

Documentation | EN

CU1123, CU1124, CU1128

EtherCAT junction and EtherCAT hub

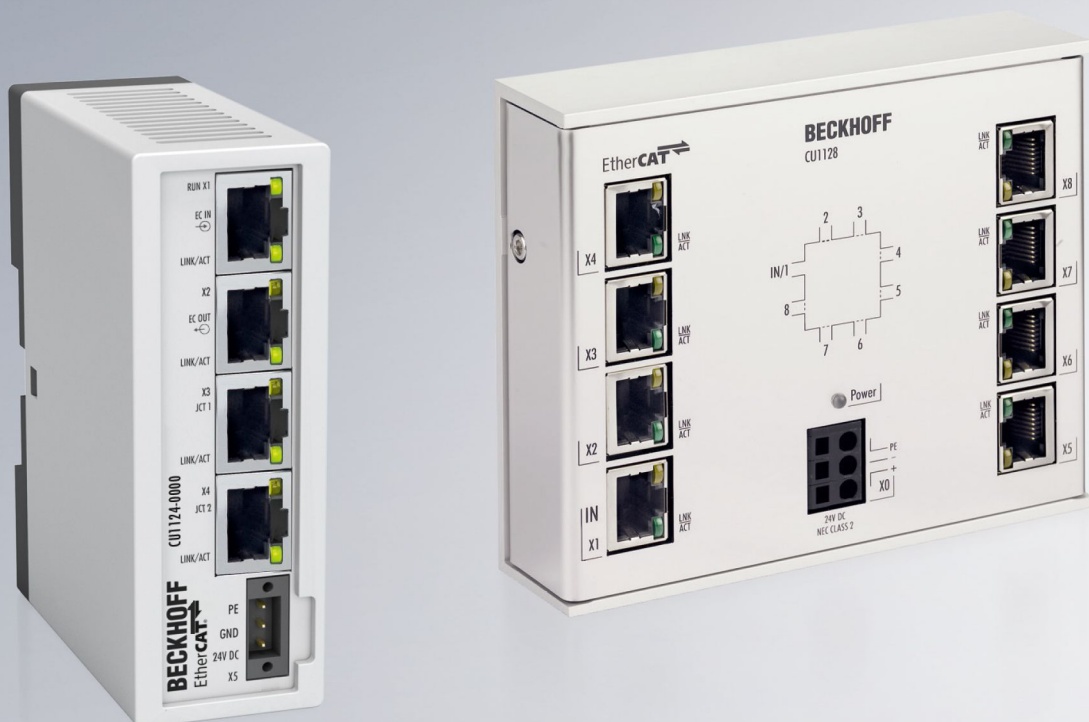


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1 Foreword

1.1 Product overview EtherCAT-junctions

CU1123 [► 16]	EtherCAT-junction 3-port, RJ45
CU1123-0010 [► 16]	EtherCAT-junction 3-port, RJ45, Extended Distance
CU1124 [► 16]	EtherCAT-junction 4-port, RJ45
CU1128 [► 20]	EtherCAT-junction

1.2 Guide through documentation

NOTICE



Further components of documentation

This documentation describes device-specific content. It is part of the modular documentation concept for Beckhoff I/O components. For the use and safe operation of the devices described in this documentation, additional cross-product descriptions are required, which can be found in the following table.

Title	Description
EtherCAT System Documentation (PDF)	<ul style="list-style-type: none">• System overview• EtherCAT basics• Cable redundancy• Hot Connect• EtherCAT devices configuration
Infrastructure for EtherCAT/Ethernet (PDF)	Technical recommendations and notes for design, implementation and testing
Software Declarations I/O (PDF)	Open source software declarations for Beckhoff I/O components

The documentations can be viewed at and downloaded from the Beckhoff website (www.beckhoff.com) via:

- the “Documentation and Download” area of the respective product page,
- the [Download finder](#),
- the [Beckhoff Information System](#).

If you have any suggestions or proposals for our documentation, please send us an e-mail stating the documentation title and version number to: documentation@beckhoff.com

1.3 Notes on the documentation

Intended audience

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards.

It is essential that the documentation and the following notes and explanations are followed when installing and commissioning these components.

The qualified personnel is obliged to always use the currently valid documentation.

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development.

We reserve the right to revise and change the documentation at any time and without prior announcement.

No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

Trademarks

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<https://www.beckhoff.com/trademarks>

1.4 Safety instructions

Safety regulations

Please note the following safety instructions and explanations!

Product-specific safety instructions can be found on following pages or in the areas mounting, wiring, commissioning etc.

Exclusion of liability

All the components are supplied in particular hardware and software configurations appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH & Co. KG.

Personnel qualification

This description is only intended for trained specialists in control, automation and drive engineering who are familiar with the applicable national standards.

Signal words

The signal words used in the documentation are classified below. In order to prevent injury and damage to persons and property, read and follow the safety and warning notices.

Personal injury warnings

DANGER

Hazard with high risk of death or serious injury.

WARNING

Hazard with medium risk of death or serious injury.

CAUTION

There is a low-risk hazard that could result in medium or minor injury.

Warning of damage to property or environment

NOTICE

The environment, equipment, or data may be damaged.

Information on handling the product



This information includes, for example:
recommendations for action, assistance or further information on the product.

1.5 Documentation issue status

Version	Comment
2.9.0	<ul style="list-style-type: none"> • Chapter “Technical data” updated • Chapter “Mounting” updated • Document structure updated
2.8	<ul style="list-style-type: none"> • Update Chapter “CU1123-00x0, CU1124 - Technical data” and “Dimensions” • Update structure
2.7	<ul style="list-style-type: none"> • Chapter “Technical data” updated • Renderings updated • Document structure updated
2.6	<ul style="list-style-type: none"> • Links updated
2.5	<ul style="list-style-type: none"> • Chapter “Cabling of power supply” updated • Chapter “Technical data” updated • CU1123-0010 added • Chapter “Disposal” added
2.4	<ul style="list-style-type: none"> • Chapter “Technical data” updated • Document structure updated
2.3	<ul style="list-style-type: none"> • Chapter “Version identification of EtherCAT devices” updated • Chapter “Technical data” updated • CU1123-0010 added • Chapter “Disposal” added
2.2	<ul style="list-style-type: none"> • Chapter “Technical data” updated • Renderings updated • Document structure updated
2.1	<ul style="list-style-type: none"> • New title page • CU1123 and CU1124 added • Document structure updated
2.0	<ul style="list-style-type: none"> • Migration
1.0	<ul style="list-style-type: none"> • Addenda • First public issue
0.1	<ul style="list-style-type: none"> • Preliminary version

1.6 Version identification of EtherCAT devices

1.6.1 General notes on marking

Name

A Beckhoff EtherCAT device has a 14-digit technical designation consisting of

- Family key
- Type
- Version
- Revision

Example	Family	Type	Version	Revision
EL3314-0000-0016	EL Terminal 12 mm, fixed connection level	3314 4-channel thermocouple terminal	0000 basic type	0016
ES3602-0010-0017	ES Terminal 12 mm, pluggable connection level	3602 2-channel voltage measurement	0010 high-precision version	0017
CU2008-0000-0000	CU device	2008 8-port Fast Ethernet switch	0000 basic type	0000

Notes

- The elements stated above result in the **technical designation**. EL3314-0000-0016 is used in the example below.
- EL3314-0000 is the order identifier, for “-0000” usually abbreviated to EL3314. “-0016” is the EtherCAT revision.
- The **order identifier** is composed of
 - family key (EL, EP, CU, ES, KL, CX, etc.)
 - type (3314)
 - version (0000)
- The **revision** -0016 reflects the technical progress such as feature enhancement with regard to EtherCAT communication and is managed by Beckhoff.
In principle, a device with a higher revision can replace a device with a lower revision, unless otherwise specified, e.g. in the documentation.
There is usually a description (ESI, EtherCAT Slave Information) in the form of an XML file which is associated and synonymous with each revision, and this is available for download from the Beckhoff website.
Since January 2014, the revision has been marked on the outside of the IP20 terminals; see Fig. *“EL2872 with revision 0022 and serial number 01200815.”*
- The type, version, and revision are read as decimal numbers, even if they are technically saved in hexadecimal.

1.6.2 Version identification of CU Infrastructure Components

The serial number/date code for Beckhoff IO devices is usually the 8-digit number printed on the device or on a sticker. The serial number indicates the configuration in delivery state and therefore refers to a whole production batch, without distinguishing the individual modules within a batch.

Structure of the serial number: **KK YY FF HH**

KK – week of production (calendar week)

YY – year of production

FF – firmware version

HH – hardware version

Example with serial number 12 06 3A 02:

12 – week of production 12

06 – year of production 2006

3A – firmware version 3A

02 – hardware version 02

CU1521

EtherCAT media
converter, multimode
fiber optic



BTN: 00007su0

Ser. No.: 4820/

Made in GERMANY



Fig. 1: CU1521 switch with serial number 4820/ and the unique Beckhoff Traceability Number (BTN) 00007su0

1.6.3 Beckhoff Identification Code (BIC)

The Beckhoff Identification Code (BIC) is increasingly being applied to Beckhoff products to uniquely identify them. The BIC is represented as a Data Matrix code (DMC, code schema ECC200); its content is based on ANSI standard MH10.8.2-2016.

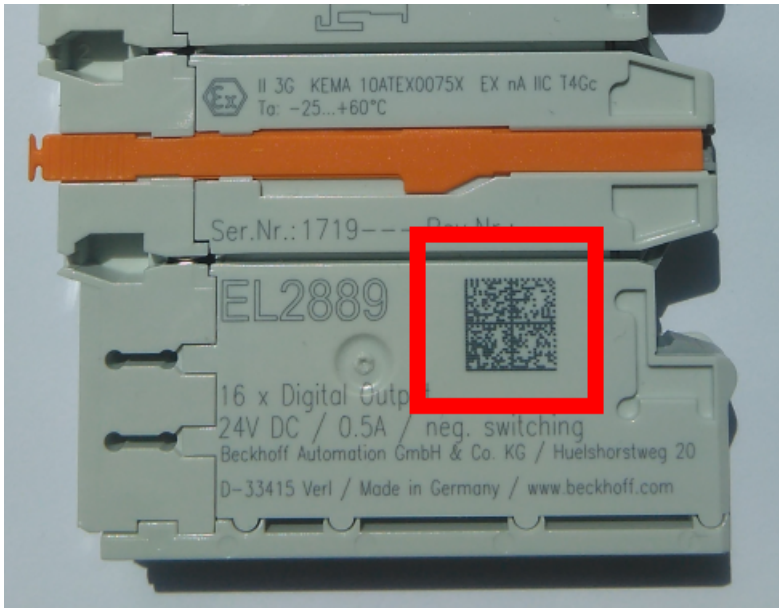


Fig. 2: BIC as a Data Matrix code (DMC, ECC200 code scheme)

The BIC is being introduced gradually across all product groups. Depending on the product, it can be found in the following locations:

- on the packaging unit
- directly on the product (if space suffices)
- on the packaging unit and the product

The BIC is machine-readable and contains information that can be used for handling and product management by the customer.

Each item of information is clearly identifiable with the data identifier (ANSI MH10.8.2-2016). The data identifier is followed by a character string. Both together have a maximum length stated by the following table. If the items of information are shorter, spaces are added.

The following information may be present; items 1 through 4 are always included, while the others depend on the product family's requirements:

Item no.	Type of information	Explanation	Data identifier	Number of characters including the data identifier	Example
1	Beckhoff order number	Beckhoff order number	1P	8	1P 072222
2	Beckhoff Traceability Number (BTN)	Unique serial number, see note below	SBTN	12	SBTN k4p562d7
3	Article description	Beckhoff article description, e.g. EL1008	1K	32	1K EL1809
4	Quantity	Quantity in packaging unit, e.g. 1, 10, etc.	Q	6	Q 1
5	Batch number	Optional: Year and week of production	2P	14	2P 401503180016
6	ID/serial number	Optional: Previous serial number system, e.g., for safety products or calibrated terminals	51S	12	51S 678294
7	Variant	Optional: Product variant number on the basis of standard products	30P	12	30P F971, 2*K183
...					

Beckhoff uses additional types of information and data identifiers for internal processes.

Structure of the BIC

Example of composite information consisting of items 1 through 4 and the example value mentioned above in item 6. The data identifiers are highlighted in bold:

1P072222**SBTN**k4p562d7**1K**EL1809 **Q**1 **51S**678294

The same number as a DMC:



Fig. 3: Example DMC **1P**072222**SBTN**k4p562d7**1K**EL1809 **Q**1 **51S**678294

BTN

An important component of the BIC is the Beckhoff Traceability Number (BTN, item no. 2). The BTN is a unique 8-character serial number that will replace all other serial number systems at Beckhoff in the future (e.g. batch designations on IO components, previous serial number circle for safety products, etc.). The BTN is also being introduced gradually, so it may not yet be coded in the BIC.

NOTICE

This information has been carefully prepared. However, the method described is constantly being refined. We reserve the right to revise and change procedures and documentation at any time and without notice. No claims for modification may be made on the basis of the data, diagrams, and descriptions in this documentation.

1.6.4 "Electronic access to the BIC (eBIC)"

Electronic BIC (eBIC)

The Beckhoff Identification Code (BIC) is applied to the outside of Beckhoff products in a visible place. If possible, it should also be electronically readable.

The interface that the product can be electronically addressed by is crucial for the electronic readout.

K-bus devices (IP20, IP67)

Currently, no electronic storage or readout is planned for these devices.

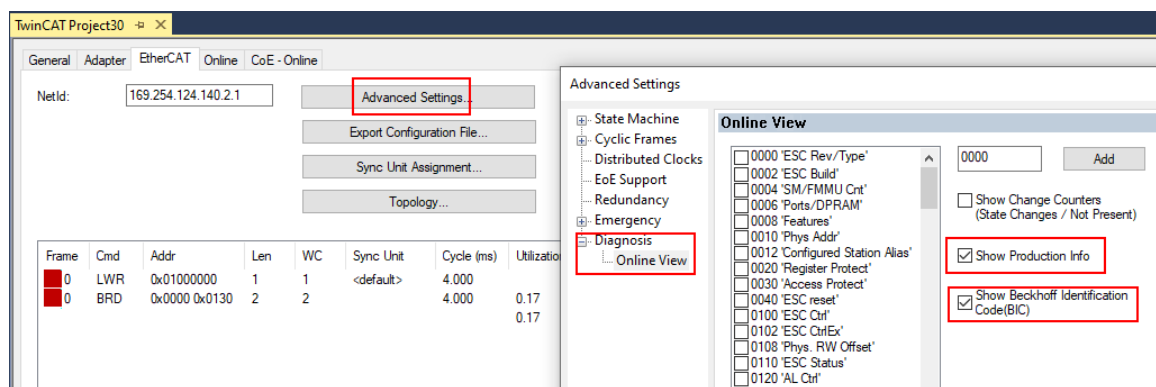
EtherCAT devices (IP20, IP67)

All Beckhoff EtherCAT devices have an ESI-EEPROM which contains the EtherCAT identity with the revision number. The EtherCAT slave information, also colloquially known as the ESI/XML configuration file for the EtherCAT master, is stored in it. See the corresponding chapter in the EtherCAT system manual ([Link](#)) for the relationships.

