BECKHOFF New Automation Technology

Documentation | EN

EP1xxx

EtherCAT Box modules with digital inputs

2020-09-22 | Version: 3.0

Table of contents

1 Foreword

1.1 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.
It is the duty of the technical personnel to use the documentation published at the respective time of each installation and commissioning.

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

Beckhoff®, TwinCAT®, EtherCAT®, EtherCAT G®, EtherCAT G10®, EtherCAT P®, Safety over EtherCAT®, TwinSAFE®, XFC®, XTS® and XPlanar® are registered trademarks of and licensed by Beckhoff Automation GmbH. Other designations used in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owners.

Patent Pending

The EtherCAT Technology is covered, including but not limited to the following patent applications and patents: EP1590927, EP1789857, EP1456722, EP2137893, DE102015105702 with corresponding applications or registrations in various other countries.

EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Copyright

1.2 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.

Description of instructions

In this documentation the following instructions are used.
These instructions must be read carefully and followed without fail!

⚠ DANGER

Serious risk of injury!

Failure to follow this safety instruction directly endangers the life and health of persons.

⚠ WARNING

Risk of injury!

Failure to follow this safety instruction endangers the life and health of persons.

⚠ CAUTION

Personal injuries!

Failure to follow this safety instruction can lead to injuries to persons.

NOTE

Damage to environment/equipment or data loss

Failure to follow this instruction can lead to environmental damage, equipment damage or data loss.

Tip or pointer

This symbol indicates information that contributes to better understanding.

1.3 Documentation issue status

Version	Comment
3.0	• Front page updated • Scope of supply added
2.8	• EP18x9-0042: Technical data and connections updated
2.7	• EP1809-0042 added • EP1816-0003 added • EP1819-0021 added • EP1859-0042 added
2.6	• Signal connection of EP1816-3008 corrected • Protection enclosure BG2000-0010 added • EP1098-0001 introduction: 2-wire connection corrected • EP1816-1008 added
2.5.0	• EP1816-3008 added
2.4.1	• EP1111-0000 – technical data updated
2.4.0	• Nut torques for connectors updated
2.3.0	• *Torque wrench* diagram updated • Power connection updated
2.2.0	• EP1008-0022 added • EP1819-0021 added • Cabling adjusted
2.1.0	• Nut torques for connectors extended
2.0.0	• Migration • Technical data updated
1.4.0	• *Accessories* chapter added • Chapter on *Nut torques for connectors* updated • Chapter on *EtherCAT connection* updated • Chapter on *BG2000-0000 - protective housing for EtherCAT Box* updated
1.3.0	• EP1111-0000 added • EP1098-0001 and EP1098-0002 added • EP1809-0021, EP1809-0022 and EP1819-0022 updated
1.2.0	• ATEX notes added • Extended temperature range for activated modules documented • EP1809-0021, EP1809-0022 and EP1819-0022 added • Description of the power connection updated • Overview of EtherCAT cables extended
1.1.0	• Technical data: Current consumption values amended • Nut torques for connectors added
1.0.0	• Process data description extended
0.7	• Description of status LEDs added • Signal connection extended • Explanation of the serial number adapted to the new standard
0.6	• Signal connection extended
0.5	• First preliminary version

Firmware and hardware versions

This documentation refers to the firmware and hardware version that was applicable at the time the documentation was written.

The module features are continuously improved and developed further. Modules having earlier production statuses cannot have the same properties as modules with the latest status. However, existing properties are retained and are not changed, so that older modules can always be replaced with new ones.

The firmware and hardware version (delivery state) can be found in the batch number (D-number) printed on the side of the EtherCAT Box.

Syntax of the batch number (D-number)

D: WW YY FF HH	Example with D no. 29 10 02 01:
WW - week of production (calendar week)	29 - week of production 29
YY - year of production	10 - year of production 2010
FF - firmware version	02 - firmware version 02
HH - hardware version	01 - hardware version 01

Further information on this topic: Version identification of EtherCAT devices [▶ 105].

2 EtherCAT Box - Introduction

The EtherCAT system has been extended with EtherCAT Box modules with protection class IP 67. Through the integrated EtherCAT interface the modules can be connected directly to an EtherCAT network without an additional Coupler Box. The high-performance of EtherCAT is thus maintained into each module.

The extremely low dimensions of only 126 x 30 x 26.5 mm (h x w x d) are identical to those of the Fieldbus Box extension modules. They are thus particularly suitable for use where space is at a premium. The small mass of the EtherCAT modules facilitates applications with mobile I/O interface (e.g. on a robot arm). The EtherCAT connection is established via screened M8 connectors.

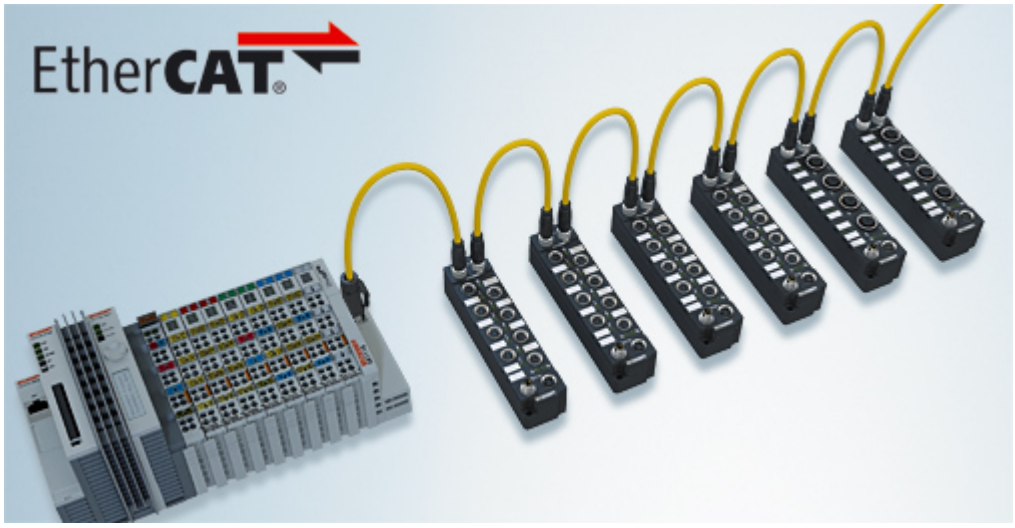


Fig. 1: EtherCAT Box Modules within an EtherCAT network

The robust design of the EtherCAT Box modules enables them to be used directly at the machine. Control cabinets and terminal boxes are now no longer required. The modules are fully sealed and therefore ideally prepared for wet, dirty or dusty conditions.

Pre-assembled cables significantly simplify EtherCAT and signal wiring. Very few wiring errors are made, so that commissioning is optimized. In addition to pre-assembled EtherCAT, power and sensor cables, field-configurable connectors and cables are available for maximum flexibility. Depending on the application, the sensors and actuators are connected through M8 or M12 connectors.

The EtherCAT modules cover the typical range of requirements for I/O signals with protection class IP67:

- digital inputs with different filters (3.0 ms or 10 µs)
- digital outputs with 0.5 or 2 A output current
- analog inputs and outputs with 16 bit resolution
- Thermocouple and RTD inputs
- Stepper motor modules

XFC (eXtreme Fast Control Technology) modules, including inputs with time stamp, are also available.

Fig. 2: EtherCAT Box with M8 connections for sensors/actuators

Fig. 3: EtherCAT Box with M12 connections for sensors/actuators

Basic EtherCAT documentation

You will find a detailed description of the EtherCAT system in the Basic System Documentation for EtherCAT, which is available for download from our website (www.beckhoff.com) under Downloads.

EtherCAT XML Device Description

You will find XML files (XML Device Description Files) for Beckhoff EtherCAT modules on our website (www.beckhoff.com) under Downloads, in the Configuration Files area.

