all diags		
	0x0F 0x08	1	-	Deactivate Force Mode	-	Startup if config not matching	Output be if one mo wrong	ehavior dule is	Output b I/O confi	ehavior at g difference		

8.3 Device area – general device parameters (0xF800)

Meaning of parameter bits

The default values are written in **bold**.

CoE index	Sub index	Designation		Meaning			
0xF800	0x01	Deactivate all	0: No	All diagnostic and alarm messages are sent.			
		Diags	1: Yes	All diagnostic and alarm messages are suppressed.			
	0x02	Output	Failure of the Et	herCAT communication			
		behavior at communication	00: Set to 0	If the EtherCAT communication fails, the gateway switches the digital output channels to 0.			
		loss	01: Substitute value	The gateway sends an error information to the I/O modules and switches the outputs of I/O modules that do not have a substitute value parameter (e.g. digital output modules) to 0. Outputs of I/O modules with substitute value parameter (e.g. example BL20-E-4AO-U/I) send the substitute value, which may also have been parame- terized channel-specific in the module			
			10: Hold cur- rent value	The gateway holds the instantaneous value for the outputs of the I/O modules.			
	0x03	Deact. Web server	Note: Activating or de	activating the web server requires a device restart.			
			0: No	The web server in the device is activated.			
			1: Yes	The web server in the device is deactivated.			
	0x07	Deactivate					
		load voltage	0: No	Load voltage diagnostics are activated.			
		alagnostics	1: Yes	All load voltage diagnostics are deactivated.			



CoE index	Sub index	Designation		Meaning			
	0x08	Output behavior if I/O config differs	The module list module that has matches that of	has been changed adaptably, i.e. it contains at least one s not been configured but whose process data width the configured module.			
			00: Set to 0	The gateway switches the outputs of modules to 0.			
			01: Substitute value	The gateway sends an error information to the I/O modules and switches the outputs of I/O modules that do not have a substitute value parameter (e.g. digital output modules) to 0. Outputs of I/O modules with substitute value parameter (e.g. example BL20-E-4AO-U/I) send the substitute value, which may also have been parame- terized channel-specific in the module.			
			10: Hold current value	The gateway holds the instantaneous value for the out- puts of the I/O modules.			
			11: Exchange process data	The gateway continues to exchange process data with the other module bus stations.			
	0x09	Output behavior if a module is wrong	The module list data width of th the process data station contains	has been changed in a non-adaptable way, i.e. the process be currently plugged I/O modules no longer corresponds to a width of the previously configured modules. The BL20 is at least one wrong module.			
			00: Set to 0	The gateway switches the outputs of modules to 0. The gateway does not send error information.			
			01: Substitute value	The gateway sends an error information to the I/O modules and switches the outputs of I/O modules that do not have a substitute value parameter (e.g. digital output modules) to 0. Outputs of I/O modules with substitute value parameter (e.g. example BL20-E-4AO-U/I) send the substitute value, which may also have been parame- terized channel-specific in the module.			
			10: Hold current value	The gateway holds the instantaneous value for the outputs of the I/O modules.			
			11: Exchange process data	The gateway continues to exchange process data with the other module bus stations.			
	0x0A	Startup if config	Startup also if co	onfiguration does not match			
		not matching	0: No	After a configuration change during operation, a dynamic configuration transfer is initiated (applies e.g. to acyclic parameterization). The communication to EtherCAT is interrupted immediately. The behavior is independent of the parameterization for the error case.			
			1 = Yes	The start-up of the BL20 station with a deviating module list is possible. Depending on the gateway parameteriza- tion ("Output behavior at I/O config differing" or "Output behavior if one module is wrong"), the process data exchange can continue. A station with an unsupported I/O module does not start.			
	0x0C	Deactivate Force	0: No				
		Mode	1: Yes	The force mode is deactivated. The use of the DTM is currently not supported.			



8.4 I/O channel parameters (Configuration Area, 0x8000...0x8FFF)

The Gateway parameters are set via Device Level Entries [> 59].