Beckhoff also writes the eBIC in the ESI-EEPROM. The eBIC was introduced into Beckhoff IO production (terminals, box modules) in 2020; as of 2023, implementation is largely complete.

The user can electronically access the eBIC (if present) as follows:

- With all EtherCAT devices, the EtherCAT master (TwinCAT) can read the eBIC from the ESI-EEPROM:
 - From TwinCAT 3.1 build 4024.11, the eBIC can be displayed in the online view.
 - To do this, check the "Show Beckhoff Identification Code (BIC)" checkbox under EtherCAT → Advanced Settings → Diagnostics:



- The BTN and its contents are then displayed:

No	Addr	Name	State	CRC	Fw	Hw	Production Data	ItemNo	BTN	Description	Quantity	BatchNo	SerialNo
1	1001	Term 1 (EK1100)	OP	0, 0	0	0	---						
2	1002	Term 2 (EL1018)	OP	0, 0	0	0	2020 KW36 Fr	072222	k4p562d7	EL1809	1		678294
3	1003	Term 3 (EL3204)	OP	0, 0	7	6	2012 KW24 Sa						
4	1004	Term 4 (EL2004)	OP	0, 0	0	0	---	072223	k4p562d7	EL2004	1		678295
5	1005	Term 5 (EL1008)	OP	0, 0	0	0	---						
6	1006	Term 6 (EL2008)	OP	0, 0	0	12	2014 KW14 Mo						
7	1007	Term 7 (EK1110)	OP	0	1	8	2012 KW25 Mo						

- Note: As shown in the figure, the production data HW version, FW version, and production date, which have been programmed since 2012, can also be displayed with "Show production info".
- Access from the PLC: From TwinCAT 3.1. build 4024.24, the functions *FB_EcReadBIC* and *FB_EcReadBTN* for reading into the PLC are available in the *Tc2_EtherCAT* library from v3.3.19.0.
- EtherCAT devices with a CoE directory may also have the object 0x10E2:01 to display their own eBIC, which can also be easily accessed by the PLC:

- The device must be in PREOP/SAFEOP/OP for access

Index	Name	Flags	Value
1000	Device type	RO	0x015E1389 (22942601)
1008	Device name	RO	ELM3704-0000
1009	Hardware version	RO	00
100A	Software version	RO	01
100B	Bootloader version	RO	J0.1.27.0
+ 1011:0	Restore default parameters	RO	> 1 <
+ 1018:0	Identity	RO	> 4 <
+ 10E2:0	Manufacturer-specific Identification C...	RO	> 1 <
10E2:01	SubIndex 001	RO	1P158442SBTN0008jekp1KELM3704 Q1 2P482001000016
+ 10F0:0	Backup parameter handling	RO	> 1 <
+ 10F3:0	Diagnosis History	RO	> 21 <
10F8	Actual Time Stamp	RO	0x170bfb277e

- The object 0x10E2 will be preferentially introduced into stock products in the course of necessary firmware revision.
- From TwinCAT 3.1. build 4024.24, the functions *FB_EcCoEReadBIC* and *FB_EcCoEReadBTN* for reading into the PLC are available in the *Tc2_EtherCAT* library from v3.3.19.0
- The following auxiliary functions are available for processing the BIC/BTN data in the PLC in *Tc2_Uutilities* as of TwinCAT 3.1 build 4024.24
 - *F_SplitBIC*: The function splits the BIC *sBICValue* into its components using known identifiers and returns the recognized substrings in the *ST_SplittedBIC* structure as a return value
 - *BIC_TO_BTN*: The function extracts the BTN from the BIC and returns it as a return value
- Note: If there is further electronic processing, the BTN is to be handled as a string(8); the identifier "SBTN" is not part of the BTN.
- On the technical background:
The new BIC information is written as an additional category in the ESI-EEPROM during device production. The structure of the ESI content is largely dictated by the ETG specifications, therefore the additional vendor-specific content is stored using a category in accordance with the ETG.2010. ID 03 tells all EtherCAT masters that they may not overwrite these data in the event of an update or restore the data after an ESI update.
The structure follows the content of the BIC, see here. The EEPROM therefore requires approx. 50... 200 bytes of memory.
- Special cases
 - In a hierarchical configuration of multiple ESCs (EtherCAT Slave Controllers) within a single device, only the top-level ESC carries the eBIC information.
 - If multiple non-hierarchically arranged ESCs are installed in a device, all ESCs carry the eBIC information.
 - If the device consists of several sub-devices which each have their own identity, but only the top-level device is accessible via EtherCAT, the eBIC of that ESC is located in the CoE object directory 0x10E2:01 and the eBICs of the sub-devices follow in 0x10E2:nn.

PROFIBUS, PROFINET, DeviceNet® devices, etc.

Currently, no electronic storage or readout is planned for these devices.

2 CU1123-00x0, CU1124 - Product description

2.1 Introduction

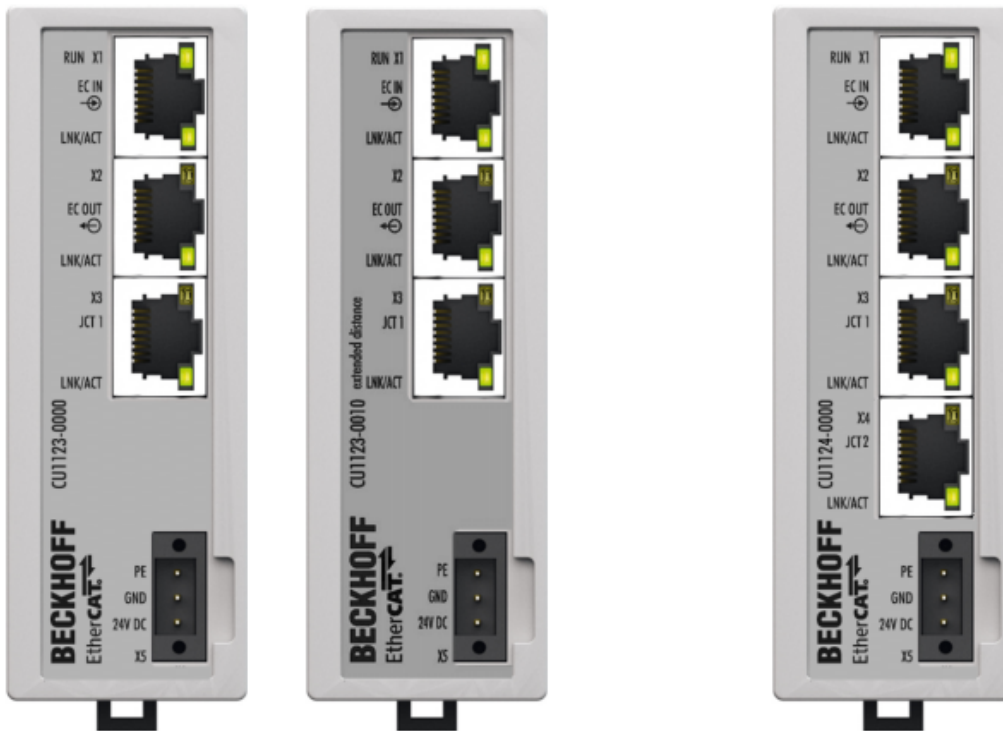


Fig. 4: CU1123, CU1123-0010, CU1124

EtherCAT hub, 3-port / 4-port, RJ45

Line, tree or star – EtherCAT supports almost any topology. The 3-port CU1123 and CU1123-0010 and the 4-port CU1124 EtherCAT junction provide compact solutions to cascade an EtherCAT network. Where junctions with several ports need to be implemented outside of the EtherCAT Terminal system, the DIN rail-mountable EtherCAT junctions can be used instead of the EK1122 EtherCAT Coupler and the 8-port CU1128 EtherCAT junction.

Port 1 is the input port for the EtherCAT network.

Additional EK1100 Couplers or EtherCAT Box modules can be connected via the ports

- 2 and 3 of the EtherCAT junctions CU1123 and CU1123-0010,
- 2, 3 and 4 of the EtherCAT junction CU1124

The EtherCAT junctions are connected via RJ45 ports with direct display of link and activity status.

CU1123, CU1123-001, CU1124 - Hot-Connect

In conjunction with TwinCAT or other suitable EtherCAT masters, the CU1123, CU1123-0010 and CU1124 EtherCAT junctions permit the connection or disconnection of EtherCAT strands while the network is in operation (Hot Connect). The device cannot be used as a standard Ethernet switch.

CU1123-0010

Using the [extended distance connection](#) [► 18], distances of up to 300 m can be bridged between two Extended Distance stations. If only one connection of the two stations is configured for Extended Distance (e.g. connecting EtherCAT Box modules), the maximum distance between the stations is 100 m. The EtherCAT branches are connected via RJ45 ports featuring link and activity status indicators.

2.2 Technical data

Technical data	CU1123-0010	CU1123	CU1124
Task in the EtherCAT system	Coupling of EtherCAT junctions		
Transmission medium	Ethernet/EtherCAT cable (min. CAT 5, 4-wire, AWG22), shielded	Ethernet/EtherCAT cable (min. CAT 5), shielded	
Bus interface	3 x RJ45	3 x RJ45	4 x RJ45
Distance between stations	Max. 300 m (<u>extended distance connection</u> [► 18])	max. 100 m (100BASE-TX)	
Protocol	EtherCAT		
Distributed Clocks	yes		
Delay	approx. 1 µs per port		
Data transfer rates	100 MBit/s		
Power supply	via three-pole spring loaded terminal (+, -, PE)		
Supply voltage	24 V _{DC} (-15 % / 20 %)		
Current consumption	typ. 100 mA		
Weight	approx. 220 g	approx. 220 g	approx. 240 g
Dimensions without connector (W x H x D)	approx. 35 mm x 98.5 mm x 76.5 mm		
<u>Mounting</u> [► 22]	on 35 mm mounting rail (EN 60715)		
Permissible ambient temperature range during operation	0°C ... + 55°C		
Permissible ambient temperature range during storage	-25°C ... + 85°C		
Permissible relative humidity	95%, no condensation		
Vibration/shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27		
EMC immunity/emission	conforms to EN 61000-6-2 / EN 61000-6-4		
Protection class	IP20		
Installation position	variable		
Replacement Power Supply Connector	<u>C9900-P944</u> [► 25]: Power supply connector, 3-pin push-in wiring connector		
Approvals/markings ^{*)}	CE, EAC, UKCA		

^{*)} Real applicable approvals/markings see type plate on the side (product marking).

2.3 Notes on Extended Distance connection

Using components which support the Extended Distance connection, distances of up to 300 m can be bridged (for connections between two Extended Distance components). These components are marked with “extended distance” both in chapter “Technical data” and on the respective RJ45 sockets of the component. In the TwinCAT System Manager “Extended Distance” is part of the type designation (tab “General”, “Type”).

Topologies with Extended Distance components, distances up to 300 m

Distances of up to 300 m can be bridged between two Extended Distance components. Possible topologies are shown in the following figure.

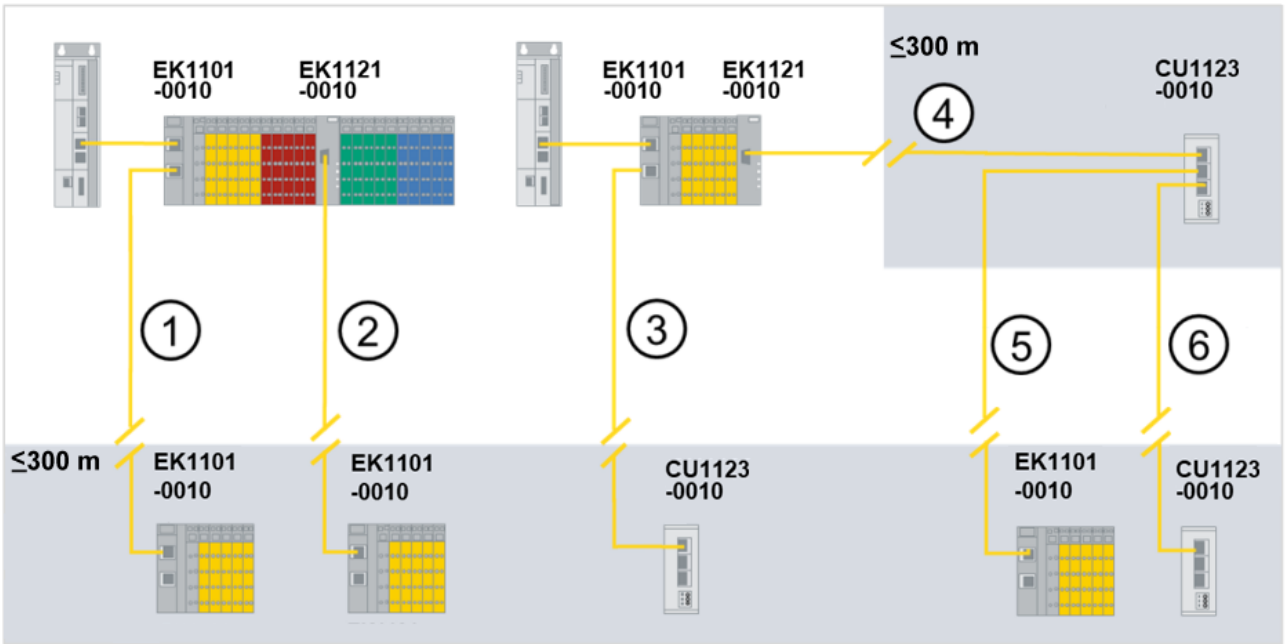


Fig. 5: Topologies with Extended Distance components, distances up to 300 m

Topologies with Extended Distance components, distances up to 300 m		
No. in the figure above	1 st Component	2 nd Component
1	EK1101-0010	EK1101-0010
2	EK1121-0010	EK1101-0010
3	EK1101-0010	CU1123-0010
4	EK1121-0010	CU1123-0010
5	CU1123-0010	EK1101-0010
6	CU1123-0010	CU1123-0010

Not permitted topologies with Extended Distance components

The EK1121-0010 EtherCAT junction cannot be used as a 2nd component because the EtherCAT port is not an output port. The following figure shows not permitted topologies with Extended Distance components.

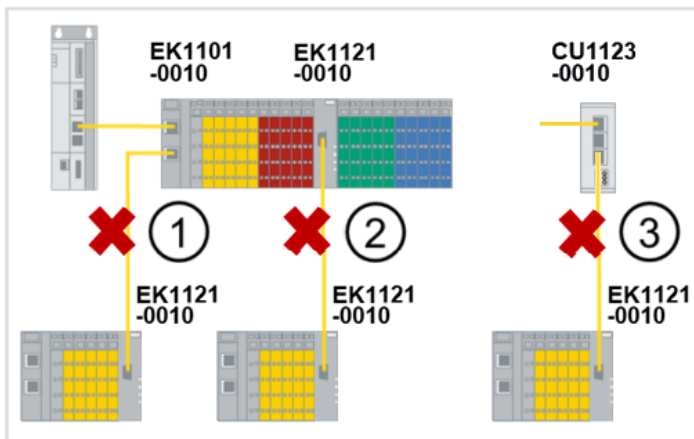


Fig. 6: Not permitted topologies with Extended Distance components

Not permitted topologies with Extended Distance components		
No. in the figure above	1 st Component	2 nd Component
1	EK1101-0010	EK1121-0010
2	EK1121-0010	EK1121-0010
3	CU1123-0010	EK1101-0010

Topologies with Extended Distance- and Standard components, distances up to 100 m

If only one connection of the two Components is configured for Extended Distance, e.g. a connection between a standard EtherCAT Coupler (EK1100) and an EtherCAT Coupler with Extended Distance connection (EK1101-0010), the maximum distance between the stations is 100 m. In the following figure the standard components are marked with a “*”. Standard components are detected automatically. The parameterization of the EtherCAT ports is not necessary. Examples of possible topologies are shown in the following figure.