3 Product overview

3.1 Module overview

Module	Number of inputs	Filter	Signal connection	EtherCAT connection	Comment
EP1008-0001 [▶ 14]	8	3.0 ms	8x M8	M8	
EP1008-0002 [▶ 14]	8	3.0 ms	4x M12	M8	
EP1008-0022 [▶ 14]	8	3,0 ms	8x M12	M8	
EP1018-0001 [▶ 14]	8	10 µs	8x M8	M8	
EP1018-0002 [▶ 14]	8	10 µs	4x M12	M8	
EP1098-0001 [▶ 18]	8	10 µs	8x M8	M8	ground switching
EP1111-0000 [▶ 21]	3 ID switches	-	-	M8	for identification of EtherCAT groups
EP1258-0001 [▶ 24]	8	10 µs	8x M8	M8	2 inputs with time stamp
EP1258-0002 [▶ 24]	8	10 µs	4x M12	M8	2 inputs with time stamp
EP1809-0021 [▶ 27]	16	3.0 ms	16x M8	M8	
EP1809-0022 [▶ 28]	16	3.0 ms	8x M12	M8	
EP1809-0042 [▶ 31]	16	3.0 ms	8x M12	M12	
EP1816-0003 [▶ 34]	16	10 µs	2x ZS2001	M8	Pluggable spring-loaded terminal
EP1816-0008 [▶ 37]	16	10 µs	1x D-Sub 25	M8	
EP1816-1008 [▶ 37]	16	10 µs	1x D-Sub 25	M8	Undervoltage detection
EP1816-3008 [▶ 37]	16	10 µs	1x D-Sub 25	M8	Undervoltage detection, accelerometers
EP1819-0021 [▶ 27]	16	10 µs	16x M8	M8	
EP1819-0022 [▶ 28]	16	10 µs	8x M12	M8	
EP1859-0042 [▶ 44]	8	3.0 ms	8x M12	M12	8 digital outputs

3.2 EP1008, EP1018

3.2.1 EP1008, EP1018 - Introduction

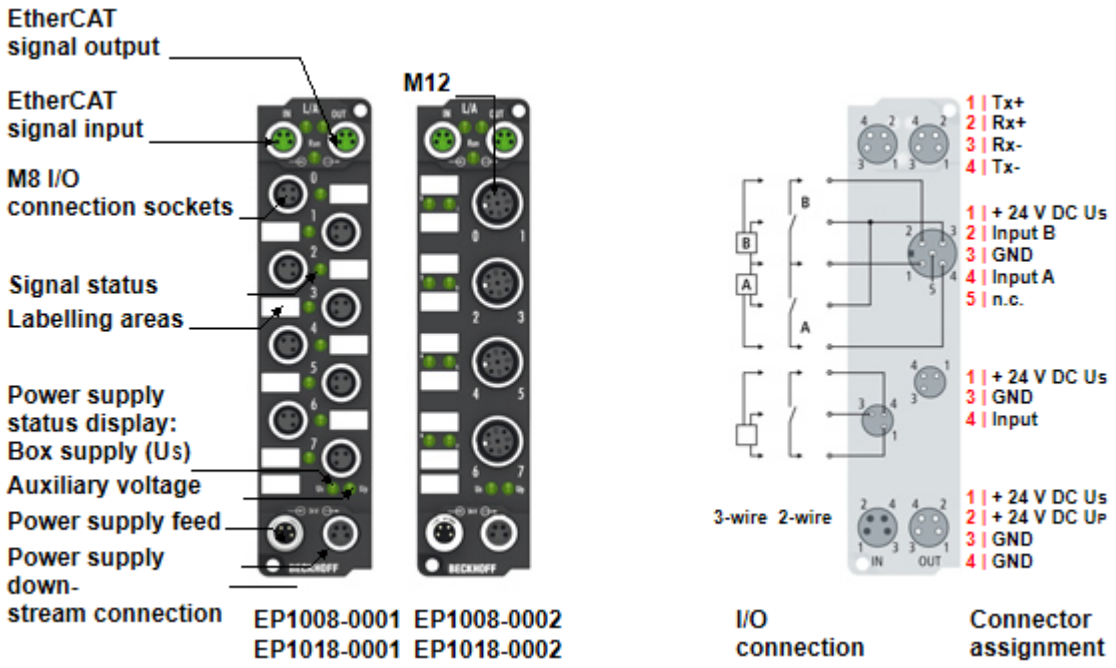


Fig. 4: EP1008-0001, EP1008-0002, EP1018-0001, EP1018-0002

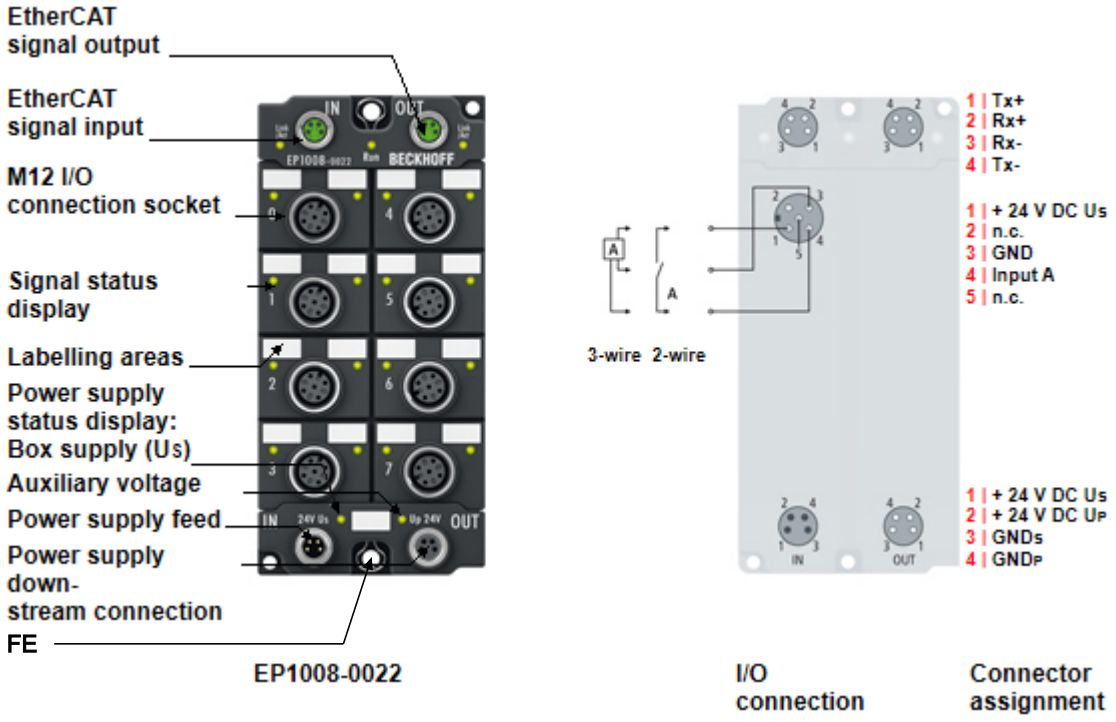


Fig. 5: EP1008-0022

8 digital inputs 24 V_{DC}

The EP1008 and EP1018 EtherCAT Box modules with digital inputs acquire binary control signals from the process level, and transfer them, electrically isolated, to the controller.

The status of the signal is displayed by light emitting diodes; the signal connection is made optionally through M8 connectors (EP1008-0001, EP1018-0001) or M12 connectors (EP1008-0002, EP1018-0002, EP1008-0022). These versions have input filters of different speeds.

The sensors are supplied from the control voltage Us. The load voltage Up is not used in the input module, but may be connected in order to be relayed downstream.