The parameters of the I/O modules plugged into the BL20 station occupy the CoE indices 0x8000...0x8FFF. 16 byte parameters are reserved for each I/O module. A maximum of 32 I/O modules can follow the gateway. The parameters of the I/O modules occupy the indices according to the module sequence in the BL20 station:

- I/O module 1: 0x8000...0x800F
- I/O module 2: 0x8010...0x801F
- I/O module 3: 0x8020...0x803F
- ...
- I/O module 32: 0x81F0...0x81FF



9 Operating

9.1 Input Area, TxPDOs, 0x6000...0x6FFF

The input data of the I/O modules plugged into the BL20 station occupy the CoE indices 0x6000...0x6FFF. 16 byte input data are reserved for each I/O module. A maximum of 32 I/O modules can follow the gateway. The input data of the I/O modules occupy the indices according to the module sequence in the BL20 station:

- I/O module 1: 0x6000...0x600F
- I/O module 2: 0x6010...0x601F
- I/O module 3: 0x6020...0x603F
- • • •
- I/O module 32: 0x61F0...0x61FF

9.2 Output Area, RxPDOs, 0x7000...0x7FFF

The output data of the I/O modules plugged into the BL20 station occupy the CoE indices 0x7000...0x7FFF. 16 byte output data data are reserved for each I/O module. A maximum of 32 I/O modules can follow the gateway. The output data of the I/O modules occupy the indices according to the module sequence in the BL20 station:

- I/O module 1: 0x7000...0x700F
- I/O module 2: 0x7010...0x701F
- I/O module 3: 0x7020...0x703F
- ...
- I/O module 32: 0x71F0...0x71FF



9.3 LED displays

LED GW	Meaning
Off	No voltage
Green	Gateway ready for operation
Green flashing	Undervoltage U_{SYS} and or U_L
Orange (LED lights up red and green at the same time)	Internal flashing of the device after firmware download via FoE
Red	At least one I/O module sends active diagnosis.
Red flashing	Wink command active
LED IOs	Meaning
Green	The configured modules match the plugged modules.
Red blinking	No communication via the module bus At least one module has to be plugged and has to be able to communicate with the gateway.
Red/green flashing	 The current and the projected module list do not match. The data exchange is still in progress. The gateway is still in INIT status, the module list has not yet been written to the gateway.
LED RUN	Meaning
Off	Status Init
Green flashing	Status Pre Operational
Green flashing, 1 $ imes$	Status Safe Operational
Green	Status Operational
Green flickering	Status Bootstrap
LED ERR	Meaning
Off	No error
Red	Controller error (Application controller Failure)
Red flashing, 1 $ imes$	Local error, synchronization error, device changes from status Operational to status Pre Operational
Red flashing, 2 $ imes$	Time out watchdog process data or time out watchdog EtherCAT
Red flashing	Invalid configuration



9.4 Device Area: Device Status (0xF100)

The CoE index "Device Status" (0xF100) contains the cross-station status word.

CoE index	Byte no.	Bit (sub index)										
		7	6	5	4	3	2	1	0			
0xF100	0	-	-	-	-	-	-	-	-			
	1	-	Force Mode active (0x0F)	-	-	-	-	-	-			
	2	Reserv	ed									
	3											

Meaning of the status bits

CoE sub index	Diagnostics	Meaning
0x0F	Force mode active	Currently not supported The force mode has been activated via the service interface (by DTM).



9.5 Device Area: Device Diagnosis (0xF110)

The CoE index "Device Diagnosis (0xF110) contains the cross-station status diagnostic

CoE index	Byte no.	Bit (sub index)									
		7	6	5	4	3	2	1	0		
0xF110	0	Under- voltage U _L (0x08)	-	-	-	I/O configura- tion changed (0x04)	-	-	Summarized module diagnosis (0x01)		
	1	-	-	-	-	Master config- uration error (0x0C)	Module bus error (0x0B)	Undervoltage U _{sys} (0x0A)	Overvoltage U _{sys} (0x09)		
	2	reserved									
	3										

Meaning of Diagnostic Bits

CoE sub index	Diagnostics	Meaning
0x01	Summarized module diagnosis	Group diagnostics, at least one I/O module with diagnostics function reports a diagnosis
0x04	I/O configuration changed	The real module list was changed so that process data can still be exchanged with the I/O modules. The module list created in the configuration software of the EtherCAT master serves as reference.
0x08	Undervoltage U _L	Load voltage U_L too low
0x09	Overvoltage U _{SYS}	System supply U _{SYS} too high (> 30 VDC)
0x0A	Undervoltage U _{SYS}	System supply U _{sys} too low (< 18 VDC)
0x0B	Module bus error	No communication of the I/O modules on the module bus
0x0C	Master configuration error	The module list of the station (hardware) has been changed in such a way that process data can no longer be exchanged with the I/O modules.