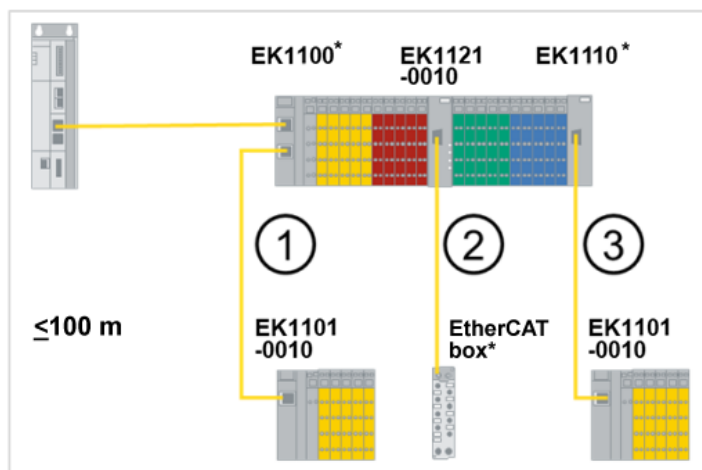


Fig. 7: Topologies with Extended Distance- and Standard components, distances up to 100 m

Not permitted topologies with Extended Distance components, distances up to 100 m		
No. in the figure above	1 st Component	2 nd Component
1	EK1100*	EK1101-0010
2	EK1121-0010	EtherCAT Box*
3	EK1100*	EK1101-0010

3 CU1128 - Product description

3.1 Introduction

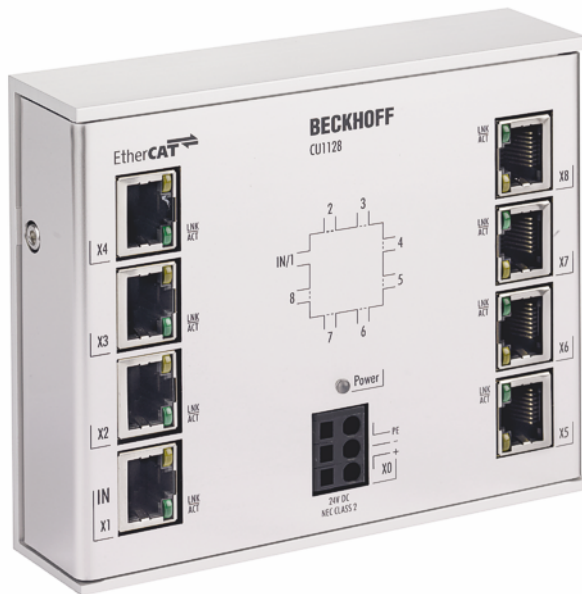


Fig. 8: CU1128

EtherCAT hub

Line, tree or star: EtherCAT supports almost any topology. If a star topology requires several junctions at a particular point, the 8-way CU1128 EtherCAT hub can be used instead of several EK1122 devices.

Port 1 is the input port for the network.

At ports 2 to 8 further EK1100 or EtherCAT Box modules can be connected. The EtherCAT junctions are connected via RJ-45 sockets with direct display of link and activity status.

In conjunction with TwinCAT or other suitable EtherCAT masters the CU1128 also supports coupling and uncoupling of EtherCAT segments during operation (hot-connect). The device cannot be used as a standard Ethernet switch.

3.2 Technical data

Technical data	CU1128
Task in the EtherCAT system	Coupling of EtherCAT junctions
Transmission medium	Ethernet/EtherCAT cable (min. CAT 5), shielded
Bus interface	8 x RJ45
Distance between stations	max. 100 m (100BASE-TX)
Protocol	EtherCAT
Distributed Clocks	Yes
Delay	approx. 1 µs per port
Data transfer rates	100 Mbit/s
Power supply	via three-pole spring loaded terminal (+, -, PE)
Supply voltage	24 V _{DC} (18 V _{DC} to 30 V _{DC})
Current consumption	from HW 08: typ. 140 mA before: typ. 185 mA
Weight	approx. 430 g
Dimensions without connector (W x H x D)	approx. 122 mm x 100 mm x 38 mm
Mounting [► 24]	on 35 mm mounting rail (EN 60715)
Permissible ambient temperature range during operation	from HW 08: -25 °C ... +60 °C (extended temperature range) before: 0 °C ... + 55 °C
Permissible ambient temperature range during storage	-40 °C ... + 85 °C
Permissible relative humidity	95%, no condensation
Vibration/shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27
EMC immunity/emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP20
Installation position	variable
Approvals/markings ^{*)}	CE, EAC, UKCA cULus [► 28]

^{*)} Real applicable approvals/markings see type plate on the side (product marking).

4 Mounting

4.1 CU1123-00x0, CU1124 - Mounting and removal

The CU1123-00x0 and CU1124 EtherCAT junctions are fastened on the mounting surface with the aid of a 35 mm DIN rail (according to EN 60715).

i Mounting rail installation

Please ensure that the CU1123-00x0 und CU1124 is pushed on until it makes contact with the mounting rail and audibly clicks into place on the mounting rail. See chapter [Recommended mounting rails](#) [► 23].

Mounting

- Fit the mounting rail to the planned assembly location.
- Position the device in the mounting rail with the spring at the top of its latching flange (1)
- Push the lower side of the device (2) against the mounting surface until it latches on the mounting rail.
- Attach the cable.

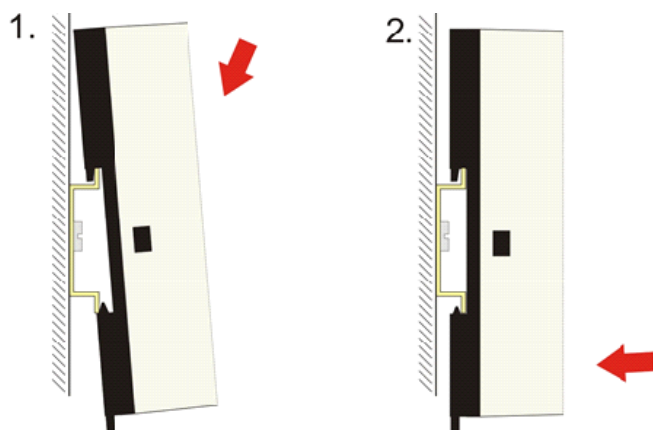


Fig. 9: Mounting

Removal

- Remove all the cables.
- Pull the strap on the underside of the device (1) downwards with a screwdriver
- Pull the device upwards away from the mounting surface (2)

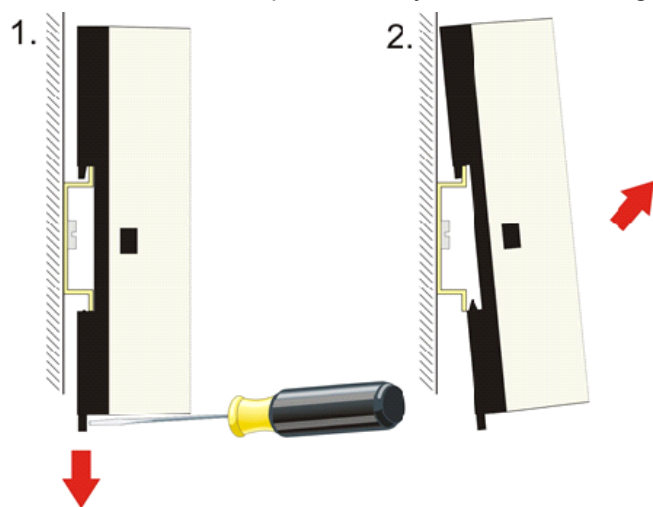


Fig. 10: Removal

4.1.1 Recommended mounting rails

Terminal Modules und EtherCAT junctions CU1123-00x0 and CU1124 can be snapped onto the following recommended mounting rails:

- DIN Rail TH 35-7.5 with 1 mm material thickness (according to EN 60715)
- DIN Rail TH 35-15 with 1.5 mm material thickness
- DIN Rail TH 35-15 with 2.2 mm up to 2.5 mm material thickness

4.2 CU1128 - Mounting and removal

The CU1128 EtherCAT hub is fastened to the mounting surface with the aid of a 35 mm mounting rail (according to EN 60715).

Mounting

- Fit the mounting rail to the planned assembly location.
- Suspend the device on the mounting rail with the spring on the lower side of its latching flange.
- Press the device upwards (1).
- Press the upper side of the device (2) against the assembly surface until it latches in the mounting rail.
- Attach the cable.

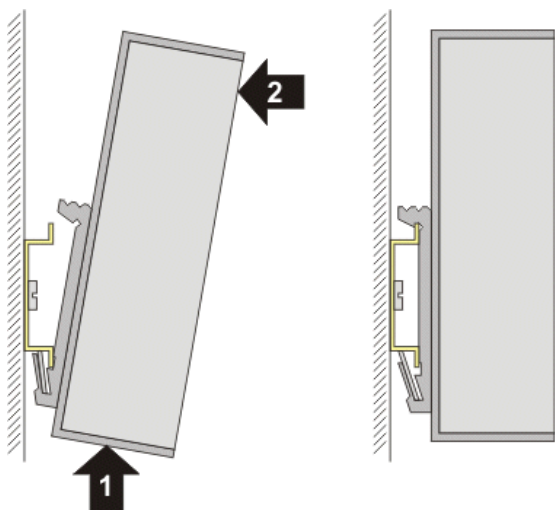


Fig. 11: Mounting

Removal

- Remove all the cables.
- Press the device upwards (3).
- Pull the other side of the device (4) away from the assembly surface.

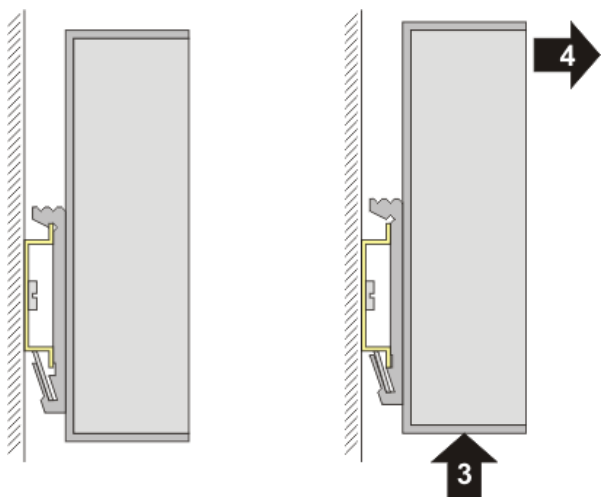


Fig. 12: Removal

4.3 Cabling of power supply

Pin assignment power supply connection



Fig. 13: Pin assignment of the connection terminal (X3)

The power supply connector is a 3-pin connector,

Type C9900-P944 [► 17]; see Technical Data [► 17].

Permissible cable cross-sections of the supply connector*

The 3-pin supply connector is connected using push-in wiring.

The following cable cross-sections are permitted:

Device	CU1128	CU1123 / CU1124
Solid conductor	0.08 ... 2,5 mm ²	0.14 ... 1.5 mm ² (AWG26-16)
Fine stranded conductor	0.08 ... 2,5 mm ²	0.14 ... 1.5 mm ² (AWG26-16)
Fine stranded conductor; with ferrule with plastic collar	0.25 ... 1,5 mm ²	0.25 ... 1.0 mm ² (AWG24-18)
Stripping length	8 ... 9 mm	10 mm

*) The outer diameter of the plastic collar should not exceed the 3.5-mm pitch.

4.4 Dimensions

Space requirement in the control cabinet

- The RJ45 connector increase the depth depending on their design and the Ethernet cable used.
- Above the mounting rail an additional height of approx. 10 mm is required to enable latching [► 24] of the switch onto the rail.