Quick links

EP1008-0001:

Technical data [▶ 16]
Process image [▶ 17]
Dimensions [▶ 48]
Signal connection [▶ 60]

EP1008-0002:

Technical data [▶ 16]
Process image [▶ 17]
Dimensions [▶ 48]
Signal connection [▶ 61]

EP1008-0022:

Technical data [▶ 16]
Process image [▶ 17]
Dimensions [▶ 49]
Functional earth (FE) [▶ 52]
Signal connection [▶ 62]

EP1018-0001:

Technical data [▶ 16]
Process image [▶ 17]
Dimensions [▶ 48]
Signal connection [▶ 60]

EP1018-0002:

Technical data [▶ 16]
Process image [▶ 17]
Dimensions [▶ 48]
Signal connection [▶ 61]

3.2.2 EP1008, EP1018 - Technical Data

Technical data	EP1008-0001	EP1008-0002	EP1008-0022	EP1018-0001	EP1018-0002
Fieldbus	EtherCAT				
Fieldbus connection	2 x M8 socket (green)				
Number of inputs	8				
Input connections	M8	M12	M12	M8	M12
Nominal input voltage	24 V_{DC} (-15%/+20%)				
Input filter	3,0 ms	3,0 ms	3,0 ms	10 µs	10 µs
"0" signal voltage	-3...+5 V (EN 61131-2, Type 3)				
"1" signal voltage	+11...+30 V (EN 61131-2, Type 3)				
Input current	typically 3 mA (EN 61131-2, Type 3)				
Module electronic supply	derived from control voltage Us				
Module electronic current consumption	typically 120 mA				
Sensor supply	derived from control voltage, Us				
Sensor current consumption	max. 0.5 A total, short-circuit proof				
Power supply connection	Feed: 1 x M8 plug, 4-pin Onward connection: 1 x M8 socket, 4-pin				
Process image	8 input bits				
Electrical isolation Fieldbus GNDS / GND_P	 500 V no	 500 V no	 500 V yes	 500 V no	 500 V no
Permissible ambient temperature during operation	-25 . +60°C 0 .. +55°C according to cURus 0 .. +55°C according to ATEX				
Permissible ambient temperature during storage	-40 .. +85°C				
Vibration / shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27				
EMC resistance/emission	conforms to EN 61000-6-2 / EN 61000-6-4				
Protection class	IP65, IP66, IP67 (conforms to EN 60529)				
Installation position	variable				
Approvals	CE, cURus [▶ 70], ATEX [▶ 71]				

3.2.3 EP1008, EP1018 - Scope of supply

Make sure that the following components are included in the scope of delivery:

- 1x EtherCAT Box
- 2x protective cap for EtherCAT socket, M8, green (pre-assembled)
- 1x protective cap for supply voltage input, M8, transparent (pre-assembled)
- 1x protective cap for supply voltage output, M8, black (pre-assembled)
- 10x labels, blank (1 strip of 10)

Pre-assembled protective caps do not ensure IP67 protection

Protective caps are pre-assembled at the factory to protect connectors during transport. They may not be tight enough to ensure IP67 protection.

Ensure that the protective caps are correctly seated to ensure IP67 protection.

3.2.4 EP1008-00xx - Process image

Channel 1 to Channel 8

You will find the 8 digital inputs to the module (here using the EP1008-0001 as an example) under **Channel 1 to Channel 8**.

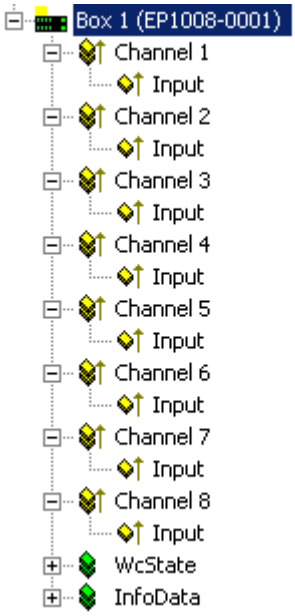


Fig. 6: EP1008-00xx, process image

3.3 EP1098-0001

3.3.1 EP1098-0001 - Introduction

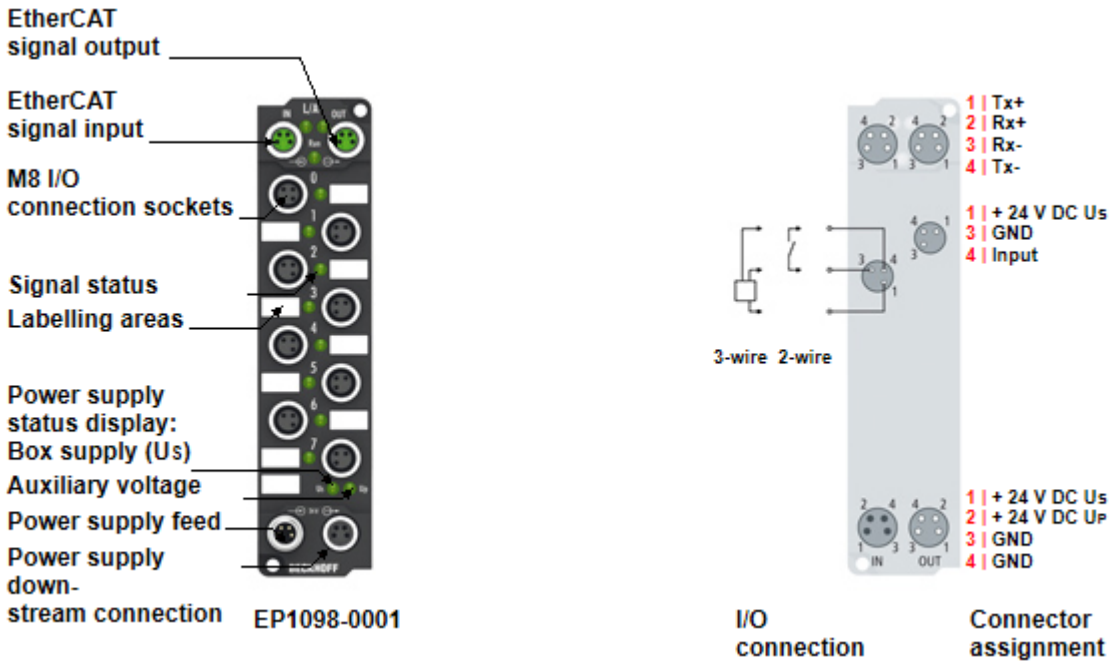


Fig. 7: EP1098-0001

8 digital inputs, 24 V_{DC}, ground switching

The EP1098-0001 EtherCAT Box with digital inputs acquires the binary control signals from the process level and transmits them, in an electrically isolated form, to the controller.

The status of the signal is displayed by light emitting diodes. The signal connection is made through M8 connectors (EP1098 -0001) or M12 connectors (EP1098 -0002).

The sensors are supplied from the control voltage Us. The load voltage Up is not used in the input module, but may be connected in order to be relayed downstream.

Quick links

Technical data [▶ 19]
Process image [▶ 20]
Dimensions [▶ 48]
Signal connection [▶ 60]

3.3.2 EP1098-0001 - Technical Data

Technical data	EP1098-0001
Fieldbus	EtherCAT
Fieldbus connection	2 x M8 socket (green)
Number of inputs	8 (negative switching)
Input connections	M8
Nominal input voltage	24 V_{DC} (-15%/+20%)
Input filter	10 µs
"0" signal voltage	11…30 V
"1" signal voltage	0…7 V
Input current	typically 2.5 mA (EN 61131-2, Type 3)
Module electronic supply	derived from control voltage Us
Module electronic current consumption	typically 120 mA
Sensor supply	derived from control voltage, Us
Sensor current consumption	max. 0.5 A total, short-circuit proof
Power supply connection	Feed: 1 x M8 plug, 4-pin Onward connection: 1 x M8 socket, 4-pin
Process image	8 input bits
Electrical isolation Fieldbus GND_S / GND_P	 500 V no
Permissible ambient temperature during operation	-25 .. +60°C -25 .. +55°C according to cURus
Permissible ambient temperature during storage	-40 .. +85°C
Vibration / shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27
EMC resistance/emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP65, IP66, IP67 (conforms to EN 60529)
Installation position	variable
Approvals	CE, cURus [▶ 70]

3.3.3 EP1098-0001 - Scope of supply

Make sure that the following components are included in the scope of delivery:

- 1x EtherCAT Box EP1098-0001
- 2x protective cap for EtherCAT socket, M8, green (pre-assembled)
- 1x protective cap for supply voltage input, M8, transparent (pre-assembled)
- 1x protective cap for supply voltage output, M8, black (pre-assembled)
- 10x labels, blank (1 strip of 10)

Pre-assembled protective caps do not ensure IP67 protection

Protective caps are pre-assembled at the factory to protect connectors during transport. They may not be tight enough to ensure IP67 protection.