9.6 Diagnosis Data, 0xA000...0xAFFF

The diagnostic data of the I/O modules plugged into the BL20 station occupy the CoE indices 0xA000...0xAFFF. 16 byte diagnostic data are reserved for each I/O module. A maximum of 32 I/O modules can follow the gateway. The diagnostic data of the I/O modules occupy the indices according to the module sequence in the BL20 station:

- I/O module 1: 0xA000...0xA00F
- I/O module 2: 0xA010...0xA01F
- I/O module 3: 0xA020...0xA03F
- ····
- I/O module 32: 0xA1F0...0xA1FF



9.7 Diag History Object (0x10F3)

The Diag History Object (0x10F3) is structured according to ETG.1020. The maximum number of diagnostic messages is 50.

The default values (if available) are written in **bold**.

Sub index	Name	Data type	Access type	PDO mapping	Description
0x01	Maximum messages	UNSIGNED8	R	No	Read: Max. number of diagnostic messages (here: 50 messages) that can be stored in the diagnostic history (see sub index 6 ff.).
0x02	Newest message	UNSIGNED8	RO	No	Sub index of the latest diagnostic message (6255), Start value = 0
0x03	Newest acknow- ledged message	UNSIGNED8	RW	No	 Overwrite Mode(sub index 5, bit 4 = 0) Read = 0: The slave sets sub index 3 to 0 when messages in the message queue are overwritten. Writing = 0: (support optional) Slave deletes all messages, i.e. resets sub index 2, 3, 4 and bit 5 in sub index 5. Writing = 15: Slave returns an SDO abort with codes 0x06090030 (value range of parameter exceeded) or 0x06090032 (value of written parameter too low). Writing = 655 sub index 3 = written value without check Writing > 55255: SDO abort with codes 0x06090030 or 0x06090031 (value of written parameter too high) Acknowledge Mode (sub index 5, bit 4 = 1) Read = 0: No messages acknowledged Read <> 0: Sub index of the latest acknowledged diagnostic message (6255) Writing = 15: Slave returns an SDO abort with codes 0x06090030 (value range of parameter exceeded) or 0x06090031 (value of written parameter too high) Acknowledge Mode (sub index 5, bit 4 = 1) Read = 0: No messages acknowledged Read <> 0: Sub index of the latest acknowledged diagnostic message (6255) Writing = 15: Slave returns an SDO abort with codes 0x06090030 (value range of parameter exceeded) or 0x06090032 (value of written parameter too low) Writing = 655: Messages are acknowledged Writing > 55255: SDO abort with codes 0x06090030 or 0x06090031 (value of written parameter too high)
0x04	New messages available	BOOLEAN	RO	TxPDO	Overwrite Mode 0: latest message was read 1: latest message was not read
					 Acknowledge Mode 0: no unacknowledged message 1: diagnostic messages are present and can be acknowledged



Sub index	Name	Data type	Access type	PDO mapping	Description
0x05	Flags	UN- SIGNED16	RW	No	Flag for controlling the sending and saving of dia- gnostic messages.
					 Bit 0: Enable sending of emergencies, see "Sending emergencies". - 0: Disabled (default, if the device does not support emergencies) - 1: New diagnostic messages are sent as emergencies
					 Bit 1: Disable info messages 0: Info messages are stored in the diagnostic buffer. 1: Info messages are not stored in the diagnostic buffer.
					 Bit 2: Deactivate warning messages 0: Warning messages are stored in the diagnostic buffer. 1: Warning messages are not stored in the diagnostic buffer.
					 Bit 3: Deactivate error messages - 0: Error messages are stored in the diagnostic buffer - 1: Error messages are not stored in the
					 diagnostic buffer. Bit 4: Mode for handling the diagnostic history 0: Overwrite mode: old messages are overwritten by new ones when the buffer is full. 1: Acknowledge mode: new messages overwrite
					only messages that were previously acknow- ledged.
					 Bit 5: Overwrite/discard information in Overwrite mode: unacknowledged messages have been overwritten (=buffer overflow) (sub index 3 is also set to 0) 1: in Acknowledge mode: Message buffer full of
					unacknowledged messages, a new message is discarded.
0x06	Diagnosis message	OCTET- STRING	RO	No	Diagnosis message buffer Depending on sub index 1 the EtherCAT slave can store up to 50 diagnosis messages; the first message is stored in sub index 6, the second in sub index 7 and so on. When the buffer is full, the EtherCAT slave overwrites sub index 6 and so on. Thus always the latest messages (max. 50 messages, see subindex 1) are made accessible for the EtherCAT master.