CU1123-00x0, CU1124

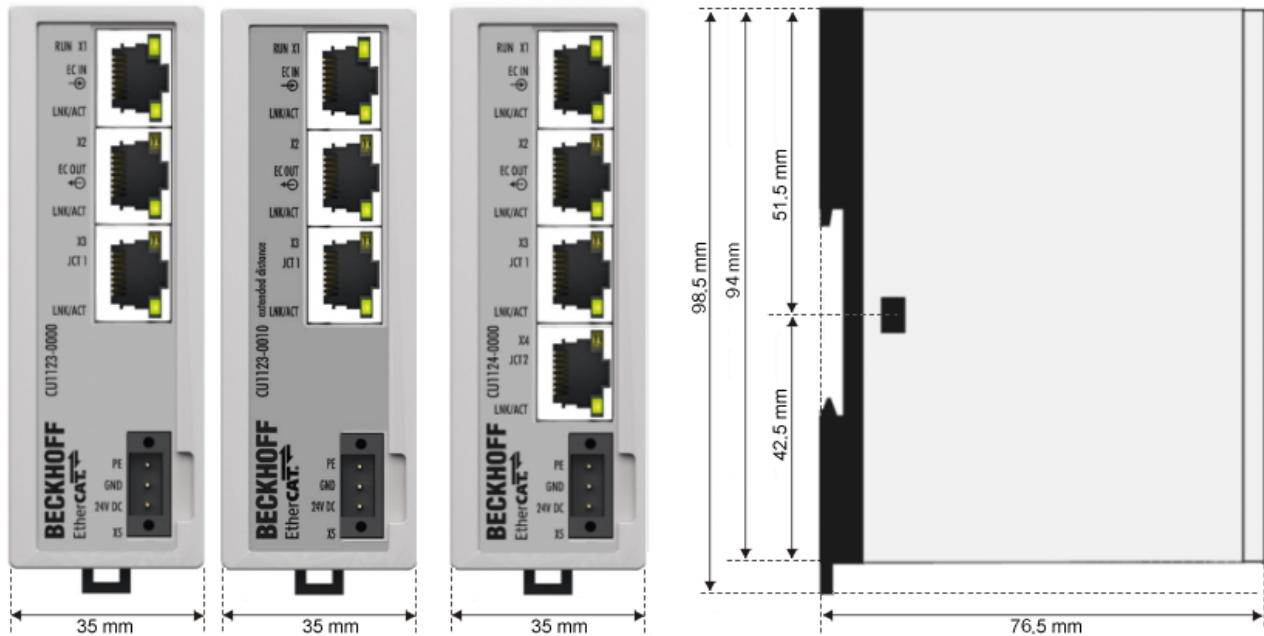


Fig. 14: CU1123-00x0, CU1124 dimensions

CU1128

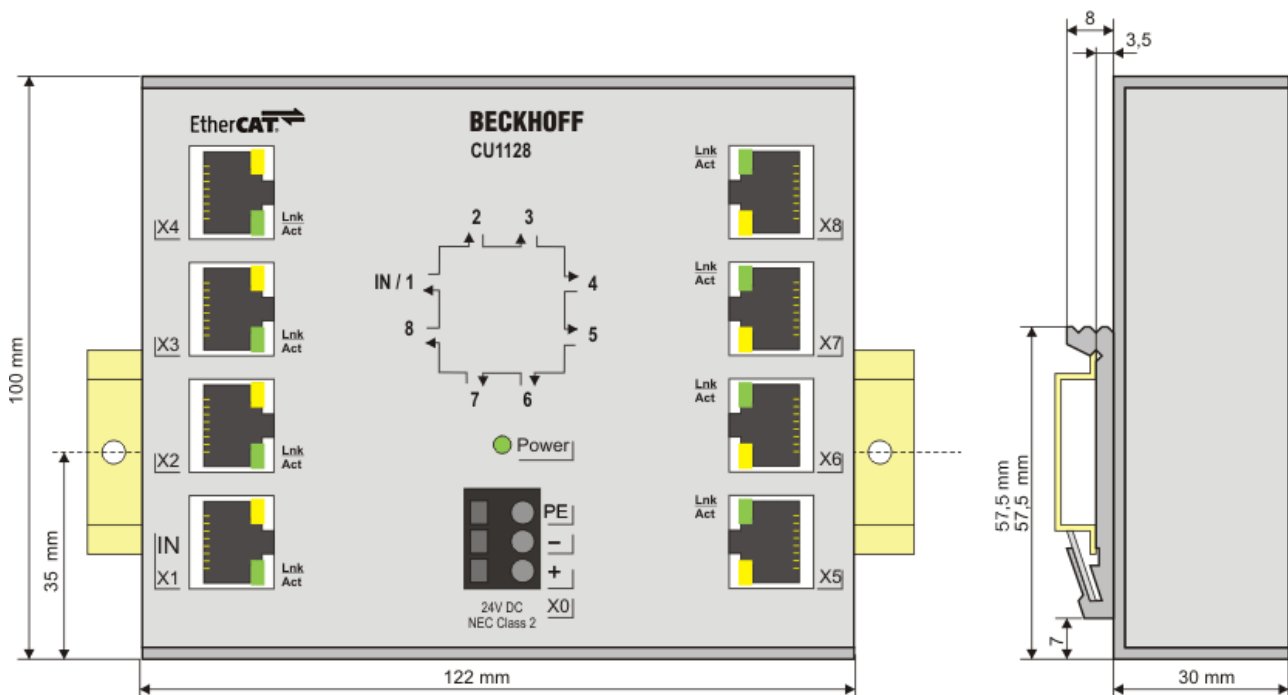


Fig. 15: CU1128 dimensions

4.5 LED Displays

CU1123-00x0, CU1124 - LEDs



Fig. 16: CU1123-00x0, CU1124 LEDs

- The green RUN-LED indicates the state of the EtherCAT State Machine. It is located at the top of the first RJ45-port (X1).
- The green LNK/ACT-LEDs indicate the current state of each channel. They are located at the bottom of each RJ45-port.

LED	Color	Display	Description
RUN	green	off	State of the EtherCAT State Machine: INIT = initialization of the terminal
		flashing	State of the EtherCAT State Machine: PREOP = function for mailbox communication and different default settings set
		single flash	State of the EtherCAT State Machine: SAFEOP = verification of the Sync Manager channels and the distributed clocks. Outputs remain in safe state
		on	State of the EtherCAT State Machine: OP = normal operating state; mailbox and process data communication is possible
		flickering	State of the EtherCAT State Machine: BOOTSTRAP = a firmware is loaded
LNK/ACT	green	off	No connection
		on	Connection available (link)
		flashing	Data transfer (act)

CU1128 - LEDs

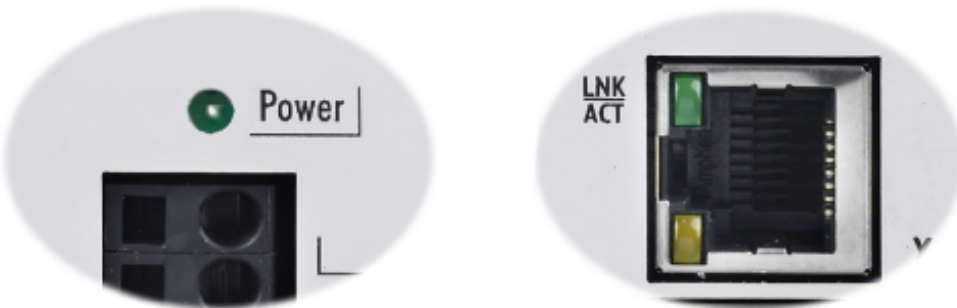


Fig. 17: CU1128 - Power LED, LNK/ACT-LED

- The green Power LED indicates the presence of the supply voltage (24 V_{DC}).
- The green LNK/ACT-LEDs indicate the current state of each channel. They are located at the bottom of the RJ45-ports X1...X4 and on the top of the RJ45-ports X5...X8.

LED	Color	Display	Description
LNK/ACT	green	off	No connection
		on	Connection available (link)
		flashing	Data transfer (act)

4.6 UL notice

⚠ CAUTION	
	Application Beckhoff EtherCAT modules are intended for use with Beckhoff's UL Listed EtherCAT System only.
⚠ CAUTION	
	Examination For cULus examination, the Beckhoff I/O System has only been investigated for risk of fire and electrical shock (in accordance with UL508 and CSA C22.2 No. 142).
⚠ CAUTION	
	For devices with Ethernet connectors Not for connection to telecommunication circuits.

Basic principles

UL certification according to UL508. Devices with this kind of certification are marked by this sign:



4.7 Disposal



Products marked with a crossed-out wheeled bin shall not be discarded with the normal waste stream. The device is considered as waste electrical and electronic equipment. The national regulations for the disposal of waste electrical and electronic equipment must be observed.

5 Basic principles

5.1 Basic function principles

The CU112x are infrastructure devices without controllable input/output data (I/O). It can be used

- as a junction point for conducted Fast Ethernet, in order to connect EtherCAT terminal stations, drives or any other EtherCAT slaves to drop lines.
- as distributed clock reference clock (see [notes](#) [► 41]).

They have no I/O and no CoE directory and are not parameterizable. The core functions of the link control and distributed clocks synchronization are mapped by the ESCs.

CU1123-00x0, CU1124 - Structure

The CU1123-00x0 supports three RJ45-Ports and the CU1124 supports four RJ45-Ports. For this purpose an internal communication-IC (ESC) is used. The following figure shows the structure of the internal ESC-Ports (A, B, C, D) and the designation of the connection sockets (CU1123-00x0: X1 ... X3, CU1124: X1 ... X4).

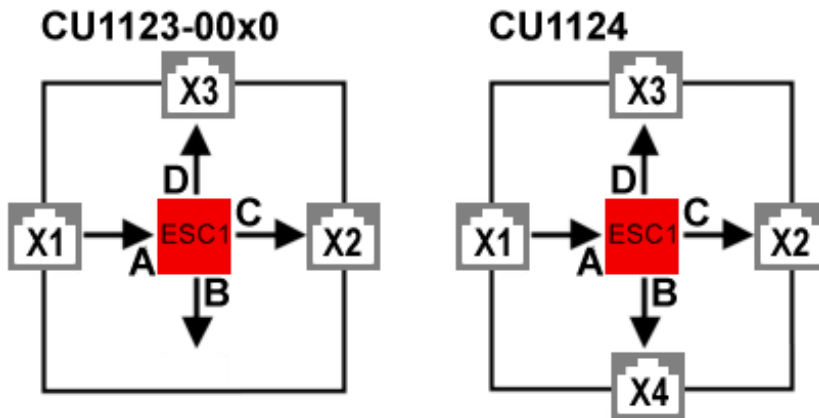


Fig. 18: CU1123, CU1124 - diagram

Please note:

- port X1 is always the input for the EtherCAT traffic in the CU1123-00x0 and CU1124.
- the other ports X2..X3 (CU1123-00x0), X2...4 (CU1124) should be used as outputs.

CU1128 - Structure

In order to provide eight EtherCAT connections, the CU1128 has three internal communication ICs (ESCs), which are connected in series internally. For this reason the CU1128 appears as three individual slaves in the EtherCAT configurator, although they are located in one housing. The interrelationship between the internal ESC ports (A, B, C, D) and the descriptions of the connection sockets (1..8) is as follows:

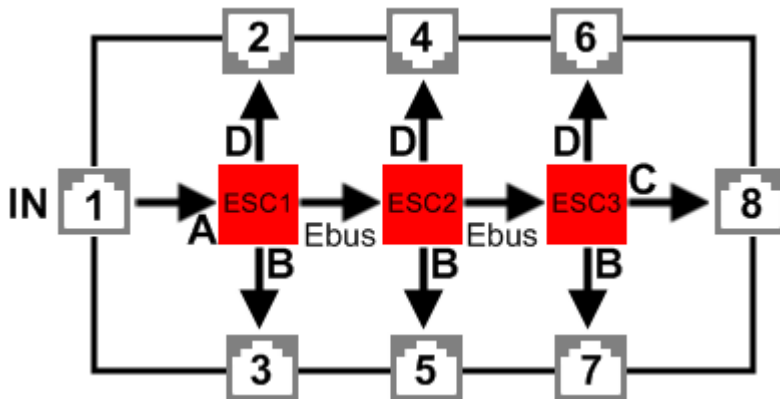


Fig. 19: CU1128 - diagram

Accordingly, three devices are displayed in the TwinCAT System Manager:

No	Addr	Name	State	CRC
1	1001	Box 1 (CU1128)	OP	0, 0, 0
2	1002	Term 2 (CU1128)	OP	0, 0, 0
3	1003	Term 3 (CU1128)	OP	0

Fig. 20: Three slaves in the TwinCAT System Manager

Please note:

- port 1 is always the input for the EtherCAT traffic in the CU1128.
- the other ports 2..7 should be used as outputs.
- it is not permitted to delete subdevices once the CU1128 has been configured.

For differentiation see also [EEPROM Update](#) [► 49].

CU1128 - Topological configuration

With the CU1128, special attention should be paid to the sequence of the EtherCAT slaves. Since the CU1128 has seven junction ports, drop lines connected to ports must and can be clearly identified in practice. If incorrect information is provided in the configuration (TwinCAT System Manager file *.tsm), the system cannot start.

For each EtherCAT device the System Manager indicates at which *Previous Port* it is connected, i.e. the name of the connected port (B to D) of the previous slave. This also applies for the internal connections between the ESCs in the CU1128:

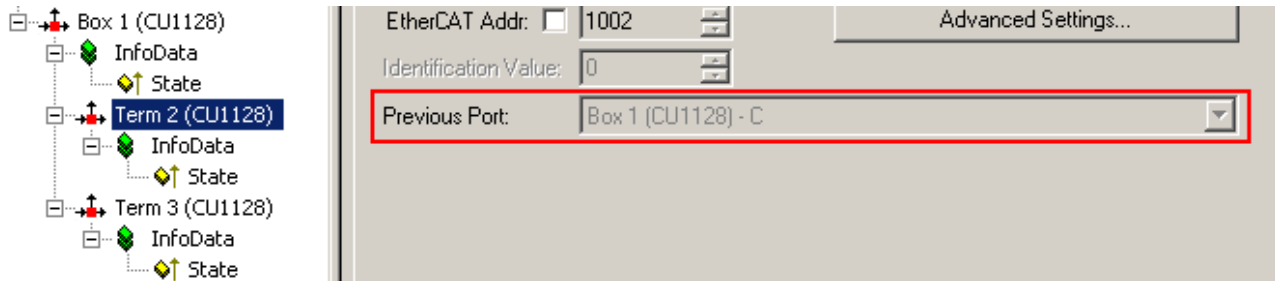


Fig. 21: Previous port of the second ESC in the CU1128

In fig. *Previous port of the second ESC in the CU1128*, for example, it is stated that the second ESC in the CU1128 “Box 1”, called “Term 2”, is connected to ESC 1 Port C; cf. Fig. *CU1128 - diagram*. This setting cannot be changed, since it is defined by the CU1128 device.

In general, however, it is changeable if a pluggable coupler, EtherCAT Box or similar is present in the configuration; see Fig. *Set the Previous Port for an EK1100*. Then,

- drag & drop with the mouse can then be used in the System Manager to set up the general position in the I/O system.
- the previous port in the “fine adjustment” can be selected, if several options are available.

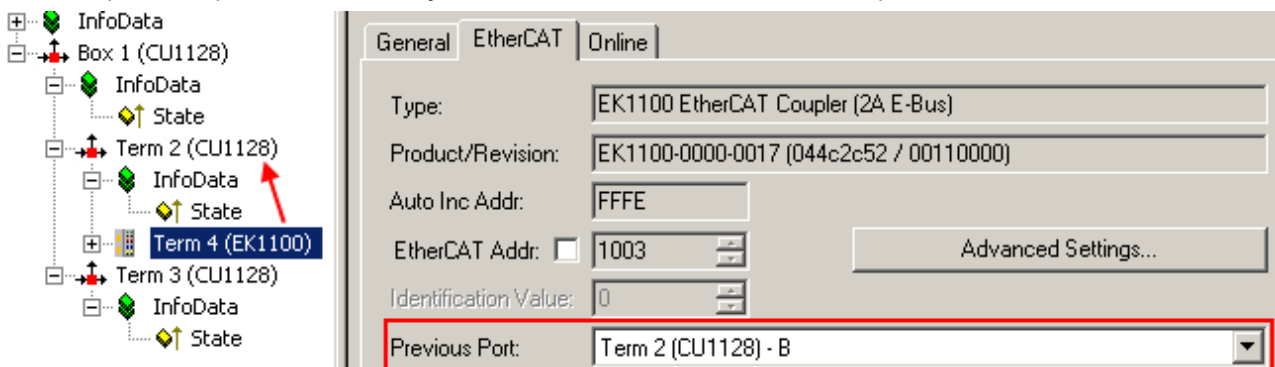


Fig. 22: Set the Previous Port for an EK1100

In fig. *Set the Previous Port for an EK1100*, the coupler “Term 4” is set up as successor to the ESC2 “Term 2”. Both free ports of the ESC2 (B and D, see Fig. *CU1128 - diagram*) are thus available in the previous port selection of the EK1100; B is selected here.

The System Manager detects whether ports can technically and actually be connected by means of the port property, i.e. *Ethernet* or *E-bus* in the ESI/XML device descriptions. The internal connections in the CU1128 are E-bus connections, the eight ports on the other hand are Ethernet, see fig. *CU1128 - diagram*.

See also notes for [configuration setup](#) [► 43].

5.2 Basic function principles of EtherCAT junctions

Some Beckhoff EtherCAT devices can be used for junctions in the EtherCAT segment. These include EK1122, EK1521, EP1122 or also CU112x. In the following examples only the EK1122 is used. The technical and system characteristics of the other devices are similar.

EtherCAT handling in the slaves

With EtherCAT as fieldbus protocol a wide range of bus topologies can be used: line, star and tree topology, with redundancy support even ring topology. The simplest topology is the line topology, in which each EtherCAT slave passes the data on to the *only* next slave; see following Fig. *EtherCAT line topology*.