Ensure that the protective caps are correctly seated to ensure IP67 protection.

3.3.4 EP1098-0001 - Process image

Channel 1 to Channel 8

You will find the 8 digital inputs to the module (here using the EP1098-0001 as an example) under **Channel 1 to Channel 8**.

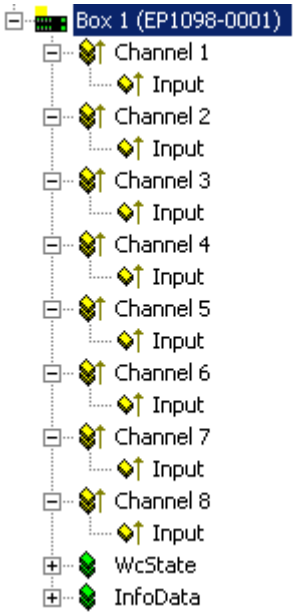


Fig. 8: EP1098-0001, Process image

3.4 EP1111-0000

3.4.1 EP1111-0000 - Introduction

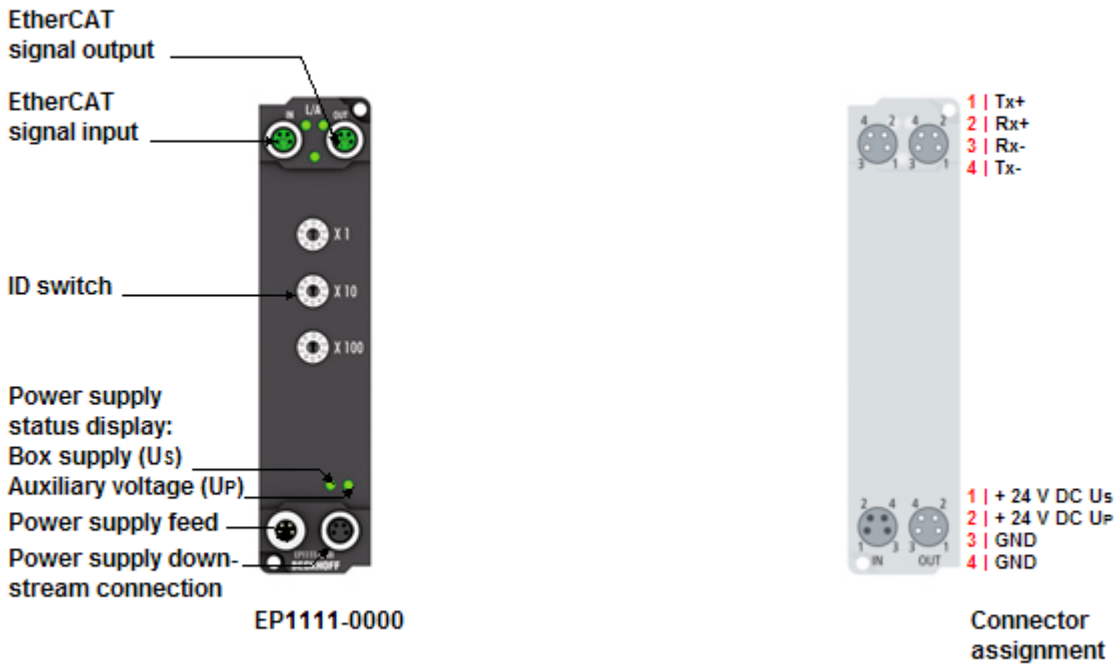


Fig. 9: EP1111-0000

EtherCAT Box with ID switch

The EP1111-0000 EtherCAT Box has three decimal ID switches, with which a group of EtherCAT components can be assigned an ID. This group can be present in any position in the EtherCAT network, as a result of which variable topologies can be realized in a simple manner.

The EtherCAT connection is established via shielded M8 connectors with direct display of link and activity status. The Run LED indicates the status of the EP1111.

Quick links

HotConnect in the EtherCAT system documentation.
Technical data [▶ 22]
Process image [▶ 23]
Dimensions [▶ 48]
Setting the Hot Connect ID [▶ 74]

3.4.2 EP1111-0000 - Technical Data

Technical data	EP1111-0000
Fieldbus	EtherCAT
Fieldbus connection	2 x M8 socket (green)
Task within EtherCAT system	identification of any EtherCAT group in the EtherCAT network
Number of ID switches	3
Positions per ID switch	10
Number of different IDs	999
Module electronic supply	derived from control voltage Us
Module electronic current consumption	typically 120 mA
Power supply connection	Feed: 1 x M8 plug, 4-pin Onward connection: 1 x M8 socket, 4-pin
Process image	2 byte input data
Electrical isolation Fieldbus GND_S / GND_P	 500 V yes
Weight	app. 165 g
Permissible ambient temperature during operation	-25 .. +60°C -25 .. +55°C according to cURus
Permissible ambient temperature during storage	-40 .. +85°C
Vibration / shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27
EMC resistance/emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP65, IP66, IP67 (conforms to EN 60529)
Installation position	variable
Approvals	CE, cURus [▶ 70]

3.4.3 EP1111-0000 - Scope of supply

Make sure that the following components are included in the scope of delivery:

- 1x EtherCAT Box EP1111-0000
- 2x protective cap for EtherCAT socket, M8, green (pre-assembled)
- 1x protective cap for supply voltage input, M8, transparent (pre-assembled)
- 1x protective cap for supply voltage output, M8, black (pre-assembled)
- 10x labels, blank (1 strip of 10)

Pre-assembled protective caps do not ensure IP67 protection

Protective caps are pre-assembled at the factory to protect connectors during transport. They may not be tight enough to ensure IP67 protection.

Ensure that the protective caps are correctly seated to ensure IP67 protection.

3.4.4 EP1111-0000 - Process image

ID inputs

You will find input data of the ID switches under under **ID Inputs**.