Diagnostic message (beginning with sub index 6)

Parameters	Data type	Description						
Diag Code	UN-	Diagnosis code to identify the diagnosis message						
	SIGNED32	Bit 015	0x00000xDFFF	Reserved				
			0xE0000xE7FF	Bit 1631: can be used manufacturer specific				
			0xE800	Bit 1631: Emergency Error Code as defined in DS301 or DS4xxx				
			0xE8010xEDFF	Reserved				
			0xEE000xEFFF	Bit 1631: profile specific				
			0xF0000xFFFF	Reserved				
Flags	UN-	Bit 03		Diag type:				
	SIGNED16			00 = nfo message				
				01 = warning messag				
				10 = error message				
Text ID	UN-	Text ID as reference to Diagnosis text as defined in the ESI file						
	SIGNED16	0		No text ID				
		165535		Text ID, vendor specific text ID [▶ 69]				
Time Stamp	UN-	Time stamp in ms						
	SIGNED64	0		No time stamp				
		≠ 0		Time stamp				

Text IDs

Text ID	Meaning
0x100x21	State change request from x to y
0x11	Sync Manager x invalid address (y)
0x12	Sync Manager x invalid size (y)
0x13	Sync Manager x invalid settings (y)
0x0F	Calculate bus cycle time failed (Local timer too slow)
0x20	DC activation register is invalid
0x21	Configured SyncType (0x1C32.1 or 0x1C33.1) not supported. Check DC registers and supported SyncTypes (0x1C32.4 and 0x1C33.4)
Manufacturer specific	text IDs

Meaning of the text IDs, see diagnostic data (Diagnostic data, 0xA000...0xAFFF)

Bit 15 = 0: incoming message (Appear), Example: 0x0101

Bit 15 = 1: outgoing message (Disappear), Example: 0x8101



9.8 Resetting the device (Reset)

The device is provided with the following options to reset to the default settings:

- DIP switch at device start
- via FDT/DTM
- via the Turck Service Tool, if the EoE function is activated
- Via CoE index 0xFBF0 "Device Reset Command"

9.8.1 Resetting the device via DIP switches

The gateway is reset via the DIP switches as follows:

• Before starting the device: Set DIP switch $2^5 = "1"$ and DIP switch "Mode" = "on".



Fig. 51: Resetting the device via DIP switches

- Start the device.
- ⇒ The device is reset to factory settings.



NOTE

DIP switch "Mode" = "on" is no valid operation mode.

- ▶ After the reset to factory settings: Set DIP switch "Mode" back to "off".
- ▶ If necessary, set device ID via DIP switch 2⁰...2⁷.



9.8.2 Resetting the device with Turck Service Tool

- Click search and browse network for devices.
- Mark the device that is to be reset.
- Execute a factory reset via Actions (F4) \rightarrow Factory settings.

Yc	our Global Aut	omat	tion P	artner						UR	СК
Search (I	F5) Change (F2)	Wink (F	3) Acti	(F4)	Clipboard La	EN .	Expe	C ert view O	FF Close		
No.	MAC address	N	IP Ŭ	Reboot			Mode	Device	Version	Adapter	Protocol
- 1	00:07:46:04:EB:2B	tu	0.	Network re	eset		PG	BL20	3.3.18.0	192.168.144.244	DCP, Turck
- 2	00:07:46:1F:C0:AB		1 🖽	Factory res	et		PG	TBE	1.4.14.7	172.28.7.69	Turck
- 3 - 4	00:07:46:17:44:A4 54:4A:16:A0:F0:F9	4		Set clock Set HF RFII	D re Set device r	parameters	PG PG and ne	TBE RI 20 twork cor	1.4.1.0 1.4.1.8 nfiguration	172.28.7.69 172.28.7.69 to factory default v	Turck Turck values.
6	20:87:56:24:CE:6A	s	<u>192.16</u>	<u>3.144.162</u>	255.255.255.0	192.1	_	SCA		192.168.144.244	DCP
Found 6 D	evices.										