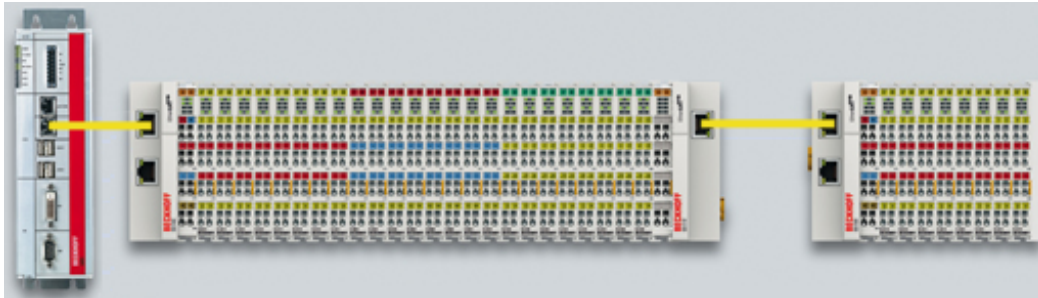


Fig. 23: EtherCAT line topology

When using, for example, EK1100 EtherCAT Couplers, a junction and thus a type of tree topology is possible; see following Fig. *Line topology with extensions*.

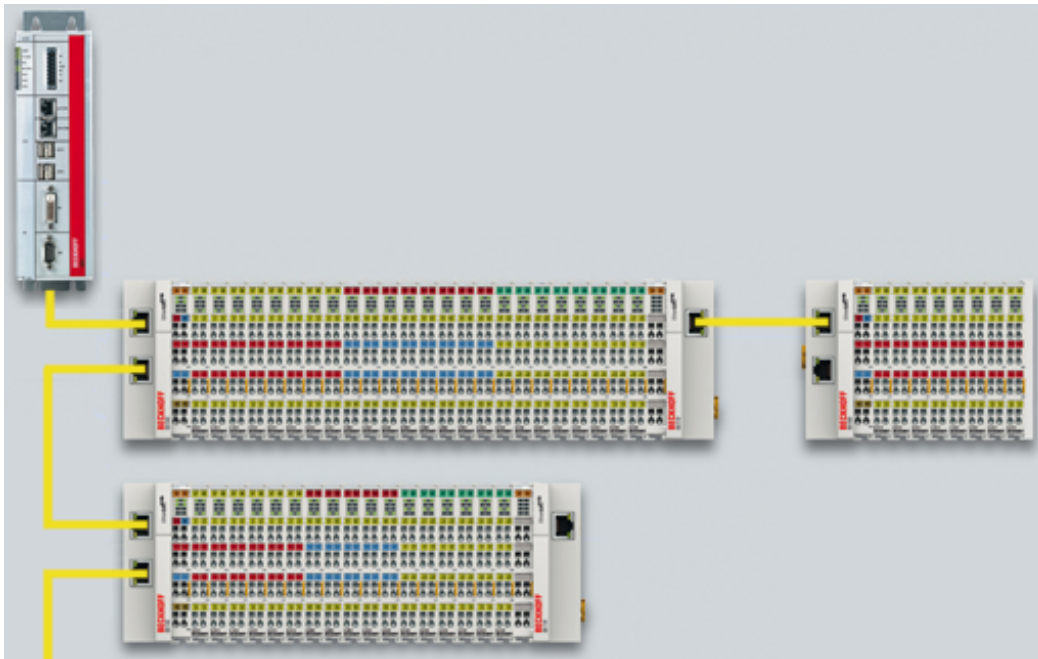


Fig. 24: Line topology with extensions

The basic principle is that internally the Ethernet frame(s) with the EtherCAT protocol data continue to be transported in a logical ring:

- the EtherCAT master sends the frame on the two outgoing lines of the Ethernet cable
- this frame passes each slave once,
- is reversed by the last slave in the logical sequence
- and is returned to the master through each EtherCAT slave via two return lines of the Ethernet cable without further processing.

At short cycle times in the order of 50 μ s at 20,000 Ethernet frames are in transit in the EtherCAT system every second, plus acyclic organizational frames. The master awaits the return of the sent frames, which return the device input data to the master, for example. Telegram transfer between slaves is link-based: An

EtherCAT slave will only forward a frame if a 'link' signal to the next device is present. Normally it can be assumed that the downstream device correctly processes each EtherCAT telegram and returns or process it at the end.

The crucial factor for forwarding EtherCAT telegrams is that a link signal is reported only from one slave to the next if both slaves are actually ready for real-time participation in data processing. Specifically, this means that an EtherCAT slave should not open the respective Ethernet port until it is ready to receive and forward an Ethernet frame immediately.

A switch or router is usually used for standard Ethernet traffic forwarding. Any collisions or frame losses are compensated through frame repetition in the higher level protocol layers (e.g. TCP). This mode is generally not used for EtherCAT due to the short cycle times and the real-time requirement. Some Ethernet devices such as special switches, for example, report a link to the remote terminal even if they will only be ready for data processing in a few milliseconds. This behavior is particularly noticeable in media converters from 100Base-TX (copper) to 100Base-Fx (optical fiber), which may report a link to the preceding EtherCAT slave even if the optical fiber connection is interrupted, depending on the setting on the copper side.

Fast link detection is therefore a central component of each ESC (EtherCAT slave controller, hardware processing unit for the EtherCAT protocol). According to the EtherCAT specification an ESC can have and control one to four ports. Via an open port it can handle outgoing and incoming Ethernet traffic. The direction of data flow in a fully configured ESC is shown in Fig. *Direction of data flow in the ESC* – the data in the EtherCAT datagrams are thereby processed only between Ports 0 (A) and 3 (D) in the EtherCAT processing unit.

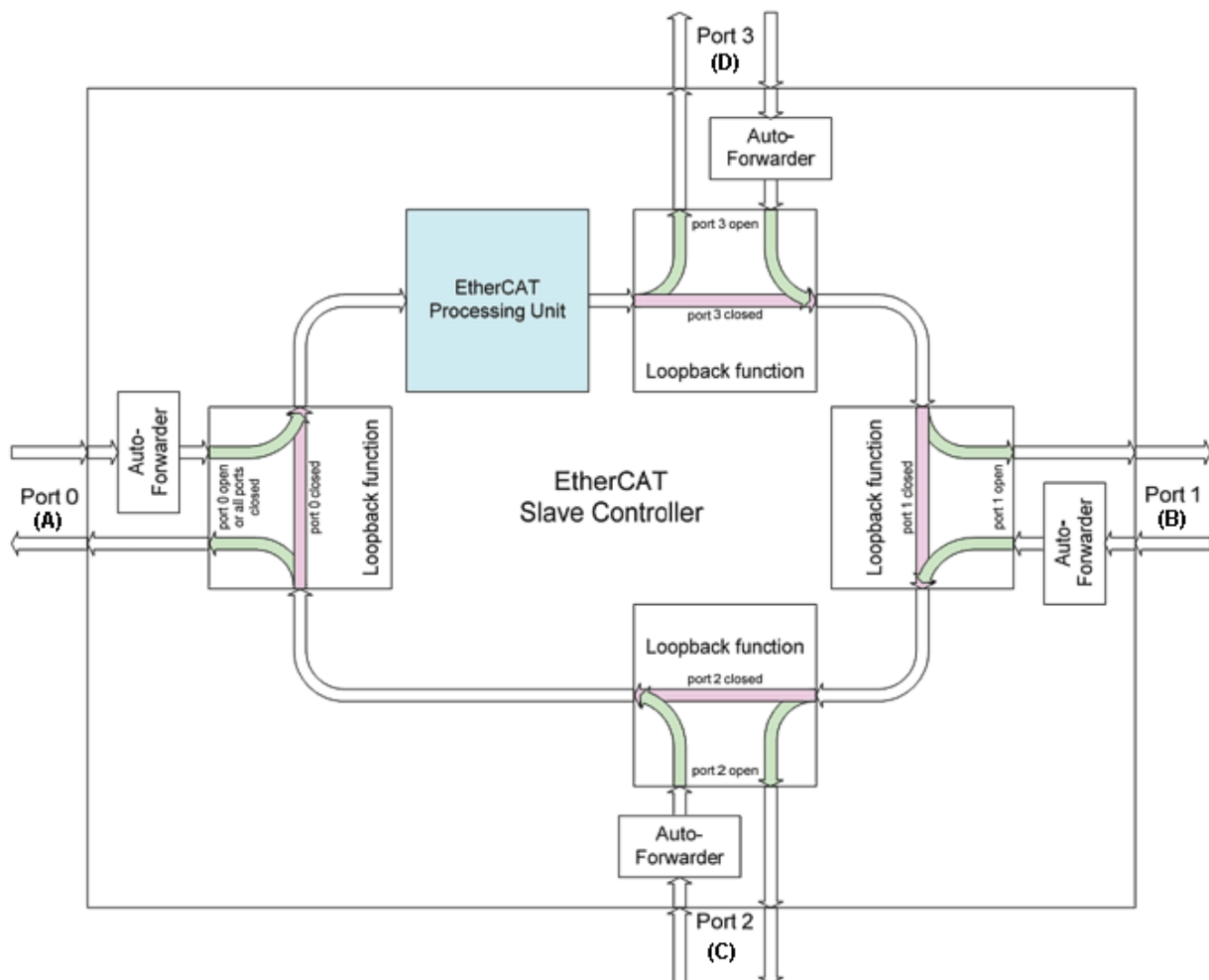


Fig. 25: Direction of data flow in the ESC

Ideally link detection and therefore port handling in the ESC should be fast enough that lost frame events are avoided even at 100 μ s cycle time. Nevertheless, at least one lost frame can never be ruled out if a connection is disconnected while an Ethernet frame is in transit on this line and in the bus segment downstream of the separation point.

Implementation: EL terminal

A standard EtherCAT slave such as a Beckhoff EL terminal has two ports:

- one for incoming frames (port 0 [A])
- and one for outgoing frames (e.g. port [D]).

The other two ports are internally closed in the ESC. An EtherCAT telegram enters the processing unit via port 0 (A)/top and is forwarded to the next slave via port 3 (D)/left, if a link to this port exists - see green arrows. This is the case if a further EL terminal is connected to the right.

If no link exists, the frame is forwarded to port 1(B) via the purple route. This and port 2 (C) have no link and therefore return the frame to port 0 (A), where the frame leaves via the same Ethernet port through which it arrived at the slave. This is the case if the terminal acts as end terminal.

An EtherCAT device with a single port is therefore only of limited use, since it can only be used as end device.

Implementation: EK1100 EtherCAT Coupler

Three of the four available ports in the EK1100 EtherCAT Coupler are used, thus enabling a connection to the right to terminals and via an RJ45 socket to further couplers; cf. Fig. "[Line topology with extensions \[► 33\]](#)". In the EK1100 the processing unit is not used for process data exchange.

Implementation: EK1121-0010 EtherCAT junction, Extended Distance

As in the EK1100, three ESC ports can be connected in these junctions: Two via E-bus within the terminal and one via the RJ45 sockets with Ethernet configuration.

Implementation: EK1122 EtherCAT junction

In the EK1122 all four ESC ports can be connected - two via the internal E-bus and two via the RJ45 sockets with Ethernet configuration. In the TwinCAT System Manager the link statuses of ports 0, 1, 2 and 3 are shown by the online display – they are designated there as ports A, B, C and D; see Fig. "[Topology display for interrupted line \[► 38\]](#)".

Implementation: EK1521 / EK1521-0010 / EK1561 EtherCAT junction

As in the EK1100, three ESC ports can be connected in these junctions: Two via E-bus within the terminal and one via the SC socket/versatile link and optical fiber cable/POF line.

Implementation: CU1123-00x0 EtherCAT junction

In the CU1123-00x0 EtherCAT junction three of the four available ports can be connected via the RJ45 sockets.

Implementation: CU1124 EtherCAT junction

In the CU1124 EtherCAT junction all four available ports can be connected via the RJ45 sockets.

Implementation: CU1128 EtherCAT junction

The CU1128 integrates three ESCs, which means eight ports in total are available to users. The three ESCs are interconnected via E-bus.

Example configuration with EK1122

The following section describes the link characteristics under TwinCAT and its representation in the System Manager.

The screenshot displays the TwinCAT configuration environment. On the left, a project tree shows the configuration hierarchy: SYSTEM - Configuration, NC - Configuration, PLC - Configuration, I/O - Configuration, and I/O Devices. Under I/O Devices, 'Device 4 (EtherCAT)' is expanded, showing its components: Device 4-Image, Device 4-Image-Info, Inputs, Outputs, InfoData, and a list of terms (Term 1 to Term 11). Each term is associated with a specific EtherCAT module (e.g., EK1100, EL3102, EL4732, EL1012, EL2004, EL9011). The right pane shows the 'Online' tab, which provides a real-time overview of the slave stations. It includes a table with columns for No., Addr., Name, State, and CRC. Below the table, there are buttons for 'Actual State' (OP, Pre-Op, Safe-Op, Op), 'Clear CRC', 'Clear Frames', 'Save Online Data', 'Load Online Data...', 'Delete Online Data', and an 'Offline' checkbox. A statistics table on the right shows counters for Send Frames, Frames / sec, Lost Frames, and Tx/Rx Errors, along with cyclic and queued data counts.

No.	Addr.	Name	State	CRC
1	1001	Term 1 (EK1100)	OP	0, 0
2	1002	Term 2 (EK1122)	OP	0, 0
3	1003	Term 3 (EK1100)	OP	0, 0
4	1004	Term 4 (EL3102)	OP	0
5	1005	Term 5 (EK1100)	OP	0, 0
6	1006	Term 6 (EL4732)	OP	0
7	1007	Term 7 (EL1012)	OP	0, 0
8	1008	Term 8 (EL2004)	OP	0

Counter	Cyclic	Queued
Send Frames	7131	+ 6479
Frames / sec	247	+ 2
Lost Frames	0	+ 0
Tx/Rx Errors	0	/ 0

Fig. 26: Example configuration

The TwinCAT online topology shows the wiring scheme, see Fig. *Online Topology*. The EK1122 is selected, so that further information is shown. The green bars above the slaves indicate the correct RUN state in all slaves.