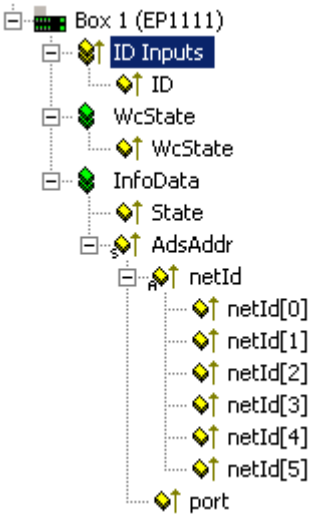


Fig. 10: EP1111-0000, ID inputs

3.5 EP1258-000x

3.5.1 EP1258-000x - Introduction

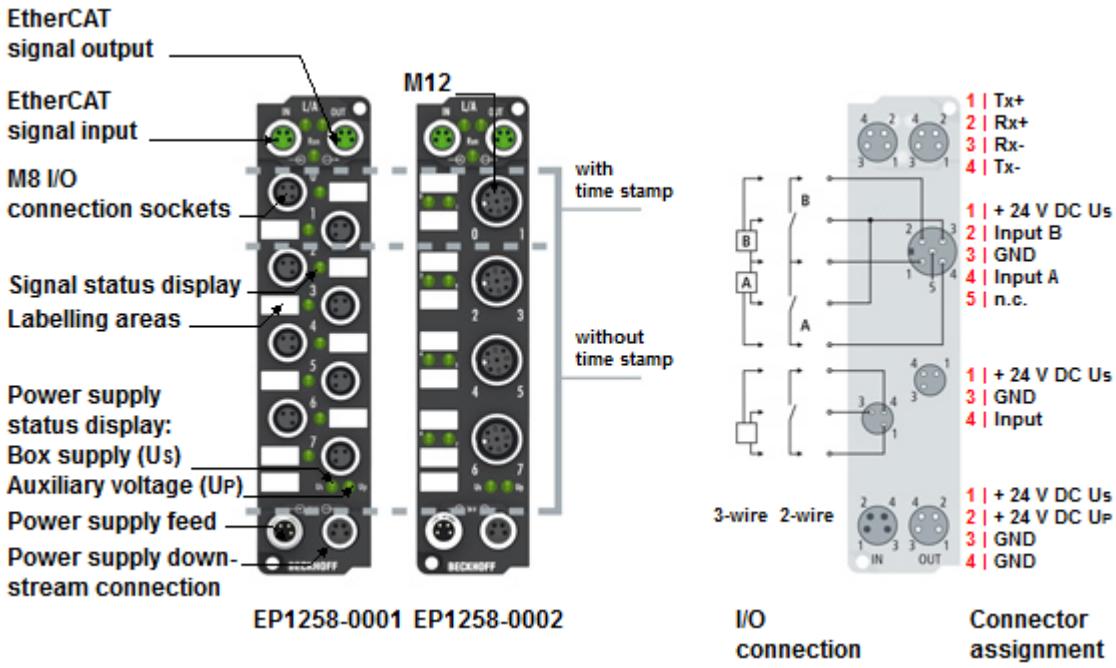


Fig. 11: EP1258-0001, EP1258-0002

8 digital inputs 24 V_{DC} (two channels with time stamp)

The EP1258 EtherCAT Box with digital inputs acquires fast binary control signals from the process level and transmits them, electrically isolated, to the controller.
The status of the signal is displayed by light emitting diodes; the signal connection is made optionally through M8 connectors (EP1258-0001) or M12 connectors (EP1258-0002). Both modules have 10 µs input filters.
The sensors are supplied from the control voltage U_S. The peripheral voltage U_P is not used in the input module, but may be connected in order to be relayed downstream.

Distributed Clocks

Channels 0 and 1 are assigned a time stamp that shows the time of the last edge change with a resolution of 1 ns. This technology enables signals to be traced exactly over time and synchronized with the clocks distributed across the system. With this technology, machine-wide parallel hardware wiring of digital inputs or encoder signals for synchronization purposes is often no longer required. As a result, equally timed reactions, independent of the bus cycle time, are to a large extent possible. Distributed Clocks in the EtherCAT system documentation.

Quick links

EP1258-0001

Technical data [▶ 25]
Dimensions [▶ 48]
Signal connection [▶ 60]

EP1258-0002

Technical data [▶ 25]
Dimensions [▶ 48]
Signal connection [▶ 61]

3.5.2 EP1258-000x - Technical Data

Technical data	EP1258-0001	EP1258-0002
Fieldbus	EtherCAT	
Fieldbus connection	2 x M8 socket (green)	
Number of inputs	8	
Input connections	M8	M12
Nominal input voltage	24 V_{DC} (-15%/+20%)	
Input filter	10 µs	
"0" signal voltage	-3...+5 V (similar to EN 61131-2, Type 3)	
"1" signal voltage	+11...+30 V (similar to EN 61131-2, Type 3)	
Input current	typically 3 mA (similar to EN 61131-2, Type 3)	
Module electronic supply	derived from control voltage Us	
Module electronic current consumption	typically 120 mA	
Sensor supply	derived from control voltage Us	
Sensor current consumption	max. 0.5 A total, short-circuit proof	
Power supply connection	Feed: 1 x M8 plug, 4-pin Onward connection: 1 x M8 socket, 4-pin	
Resolution time stamp	1 ns (Channel 0/1)	
Precision of the time stamp	10 ns (+ input delay) (Channel 0/1)	
Precision of the distributed clocks	< 100 ns (Channel 0/1)	
Process image	8 input bits , 36 byte time stamp	
Electrical isolation Fieldbus GND_S / GND_P	 500 V no	
Permissible ambient temperature during operation	-25 .. +60°C -25 .. +55°C according to cURus 0 .. +55°C according to ATEX	
Permissible ambient temperature during storage	-40°C ... +85°C	
Vibration / shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27	
EMC resistance/emission	conforms to EN 61000-6-2 / EN 61000-6-4	
Protection class	IP65, IP66, IP67 (conforms to EN 60529)	
Installation position	variable	
Approvals	CE, cURus [▶ 70], ATEX [▶ 71]	

3.5.3 EP1258-000x - Scope of supply

Make sure that the following components are included in the scope of delivery:

- 1x EtherCAT Box EP1258-000x
- 2x protective cap for EtherCAT socket, M8, green (pre-assembled)
- 1x protective cap for supply voltage input, M8, transparent (pre-assembled)
- 1x protective cap for supply voltage output, M8, black (pre-assembled)
- 10x labels, blank (1 strip of 10)

Pre-assembled protective caps do not ensure IP67 protection

Protective caps are pre-assembled at the factory to protect connectors during transport. They may not be tight enough to ensure IP67 protection.

Ensure that the protective caps are correctly seated to ensure IP67 protection.

3.5.4 EP1258-0001 - Process image

Channel 1 to Channel 8

You will find the 8 digital inputs to the module (here using the EP1258-0001 as an example) under **Channel 1 to Channel 8.**

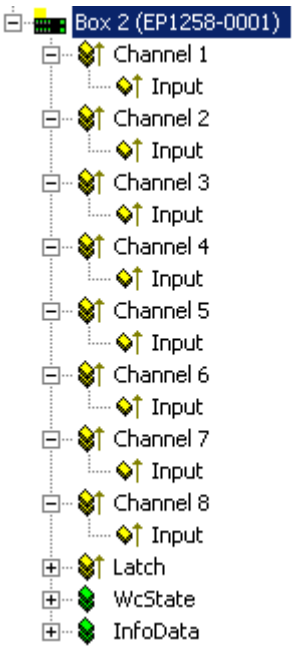


Fig. 12: EP1258-0001, Process image

3.6 EP1809, EP1819

3.6.1 EP1809-0021, EP1819-0021 - Introduction

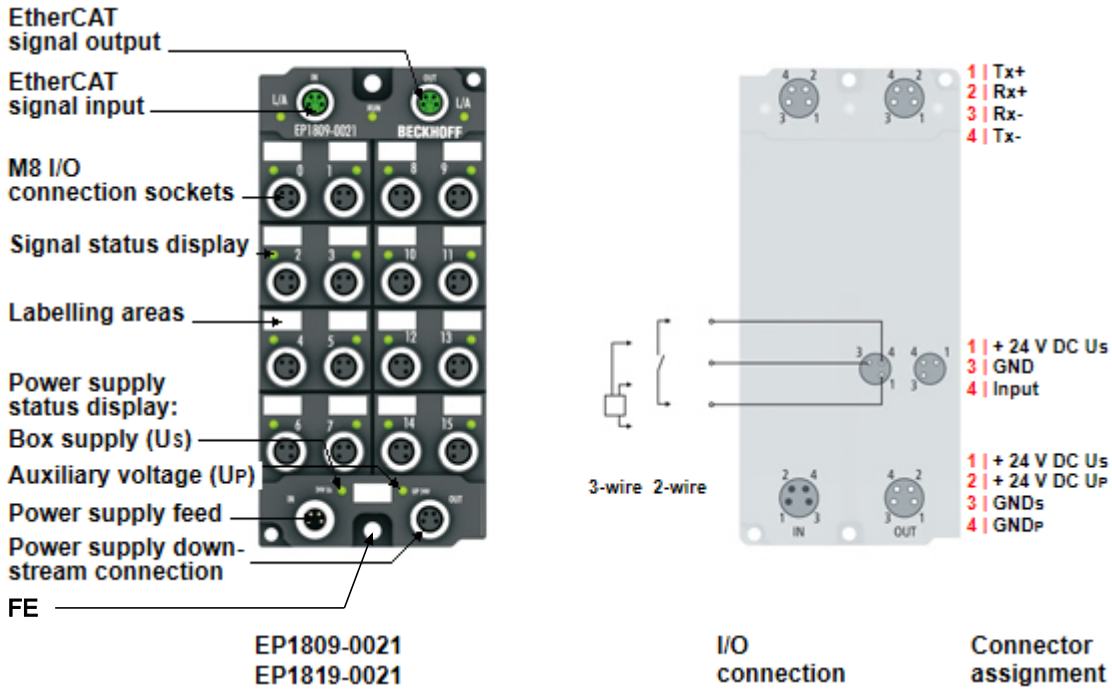


Fig. 13: EP1809-0021, EP1819-0021

16 digital inputs 24 V_{DC}

The EtherCAT modules EP1809-0021 and EP1819-0021 with digital inputs acquire binary control signals from the process level and transmit them, in an electrically isolated form, to the controller. The state of the signals is indicated by light emitting diodes. The signals are connected via M8 connectors.