Fig. 52: Turck Service Tool - resetting the device to factory settings

⇒ The device is reset to factory settings.

9.8.3 Resetting the device via Object Dictionary

The device is reset via the CoE index 0xFBF0 "Device Reset Command", subindex 0x01 "Command".

Write the reset command 74 65 73 65 72 66 as hexadecimal value in CoE index 0xFBF0:01.

E- FBF0:0	Device Reset Command	> 3 <
FBF0:01	Command	RW 74 65 73 65 72 66
FBF0:02	Status	RO 0x00 (0)
FBF0:03	Response	RO 00 00

Fig. 53: TwinCAT (example) - Resetting the device to factory settings via CoE index

⇒ The device is reset to factory settings.



10 Maintenance

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

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

10.1 Carrying out the firmware update

The firmware update is performed according to ETG specification ETG.5003.0002. The FoE protocol (File access over EtherCAT) is used for the firmware update of the device. The device must be in "Bootstrap" status for the update process.

The current firmware version of the device can be read from CoE index 0x100A "Manufacturer Software Version", the current hardware version from CoE index 0x1009 "Manufacturer Hardware Version".



NOTICE

Interruption of data connection and power supply during firmware update **Risk of device damage due to faulty firmware update**

Do not interrupt the data connection and the power supply during the firmware update.


10.1.1 Updating the firmware via TwinCAT

Downloading the firmware file

The firmware file for the device is available free of charge for download from www.turck.com.

- ▶ In the project tree double-click **Box 4 (BL20-E-GW-EC-20)**.
- Click Online tab \rightarrow Status Machine \rightarrow Bootstrap.
- Click File access over EtherCAT \rightarrow Download....

General	EtherCAT	Process Data	Plc	Slots	Startup	CoE - Online	Diag History	Online
State Init Pre Op	Machine Op	Bootstrap Safe-Op Clear Error		Curren Reque	nt State: ested State	BOOT BOOT		
DLLS	Status							
Port	A: Car	rier / Open						
Port	B: No	Carrier / Closed						
Port	C: No	Carrier / Closed						
Port	D: No	Carrier / Closed						
File Access over EtherCAT Download Upload								

Fig. 54: Starting the firmware update

- In the new window select the firmware file.
- Confirm with **OK**.
- ⇒ The firmware file is loaded in the flash memory of the device.
- ⇒ The RUN LED flickers green.
- ➡ TwinCAT displays a progress bar at the bottom of the screen to indicate the download of the firmware file.

Carrying out an update

- Click Online tab \rightarrow Status Machine \rightarrow Init.
- ⇒ The update is carried out.
- ⇒ The GW LED lights up orange during the firmware update.
- \Rightarrow When the update is complete, the device switches to normal operating mode.



10.1.2 Updating the firmware via CODESYS

Prerequisites

- The used EtherCAT master supports the firmware update function.
- The device is logged in online.
- The **Expert settings** are activated on the **General** tab.
- The option **Automatically restart slaves** on the **General** tab is deactivated.

Downloading the firmware file

The firmware file for the device is available free of charge for download from www.turck.com.

- ► In the project tree double-click BL20_E_GW_EC_20 (BL20-E-GW-EC-20).
- Click Online tab \rightarrow State Machine \rightarrow Bootstrap.
- ► Click File access over EtherCAT → Download....
- In the new window select the firmware file and click \rightarrow **Open**.
- ⇒ The firmware file is loaded in the flash memory of the device.
- ⇒ The RUN LED flickers green.
- ➡ CODESYS displays a progress bar at the bottom of the screen to indicate the download of the firmware file.