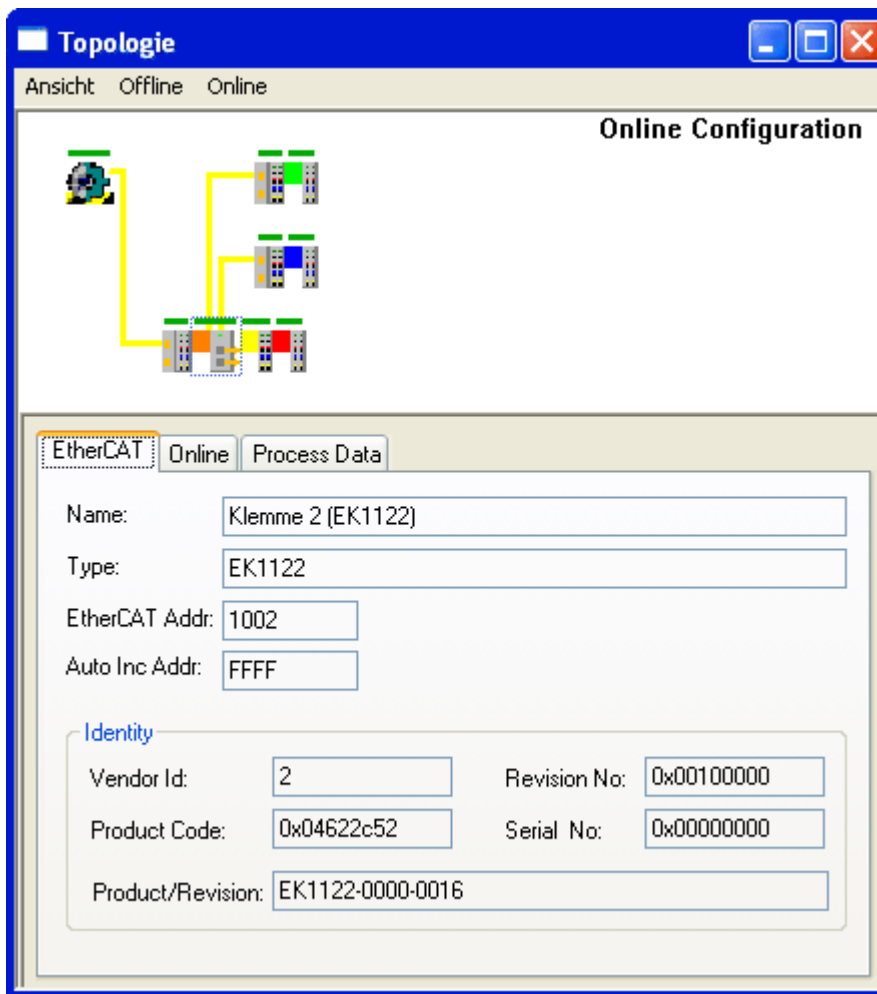


Fig. 27: Online topology

An error is now generated by disconnecting the connection between the upper RJ45 socket (X1) and the EL3102 device. Within a few μ s the ESC in the EK1122 detects the lost link and automatically closes the affected port. This has the effect that the next incoming EtherCAT telegram is immediately forwarded to port D (port 3) and the EL4732. The link is thus missing here and the System Manager marks this in the online display; see following Fig. *Example configuration with interrupted cable*.

The screenshot shows the Beckhoff System Manager interface. On the left, a tree view displays the configuration hierarchy: SYSTEM - Configuration, NC - Configuration, PLC - Configuration, I/O - Configuration, and I/O Devices. Under I/O Devices, 'Device 4 (EtherCAT)' is selected, showing its sub-components: Device 4-Image, Device 4-Image-Info, Inputs, Outputs, InfoData, and a list of terms (Term 1 to Term 11). On the right, the 'Online' tab is active, displaying a table of the device's current state.

No	Addr	Name	State	CRC
1	1001	Term 1 (EK1100)	OP	0, 0
2	1002	Term 2 (EK1122)	OP LNK_MIS D	0, 0, 0
3	1003	Term 3 (EK1100)	INIT NO_COMM	0, 0
4	1004	Term 4 (EL3102)	INIT NO_COMM	0
5	1005	Term 5 (EK1100)	OP	0, 0
6	1006	Term 6 (EL4732)	OP	0
7	1007	Term 7 (EL1012)	OP	0, 0
8	1008	Term 8 (EL2004)	OP	0

Below the table, the 'Actual State' is shown as 'OP'. There are buttons for 'Init', 'Pre-Op', 'Safe-Op', 'Op', 'Clear CRC', 'Clear Frames', 'Save Online Data', 'Load Online Data...', 'Delete Online Data', and an 'Offline' checkbox. To the right, a 'Counter' table shows statistics:

	Counter	Cyclic	Queued
Send Frames	16922	+	7153
Frames / sec	249	+	77
Lost Frames	0	+	0
Tx/Rx Errors	0	/	0

Fig. 28: Example configuration with interrupted cable

The System Manager messages can be interpreted as follows:

- Address 1002 - EK1122: "OP LNK:MIS D": The slave is in OP state, although a link is missing at port D (3) that should be present according to the configuration
- Address 1003 - EK1100: "INIT NO_COMM": Since communication with this slave is interrupted its state is shown as INIT
- Address 1004 - EL3104: ditto

● Logger output

i The logger output can be displayed in the lower part of the System Manager (Display → Show Logger Output). This may be helpful for diagnostic purposes (for link interruptions and other situations).

In the topology display any slaves affected by interruption are shown with a red border, see the following Fig. *Topology display for interrupted line.*

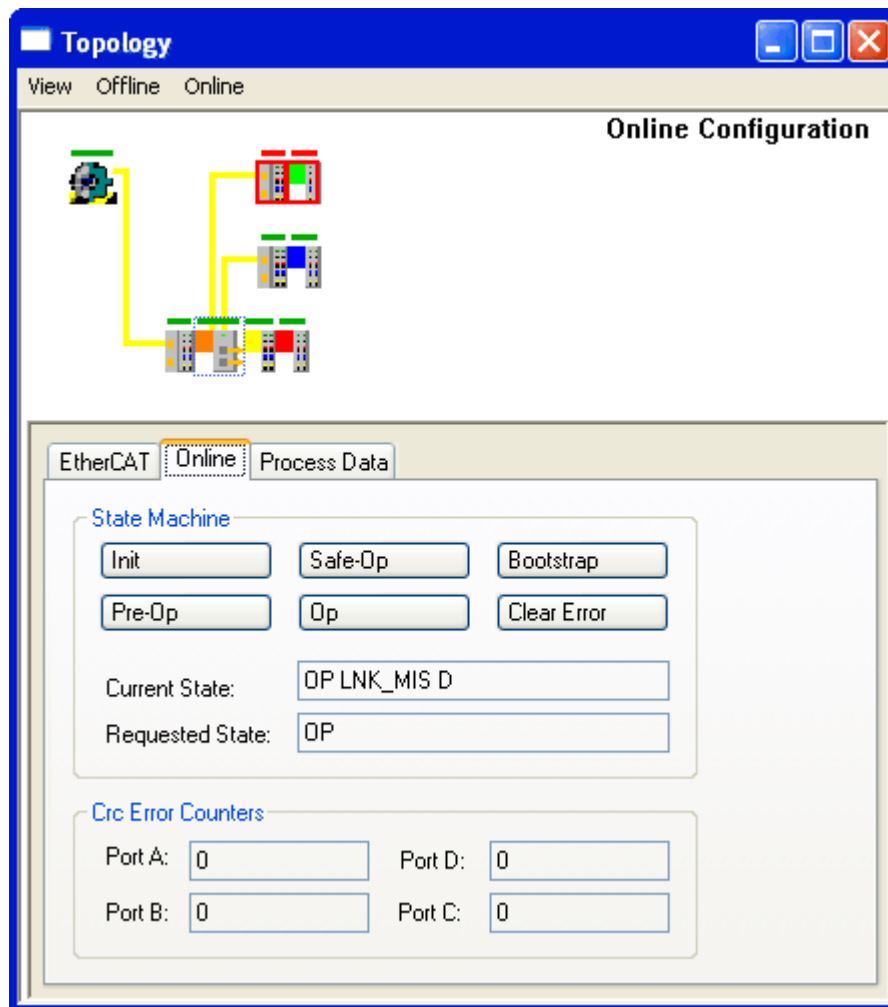


Fig. 29: Topology display for interrupted line

In Fig. "Example configuration [▶ 36]" and Fig. "Example configuration with interrupted cable" [▶ 38] note the display of acyclic frames, see the following Fig. *Comparison of the frame displays in the System Manager*.

No	Addr	Name	State	CRC
1	1001	Term 1 (EK1100)	OP	0, 0
2	1002	Term 2 (EK1122)	OP	0, 0
3	1003	Term 3 (EK1100)	OP	0, 0
4	1004	Term 4 (EL3102)	OP	0
5	1005	Term 5 (EK1100)	OP	0, 0
6	1006	Term 6 (EL4732)	OP	0
7	1007	Term 7 (EL1012)	OP	0, 0
8	1008	Term 8 (EL2004)	OP	0

Actual State:		OP
Init	Pre-Op	Safe-Op Op
Clear CRC		Clear Frames

Counter	Cyclic	Queued
Send Frames	7131	6479
Frames / sec	247	+ 2
Lost Frames	0	+ 0
Tx/Rx Errors	0	/ 0

No	Addr	Name	State	CRC
1	1001	Term 1 (EK1100)	OP	0, 0
2	1002	Term 2 (EK1122)	OP LNK_MIS D	0, 0, 0
3	1003	Term 3 (EK1100)	INIT NO_COMM	0, 0
4	1004	Term 4 (EL3102)	INIT NO_COMM	0
5	1005	Term 5 (EK1100)	OP	0, 0
6	1006	Term 6 (EL4732)	OP	0
7	1007	Term 7 (EL1012)	OP	0, 0
8	1008	Term 8 (EL2004)	OP	0

Actual State:		OP
Init	Pre-Op	Safe-Op Op
Clear CRC		Clear Frames

Counter	Cyclic	Queued
Send Frames	16922	7153
Frames / sec	249	+ 77
Lost Frames	0	+ 0
Tx/Rx Errors	0	/ 0

Fig. 30: Comparison of the frame displays in the System Manager

The image on the left shows a small number (2) of acyclic frames sent by the master during the respective second - all slaves are operating properly. The image on the right shows a significant increase (currently 77 acyclic frames/sec): The EtherCAT master has quickly detected that not all slaves are properly taking part in the data exchange. Once the master has located the fault, it continuously tries to restore the connection.

Reconnection

Once the connection has been restored, the EK1122 reports to the master that a link is present again at port D (3). The EtherCAT master will then make its process data available again for this section. Once the preparations are complete, it will instruct the EK1122 to re-open port D (3) for regular data exchange. Cyclic and acyclic data traffic with the other EtherCAT slaves continues normally.

● External access to EtherCAT diagnostics

i The system offers a wide range of options for accessing status and diagnostic information and EtherCAT master functions from the PLC. Almost all information displayed by the System Manager online can also be retrieved via ADS (see figures on this page). System Manager functions can also be triggered via PLC or ADS. Please refer to the relevant sections in the Beckhoff Information System and the notes on EtherCAT diagnostics.

6 Commissioning

6.1 Quick start

No special measures are required for commissioning the CU112x EtherCAT components.

Install the CU112x components as described in chapter [Mounting and wiring](#) [► 22].

Notes on the configuration setting can be found in chapter [Configuration in the TwinCAT System Manager](#) [► 43]

6.2 Distributed clocks reference clock

The distributed clock unit in the CU112x EtherCAT components is activated by default. The CU112x can therefore be used as distributed clocks (DC) reference clock. The use as DC reference clock is explained below using the example of CU1128.

The EtherCAT reference clock should be located near the start of the system hierarchy, in particular before flexible components (HotConnect). It is therefore advisable to use couplers or junction components such as the CU1128 as DC reference clock.

Without further settings, the TwinCAT System Manager uses the first DC-capable terminal/coupler as the reference clock; see Fig. *example topology with EL7201 as reference clock*.

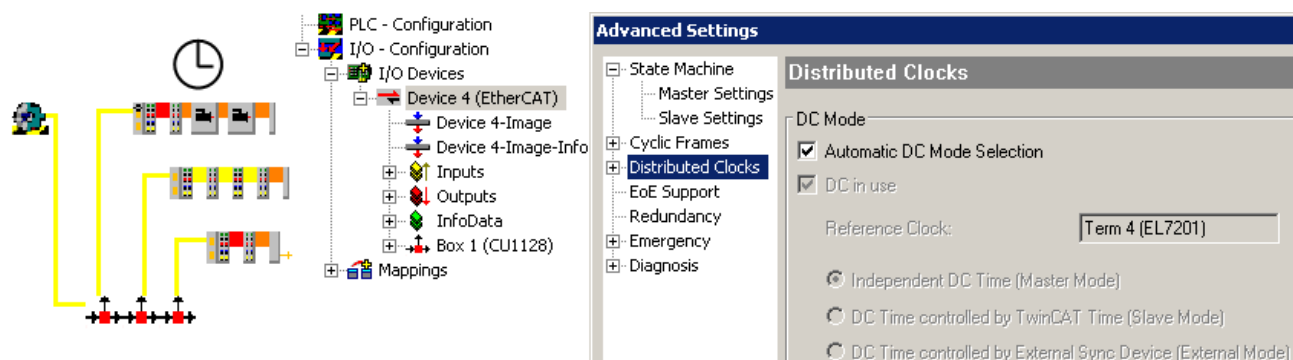


Fig. 31: example topology with EL7201 as reference clock

If the junction with the EL7201 was uncoupled, e.g. due to topology changes during machine runtime or a fault, the EtherCAT system would lose its reference clock. Central components should therefore deal with this function.

Under Advanced settings for first CU1128 (ESC1), tick the *Use as potential Reference Clock* checkbox.

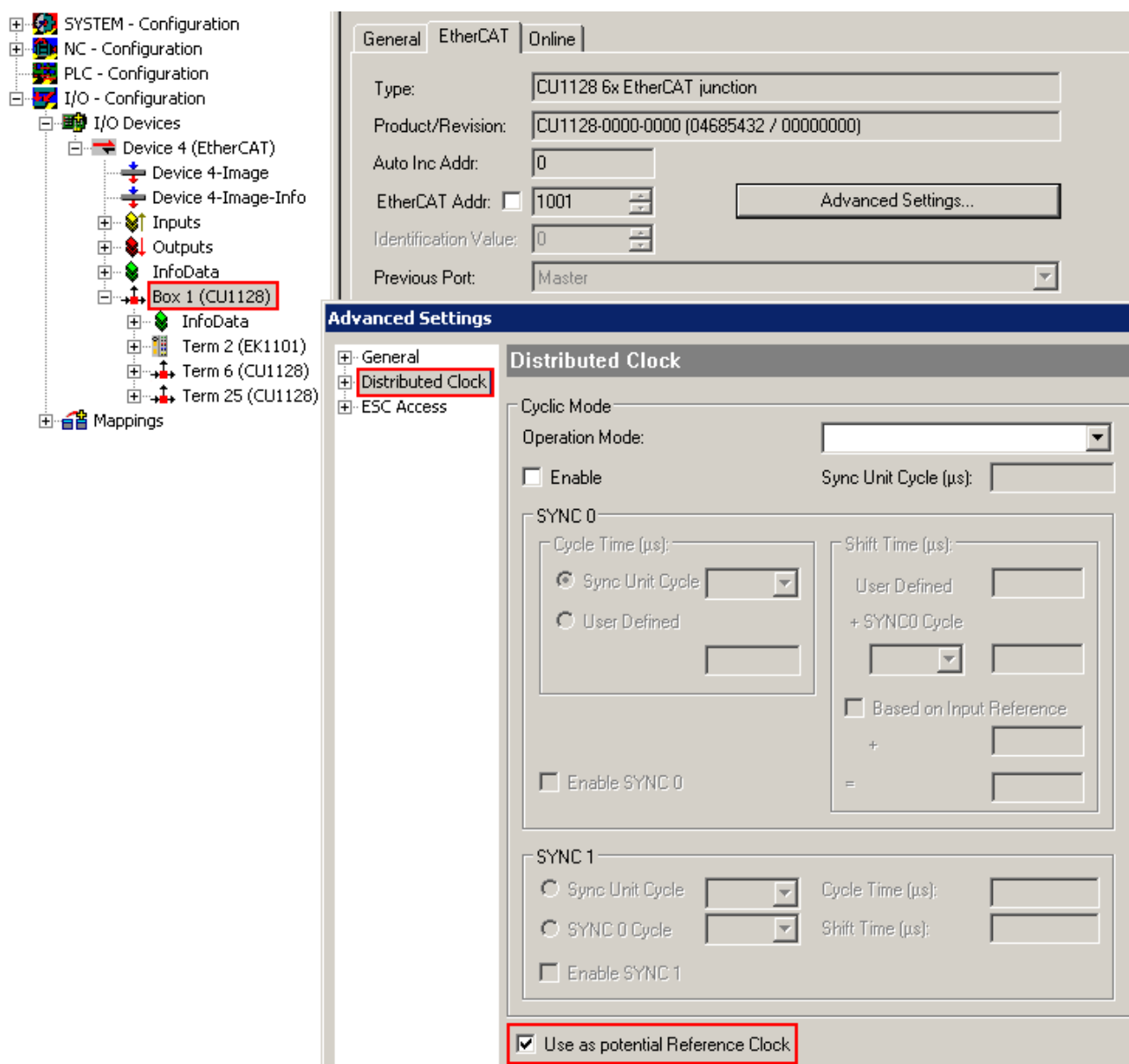


Fig. 32: activating the CU1128 DC function

Once activated, TwinCAT selects the CU1128 as reference clock.