The sensors are supplied from the box supply voltage U_S. The auxiliary voltage U_P is not used in the input module, but may be connected in order to be relayed downstream.

Quick links

Technical data [▶ 29]
Process image [▶ 30]
Dimensions [▶ 49]
Functional earth (FE) [▶ 52]
Signal connection [▶ 60]

3.6.2 EP1809-0022, EP1819-0022 - Introduction

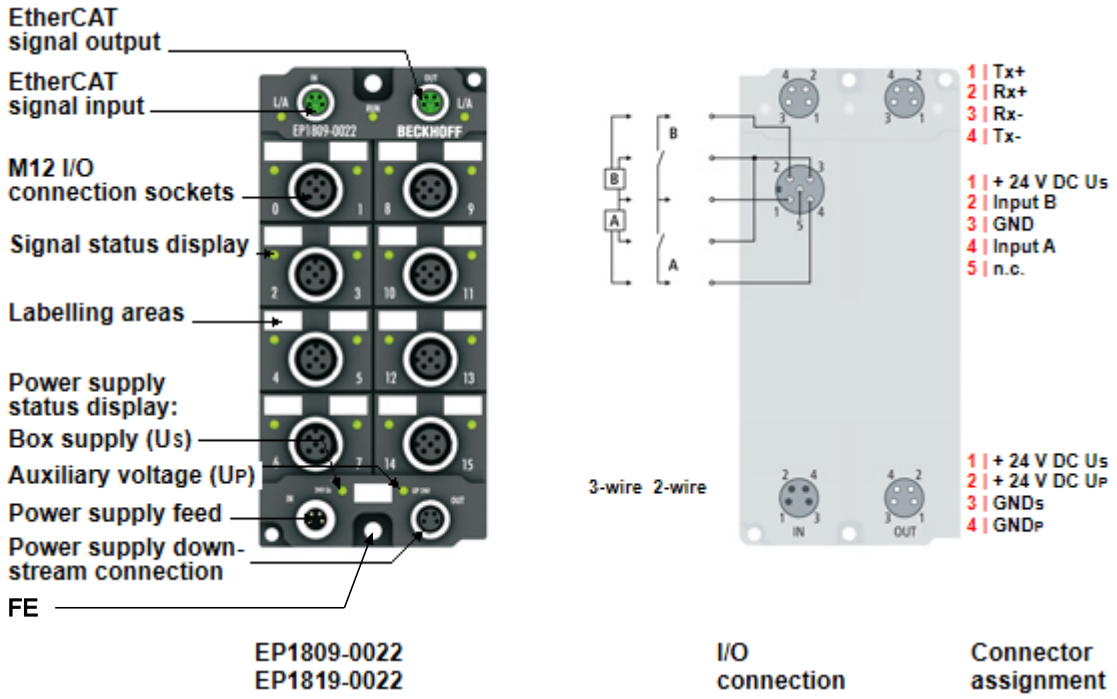


Fig. 14: EP1809-0022, EP1819-0022

16 digital inputs 24 V_{DC}

The EP1809-0022 and EP1819-0022 modules with digital inputs acquire the binary control signals from the process level and transmit them, in an electrically isolated form, to the controller. The state of the signals is indicated by light emitting diodes. The signals are connected via M12 connectors. These versions are distinguished by input filters of different speeds.

The sensors are supplied from the box supply voltage US. The auxiliary voltage UP is not used in the input module, but may be connected in order to be relayed downstream.

Quick links

Technical data [▶ 29]
Process image [▶ 30]
Dimensions [▶ 49]
Functional earth (FE) [▶ 52]
Signal connection [▶ 61]

3.6.3 EP1809, EP1819 - Technical data

Technical data	EP1809-0021	EP1809-0022	EP1819-0021	EP1819-0022
Fieldbus	EtherCAT			
Fieldbus connection	2 x M8 socket (green)			
Number of inputs	16			
Input connections	M8	M12	M8	M12
Nominal input voltage	24 V_{DC} (-15%/+20%)			
Input filter	3 ms	3 ms	10 µs	10 µs
"0" signal voltage	-3...+5 V (similar to EN 61131-2, Type 3)			
"1" signal voltage	+11...+30 V (similar to EN 61131-2, Type 3)			
Input current	typically 3 mA (similar to EN 61131-2, Type 3)			
Module electronic supply	derived from control voltage Us			
Module electronic current consumption	typically 130 mA (without sensor current)			
Sensor supply	derived from control voltage Us			
Sensor current consumption	max. 0.5 A total, short-circuit proof			
Power supply connection	Feed: 1 x M8 plug, 4-pin Onward connection: 1 x M8 socket, 4-pin			
Process image	16 input bits			
Electrical isolation Fieldbus GND_S / GND_P	 500 V yes			
Permissible ambient temperature during operation	-25 .. +60°C -25 .. +55°C according to cURus			
Permissible ambient temperature during storage	-40 .. +85°C			
Vibration / shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27			
EMC resistance / emission	conforms to EN 61000-6-2 / EN 61000-6-4			
Protection class	IP65, IP66, IP67 (conforms to EN 60529)			
Installation position	variable			
Approvals	CE, cURus [▶ 70]			

3.6.4 EP1809, EP1819 - Scope of supply

Make sure that the following components are included in the scope of delivery:

- 1x EtherCAT Box
- 2x protective cap for EtherCAT socket, M8, green (pre-assembled)
- 1x protective cap for supply voltage input, M8, transparent (pre-assembled)
- 1x protective cap for supply voltage output, M8, black (pre-assembled)
- 10x labels, blank (1 strip of 10)

Pre-assembled protective caps do not ensure IP67 protection

Protective caps are pre-assembled at the factory to protect connectors during transport. They may not be tight enough to ensure IP67 protection.

Ensure that the protective caps are correctly seated to ensure IP67 protection.

3.6.5 EP1809-0021 - Process image

Channel 1 to Channel 16

You will find the 16 digital inputs to the module (here using the EP1809-0021 as an example) under **Channel 1 to Channel 16.**