BL20_E_GW_EC_20 ×	
General	State Machine
Expert Process Data	Pre-Op Safe-Op Regulated State Rootstran Mode
Process Data	Op
Startup Parameters	File access over EtherCAT
Online	Download Upload
CoE Online	E ² PROM Access Write E ² PROM Read E ² PROM Write E ² PROM XML
EoE Settings	
Diagnosis History	
Log	
EtherCAT I/O Mapping	
EtherCAT IEC Objects	
Status	
Information	
<	>

Fig. 55: Download of the firmware file

Carrying out an update

- Click Online tab \rightarrow State Machine \rightarrow Init.
- ⇒ The update is carried out.
- ⇒ The GW LED lights up orange during the firmware update.
- ⇒ If the update is completed the device switches to normal operating mode.
- Activate the option **Automatically restart slaves** on the **General** tab.



11 Repair

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

11.1 Returning devices

If a device has to be returned, bear in mind that only devices with a decontamination declaration will be accepted. This is available for download at

https://www.turck.de/en/return-service-6079.php

and must be completely filled in, and affixed securely and weather-proof to the outside of the packaging.

12 Dismounting the BL20 station from the DIN rail

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



WARNING

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

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

13 Disposal



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



14 Technical data

Technical data	
Supply	
Power supply	24 VDC
System supply U _{SYS}	24VDC/5 VDC
Field supply U _L	24 VDC
Permissible range	1830 VDC
Nominal current from module bus	≤ 200 mA
Max. field supply current	8 A
Max. system supply current	0.7 A
Isolation voltages	
U _L to U _{SYS}	500 V _{eff}
Supply to Ethernet	500 VAC
ETH1 to ETH2	500 VAC
Connectors	
Power supply	Push-in terminals
Ethernet	$2 \times RJ45$, female connector
System data	
Max. no. of modules	32
Transmission rate	EtherCAT standard
Web server	Integrated, via EoE
Service interface	EoE
Max. line length Ethernet	100 m (per segment
EtherCAT	
CAN over EtherCAT	According to Modular Device Profile (ETG.5001.1)
Supported EtherCAT protocols	CoE, EoE, FoE, AoE
Diagnostics	CoE Emergencies, Diag History Object
Address assignment	Automatic, Explicit Device Identification, Configured Station Alias
Communikation cycle	Min. 125 μs
Installing	
Type of mounting	On DIN rail with 2 \times end plate BL20-WEW-35/2-SW, 1 \times end plate BL20-ABPL The end brackets and the end plate are included in the scope of delivery.
Mounting direction	Horizontal or vertical For vertical installation, the gateway can be positioned either above or below. In this case, sufficient ventilation and heat dissipation must be ensured.
Standard/directive conformity	
Vibration test	According to IEC 60068-2-6
Acceleration	Up to 20 g
Shock test	According to IEC 60068-2-27(shock resistance), IEC 60068-2-29 (resistance to repetitive shocks)



Technical data	
Drop and topple	According to EN 60068-2-31, according to IEC 60068-2- 2 (free fall)
Electro magnetic compatibility	According to EN 61131-2
Approvals and certificates	CE, cULus UKCA
UL cond.	cULus LISTED 3ZF0, Encl.Type 1 IND.CONT.EQ.
General information	
Dimensions (w \times l \times h)	33.5 × 129.5 × 74.4 mm
Operating temperature	0+55 °C For vertical installation, the gateway can be positioned either above or below. In this case, sufficient ventilation and heat dissipation must be ensured.
Storage temperature	-25+85 ℃
Relative humidity	5 95 % (indoor), Level RH-2, no condensation (storage at 45 $^{\circ}$ C, no function test)
Pollution degree according to IEC 664 (EN 61 131)	2
Degree of protection to IEC 529/EN 60529	IP20 (not evaluated by UL)
MTTF	294 years acc. to SN 29500 (Ed. 99) 20 °C
Halogen free	Yes

Technical data push-in terminals

Technical data	
Insulation stripping length	8 mm
Max. clamping range	0.21.5 mm ²
Clampable wires (cross section)	
Rigid	0.21.5 mm ²
Flexible	0.21.5 mm ²
Flexible with ferrule without plastic sleeve	0.21.5 mm ²
Flexible with ferrule with plastic sleeve	0.20.75 mm ²
Wire cross section AWG	2416



15 Turck branches — contact data

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



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





104



www.turck.com