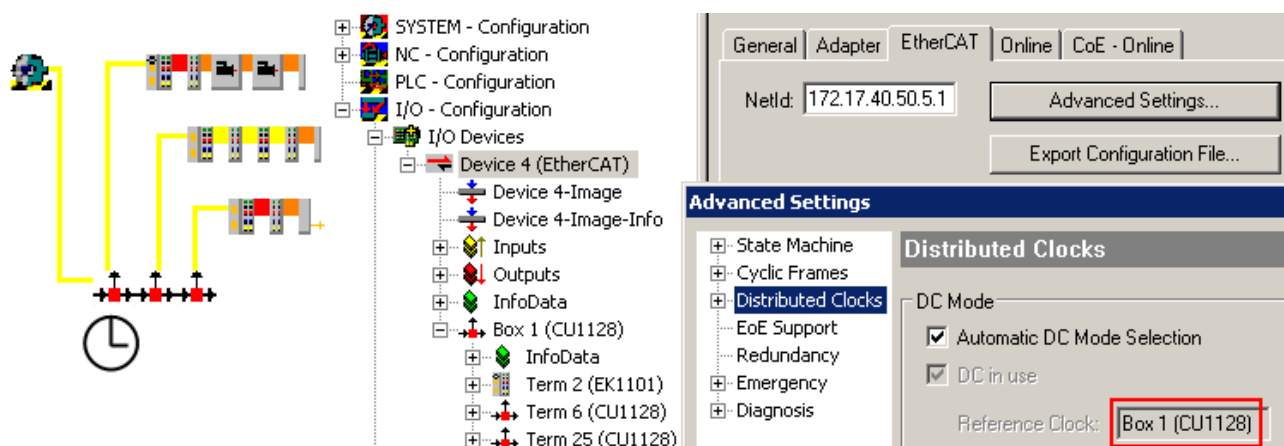


Fig. 33: CU1128 as reference clock

This function can be activated in components, refer here to the notices in the *EK1100* documentation.

6.3 Configuration of the CU1128 in the TwinCAT System Manager

Like any other EtherCAT slave, the CU1128 can be configured in two different ways in the TwinCAT System Manager:

- if it already exists and is available online and connected to the configuration PC: through scanning
- if it does not exist: through manual configuration setup

See chapter Configuration.

Since the CU1128 with its three integrated slaves is a little different from other slaves, some further information is provided below.

Configuration setup through online scan

From TwinCAT 2.10 b1340 (and therefore also TwinCAT 2.11 and higher) the CU1128 is detected during the scan, and the main device plus the two slaves (CU1128-0001 and CU1128-0002) are created.

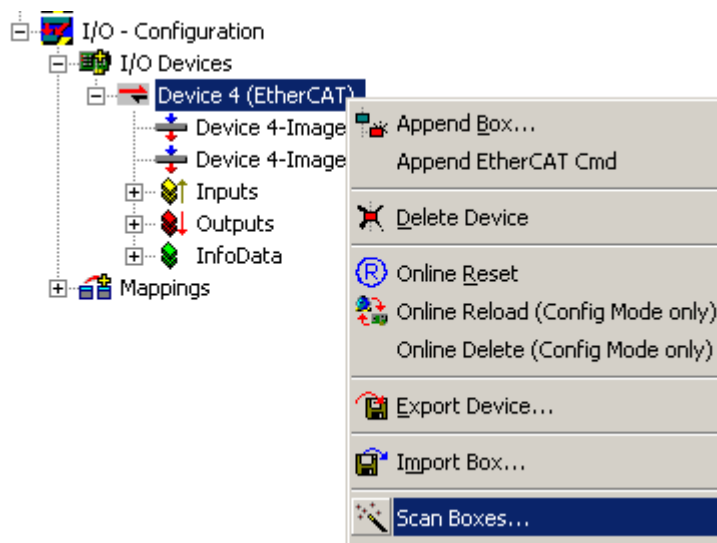


Fig. 34: Scanning EtherCAT devices in Config mode

To check, make sure in the topology view (see Fig. *CU1128 topology display in the System Manager*) that the CU1128 is displayed as three junctions in one level.

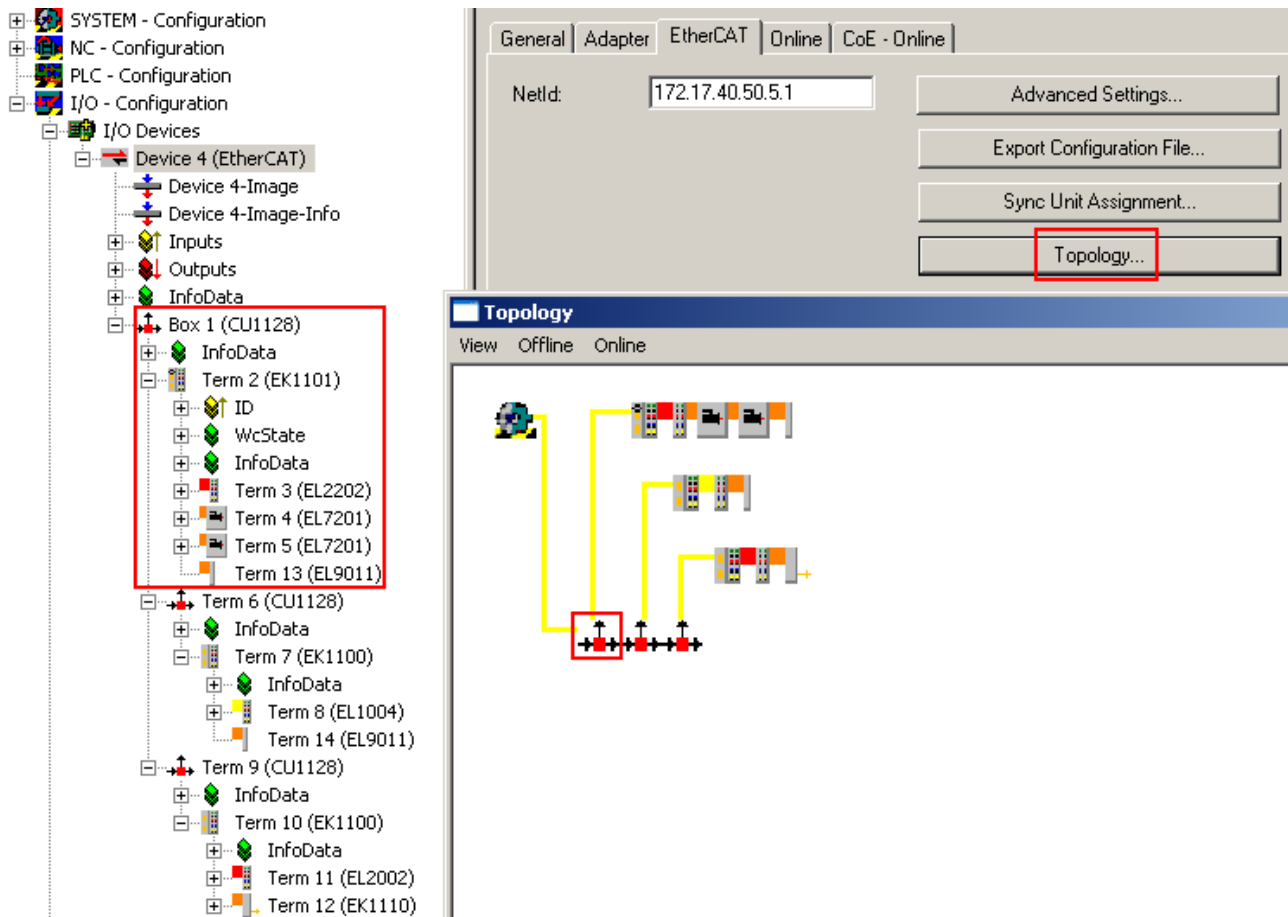


Fig. 35: CU1128 topology display in the System Manager

For comparison, the following figure shows an incorrect display, caused by inadmissible relocation of the slaves in the configuration, for example.

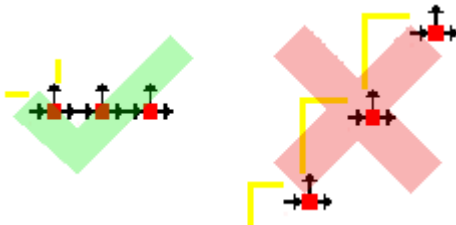


Fig. 36: CU1128 topology display

Manual configuration setup

For manual configuration setup of the CU1128 and attached devices, the correct ESI/XML file must be present, see here.

The process in detail:



Fig. 37: Right-click and select Append Box

A new device is added in the Ethernet layer. The port specification in the selection dialog plays an important part in the following; see Fig. *Selection of the main device CU1128-000* on the right-hand side: it indicates at which outgoing port of the selected device the new device is to be connected. The selection options depend on the hardware (Ethernet or E-bus) available at ports A, B, C, D. In this example only Ethernet, port B is available at the EtherCAT master.

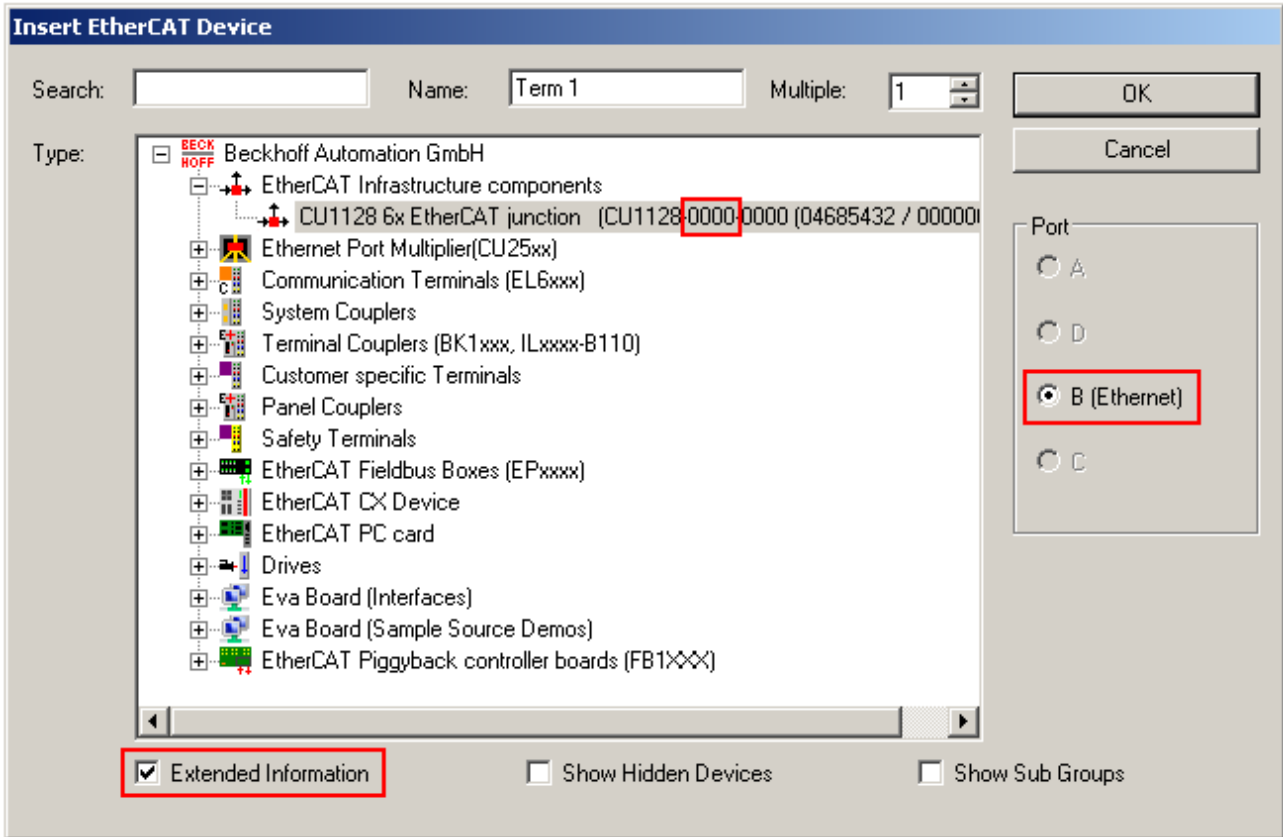


Fig. 38: Selection of the main device CU1128-0000

The revision number can be shown in the selection dialog by ticking *Extended Information*.

● Inserting CU1128

i To add a CU1128 to a configuration, always use DeviceEtherCAT -> AppendBox and then move it to the required position in the configuration via drag and drop.

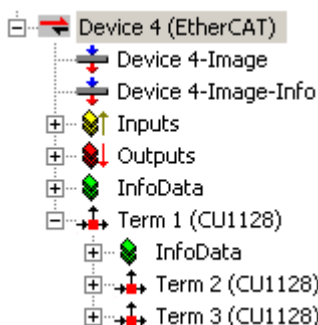


Fig. 39: Added CU1128 with secondary devices Dev A and Dev B

The *PreviousPort* field of the secondary devices indicates that they are connected to port C of the previous device.