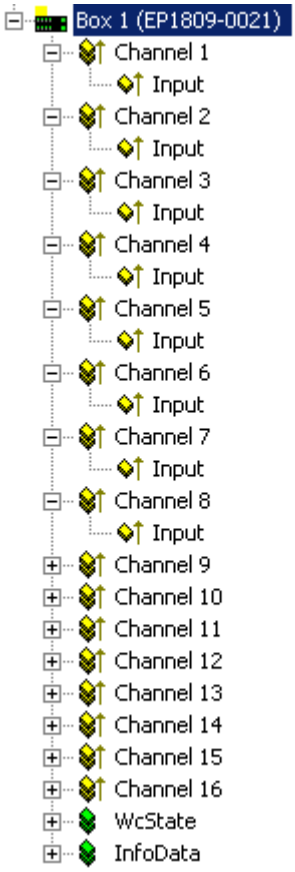


Fig. 15: EP1809-0021, Process image

3.7 EP1809-0042

3.7.1 EP1809-0042 - Introduction

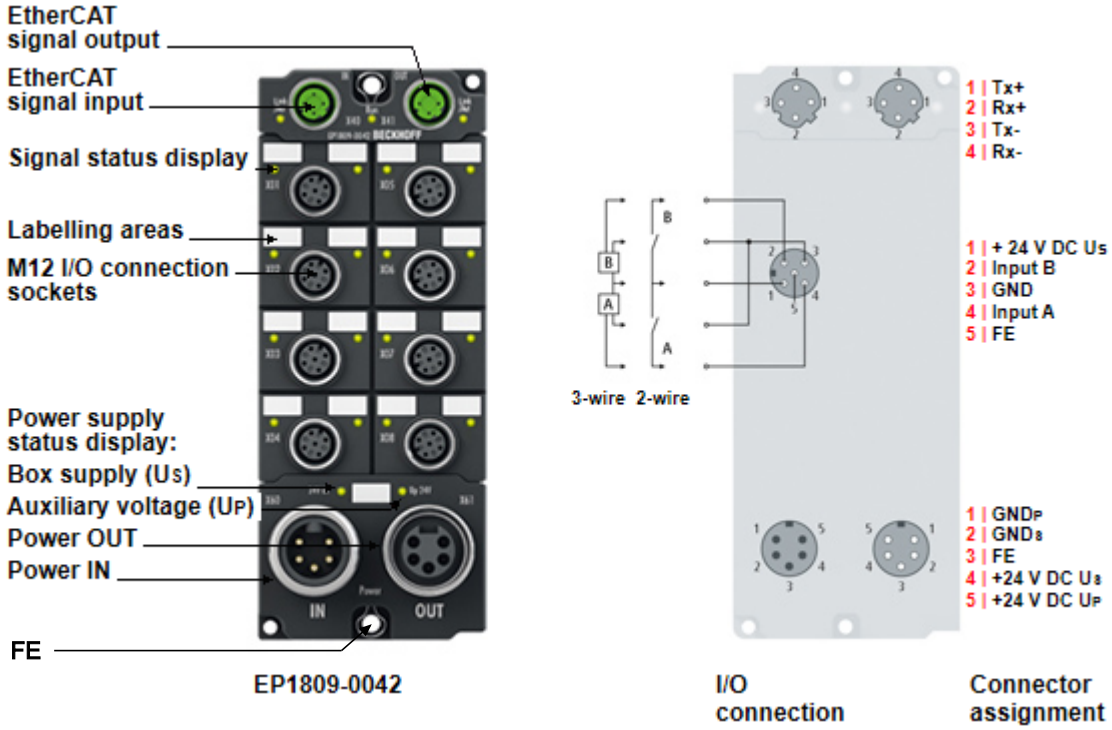


Fig. 16: EP1809-0042

16-channel digital input 24 V DC, 3.0 ms

The EP1809-0042 EtherCAT Box with digital inputs acquires the binary control signals from the process level and transmits them, in an electrically isolated form, to the controller. The state of the signals is indicated by light emitting diodes. The signals are connected via M12 screw type connectors.

The sensors are supplied from the box supply voltage U_S. The auxiliary voltage U_P is not used in the input module, but may be connected in order to be relayed downstream.

Quick links

Technical data [▶ 32]
Process image [▶ 33]
Dimensions [▶ 50]
Functional earth (FE) [▶ 52]
Signal connection [▶ 63]

3.7.2 EP1809-0042 - Technical data

All values are typical values over the entire temperature range, unless stated otherwise.

Technical data	EP1809-0042
Fieldbus	EtherCAT
Fieldbus connection	2x M12 socket, D-coded, 4-pin, green
Number of inputs	16
Input connections	8x M12 socket
Nominal input voltage	24 V_{DC} (-15%/+20%)
Input filter	3 ms
Signal voltage "0"	-3...+5 V (similar to EN 61131-2, type 3)
Signal voltage "1"	+11...+30 V (similar to EN 61131-2, Type 3)
Input current	6 mA (similar to EN 61131-2, type 3)
Supply of the module electronics	from the control voltage U_S
Current consumption of the module electronics	130 mA
Sensor supply	from the control voltage U_S max. 0.5 A in total, short-circuit proof
Power supply connection	Input: 1 x 7/8" plug, 5-pin Downstream connection: 1 x 7/8" socket, 5-pin max. 16 A per pin
Process image	16 input bits
Electrical isolation Fieldbus GND_S / GND_P	 500 V yes
Permissible ambient temperature during operation	-25…+60°C -25…+55 °C conforms to cURus
Permissible ambient temperature during storage	-40…+85°C
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	IP65, IP66, IP67 (conforms to EN 60529)
Installation position	variable
Weight	approx. 440 g
Approvals	CE, cURus in preparation

3.7.3 EP1809-0042 - Scope of supply

Make sure that the following components are included in the scope of delivery:

- 1x EtherCAT Box EP1809-0042
- 2x protective cap for EtherCAT socket, M12 (pre-assembled)
- 1x Protective cap for supply voltage output, 7/8”, black (pre-fitted)
- 10x labels, blank (1 strip of 10)

Pre-assembled protective caps do not ensure IP67 protection

Protective caps are pre-assembled at the factory to protect connectors during transport. They may not be tight enough to ensure IP67 protection.

Ensure that the protective caps are correctly seated to ensure IP67 protection.

3.7.4 EP1809-0042 - Process image

The process image contains a process data object for each digital input.

The name of each process data object contains the name of the socket and the pin number of the corresponding digital input.

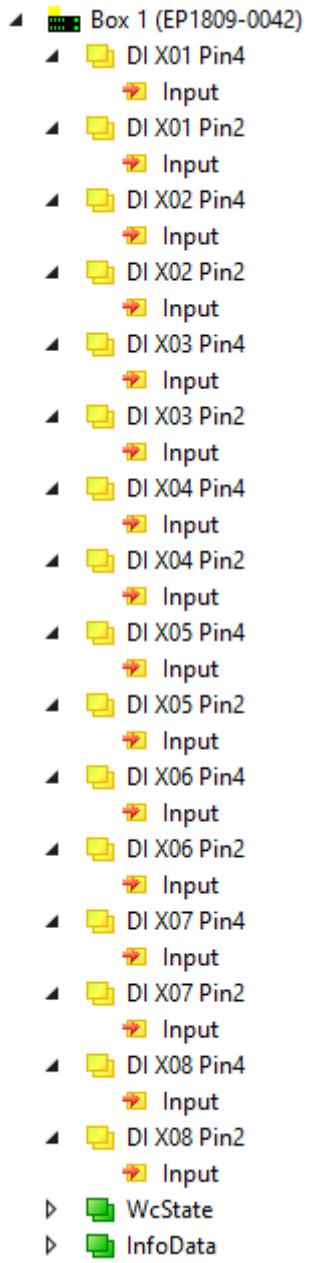


Fig. 17: EP1809-0042 - Process image

3.8 EP1816-0003

3.8.1 EP1816-x008 - Introduction

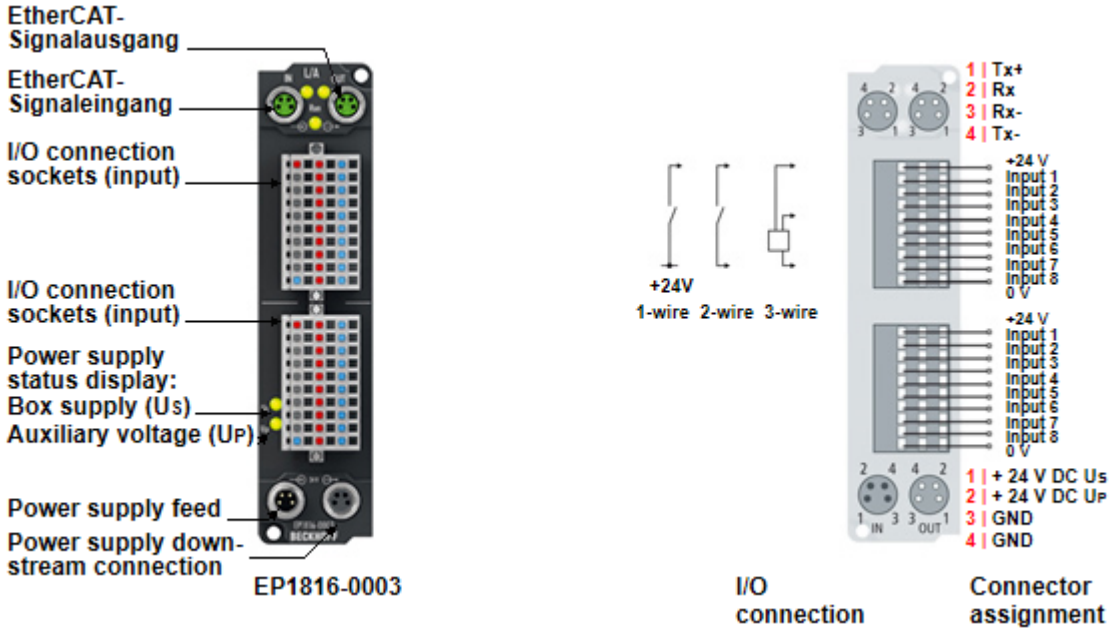


Fig. 18: EP1816-0003

EP1816-0003 | 16-channel digital input 24 V DC

The EP1816-0003 EtherCAT Box with digital inputs acquires the binary control signals from the process level and transmits them, in an electrically isolated form, to the controller. The state of the signals is indicated by light emitting diodes. For the signal connection connectors with a spring-loaded system are used, optionally available with 1 or 3 pins. The module is supplied without connectors.