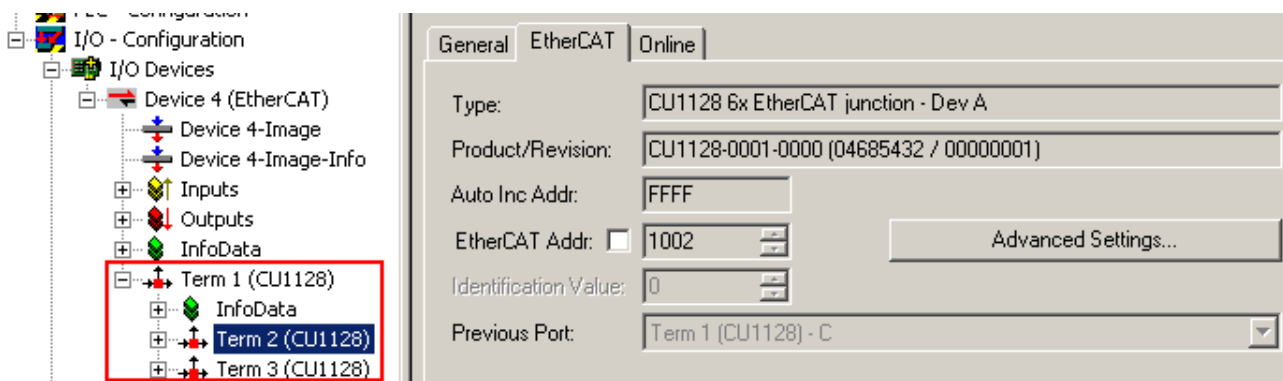


Fig. 40: Previous port specification for CU1128, ESC2

Topology view shows the three devices as a chain:



Fig. 41: CU1128 in Topology view

Adding further CU1128 devices

It is common for further devices to be connected to the outgoing ports of the CU1128 at this stage. This is explained below, using a further CU1128 as an example. Make sure that the correct connection point is selected.

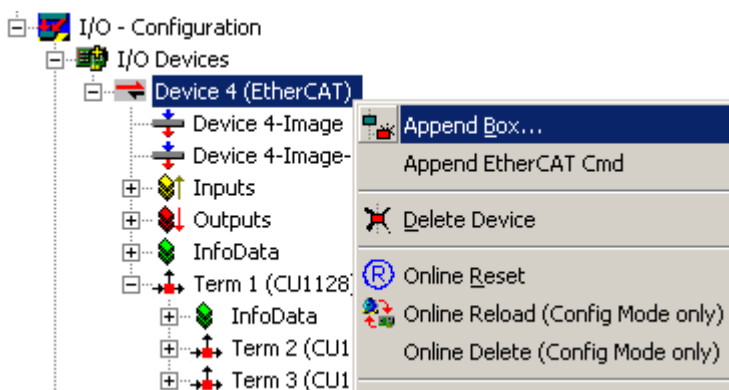


Fig. 42: Adding further CU1128 devices

Add the CU1128-0000 via *DeviceEtherCAT*.

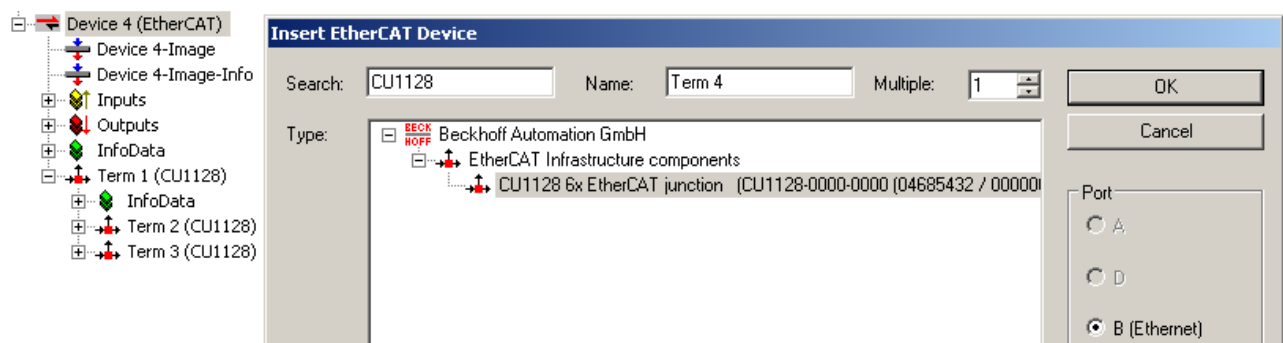


Fig. 43: Selecting the CU1128-0000

The new *Term4* is added after the existing CU1128.

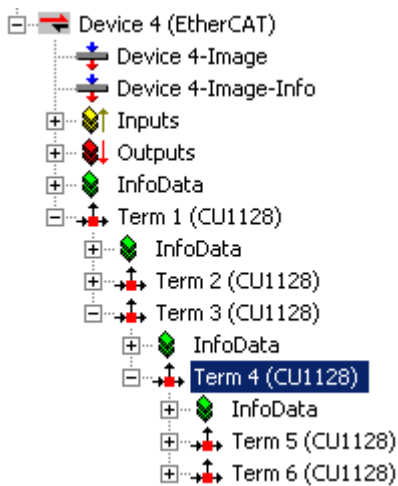


Fig. 44: Added CU1128

Then use drag and drop to move it to the required position. In this example the intention is to connect it to port 4 of the CU1128, i.e. port D of ESC2 = *Term2*. This can be specified via *PreviousPort*.

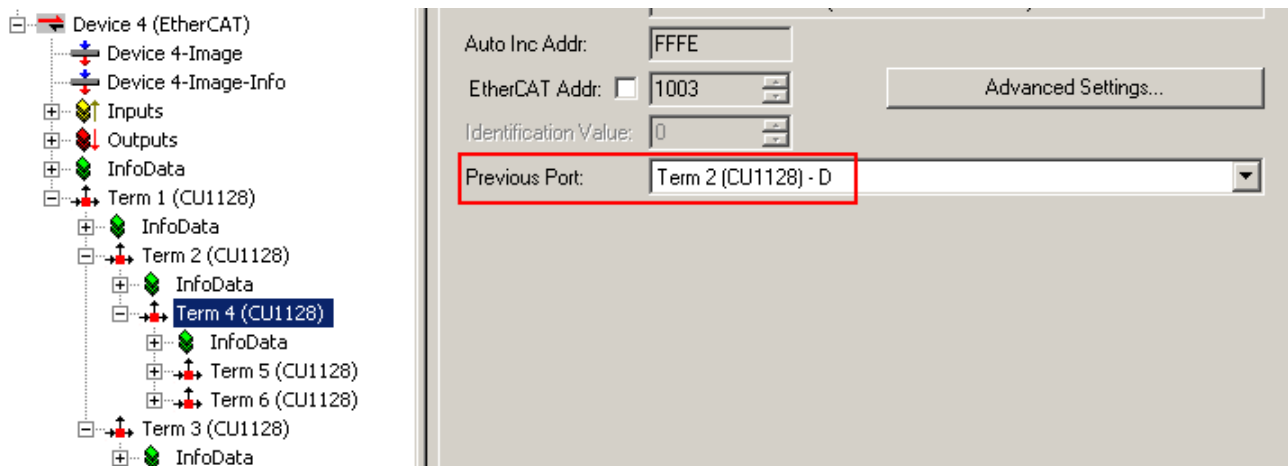


Fig. 45: Selecting PreviousPort after moving the CU1128

Select Topology view to verify the configuration.

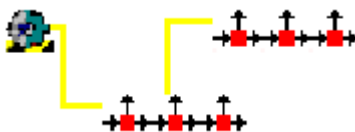


Fig. 46: Topology display for 2x CU1128

Further EtherCAT devices

Other EtherCAT devices with Ethernet hardware can also be connected to any ports via *AppendBox*.

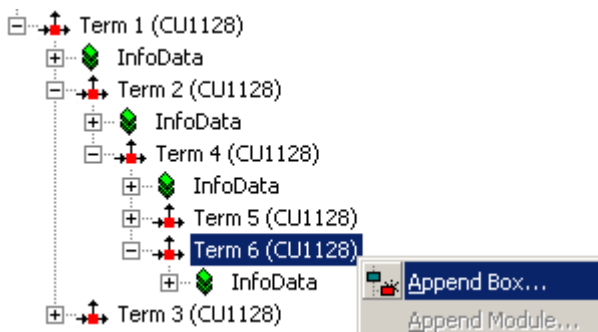


Fig. 47: Adding further devices

Only Ethernet devices can be connected to a CU1128. Therefore, please make sure that *Ethernet* is selected under Port (see Fig. *Adding a device*, right).

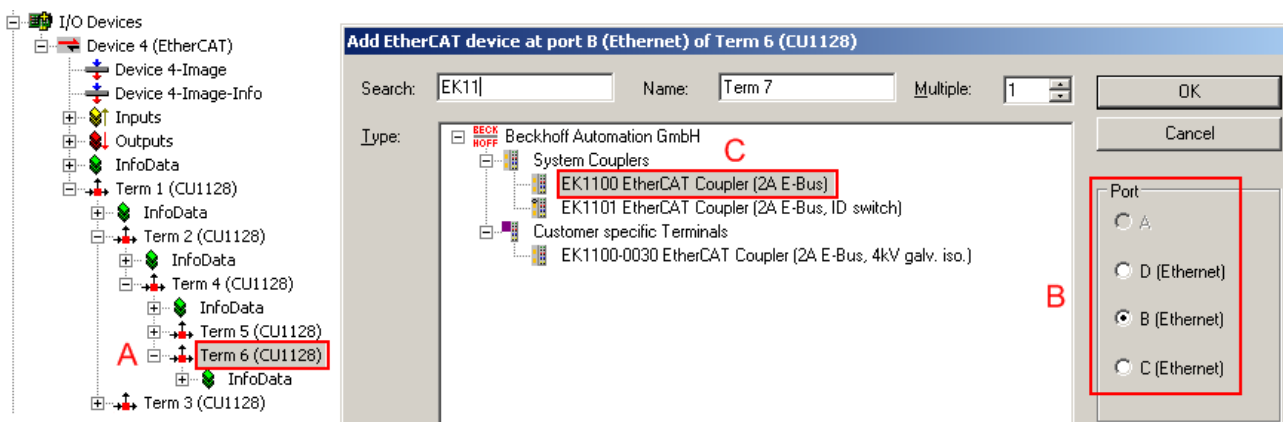


Fig. 48: Adding a device

Sequence:

- A: once the CU1128 has been selected
- B: and one of the Ethernet ports has been selected,
- C: the new device can be selected.

The E-Bus port (see Fig. *Port selection for CU1128*) cannot be chosen, because the next CU1128 secondary device is attached to it.

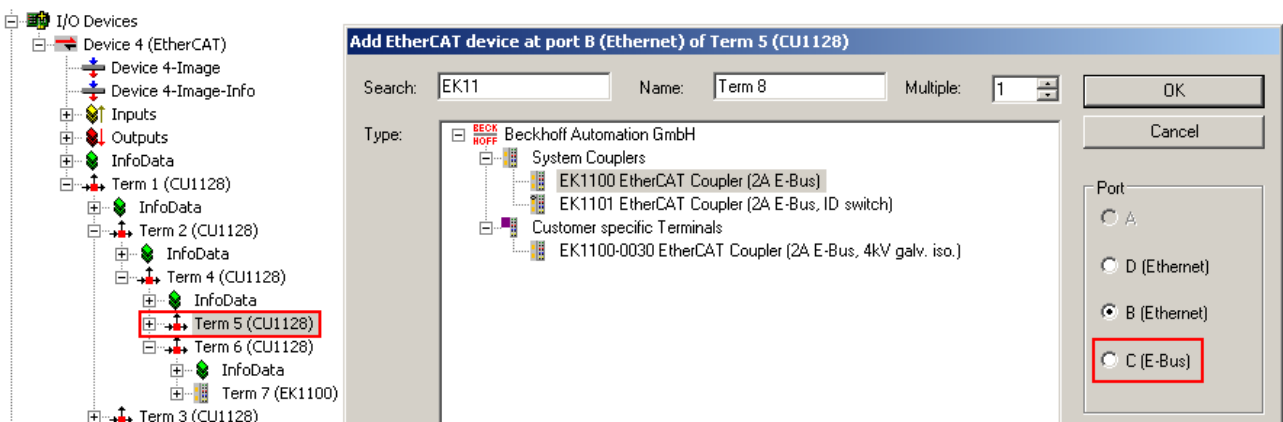


Fig. 49: Port selection for CU1128

7 Appendix

7.1 EEPROM Update

The CU1128 features three internal EtherCAT slave controllers (ESCs). This means that three EEPROMs are available for write access. These are different in the CU1128, since all three ESCs have different port technologies (Ethernet or E-Bus); see Fig. *The three internal ESC names of the CU1128*.

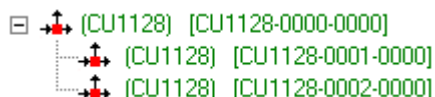


Fig. 50: The three internal ESC names of the CU1128

The main slave is the CU1128-0000, in this case revision -0000. The two following internal slaves are CU1128-0001 and CU1128-0002.

The EEPROM can be updated via the EEPROM Update dialog in the System Manager. This is only necessary in special cases and should only be done if instructed by Beckhoff support/service.

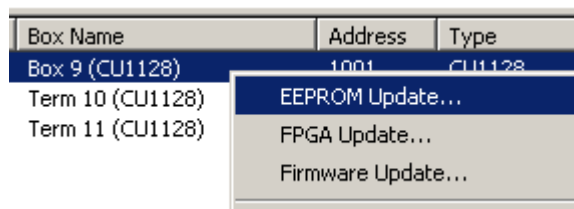


Fig. 51: EEPROM Update TwinCAT

All three internal ESCs can be write-accessed sequentially, followed by an off/on restart, in order to load the EEPROM. For assignment in the TwinCAT selection dialog, see Fig. *Currently available EEPROM descriptions for CU1128 and assignment*.

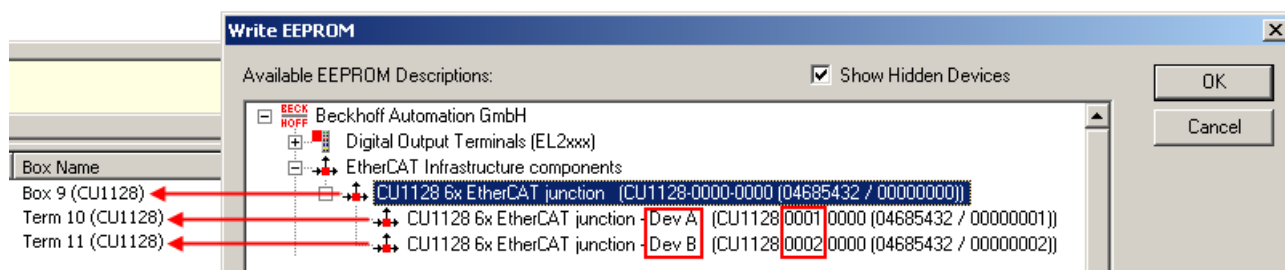


Fig. 52: Currently available EEPROM descriptions for CU1128 and assignment

Dev A is intended for ESC2 CU1128-0001, *Dev B* for ESC3, CU1128-0002.

7.2 Support and Service

Beckhoff Support and Service provides assistance with questions regarding Beckhoff products and system solutions, as well as with their planning, commissioning, and operation.

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Beckhoff Headquarters

Beckhoff Automation GmbH & Co. KG
Hülshorstweg 20
33415 Verl, Germany

☎ Phone: +49 5246 963-0
✉ Email: info@beckhoff.com
Web page: www.beckhoff.com

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Beckhoff Automation GmbH & Co. KG
Hülshorstweg 20
33415 Verl
Germany
Phone: +49 5246 9630
info@beckhoff.com
www.beckhoff.com