The sensors are supplied from the box supply voltage U_S. The auxiliary voltage U_P is not used in the input module, but may be connected in order to be relayed downstream.

Quick links

Technical data [▶ 35]
Process image [▶ 36]
Dimensions [▶ 48]
Signal connection [▶ 64]

3.8.2 EP1816-0003 - Technical data

Technical data	EP1816-0003
Fieldbus	EtherCAT
Fieldbus connection	2x M8 socket, 4-pin, green
Distributed clocks	yes
Number of inputs	16
Input connections	2x pluggable spring-loaded terminals ZS2001 (not included in the scope of delivery)
Nominal input voltage	24 V_{DC} (-15%/+20%)
Input filter	10 µs
Signal voltage "0"	-3...+5 V (EN 61131-2, type 3)
Signal voltage "1"	+11...+30 V (EN 61131-2, type 3)
Input current	typically 3 mA (EN 61131-2, type 3)
Supply of the module electronics	from the control voltage Us
Current consumption of the module electronics	typically 120 mA
Sensor supply	from the control voltage Us
Sensor current consumption	max. 0.5 A, short-circuit proof overall
Power supply connection	Power supply: 1 x M8 plug, 4-pin Downstream connection: 1 x M8 socket, 4-pin
Electrical isolation Fieldbus GND_S / GND_P	 500 V no
Ambient temperature during operation	-25 .. +60°C -25 .. +55°C according to cURus
Ambient temperature during storage	-40 .. +85°C
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	IP65, IP66, IP67 (according to EN 60529)
Installation position	variable
Approvals	CE, cURus [▶ 70]

3.8.3 EP1816-0003 - Scope of supply

Make sure that the following components are included in the scope of delivery:

- 1x EtherCAT Box EP1816-0003
- 2x protective cap for EtherCAT socket, M8, green (pre-assembled)
- 1x protective cap for supply voltage input, M8, transparent (pre-assembled)
- 1x protective cap for supply voltage output, M8, black (pre-assembled)
- 10x labels, blank (1 strip of 10)

Pre-assembled protective caps do not ensure IP67 protection

Protective caps are pre-assembled at the factory to protect connectors during transport. They may not be tight enough to ensure IP67 protection.

Ensure that the protective caps are correctly seated to ensure IP67 protection.

3.8.4 EP1816-0003 - Process image

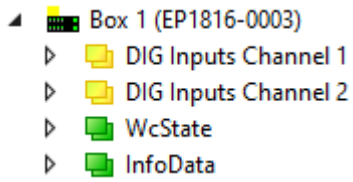
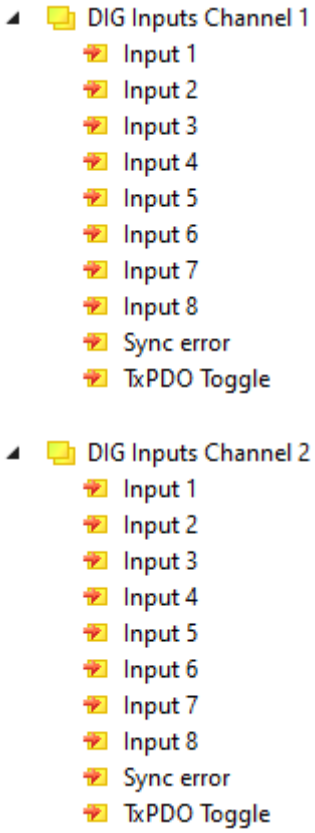


Fig. 19: EP1816-0003 Process image

DIG Inputs Channel *n*



- Input x
  Digital inputs.
- Sync error
  This bit is only relevant in Distributed Clocks mode.
  It is TRUE if a synchronization error occurred during the elapsed EtherCAT cycle.
- TxPDO Toggle
  This bit is inverted each time the digital inputs are updated.

3.9 EP1816-x008

3.9.1 EP1816-x008 - Introduction

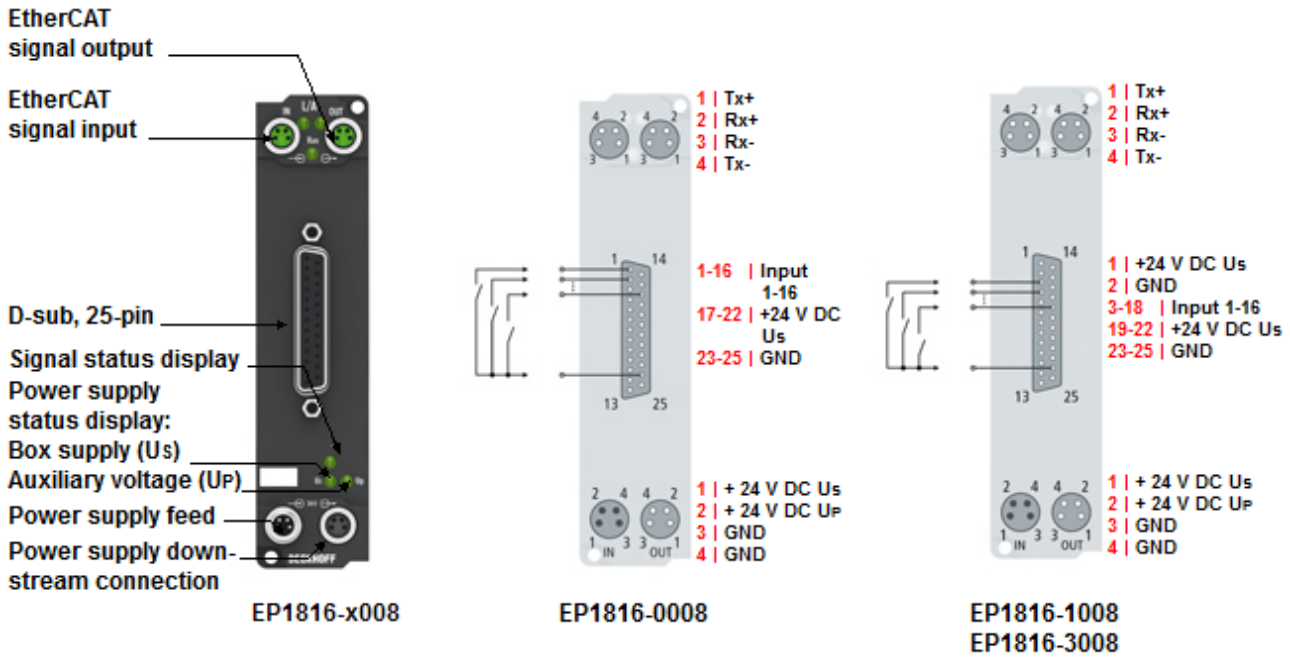


Fig. 20: EP1816-x008

EP1816-x008 | 16-channel digital input

The EP1816-x008 EtherCAT Box with digital inputs acquires the binary control signals from the process level and transmits them, in an electrically isolated form, to the controller. The state of the signals is indicated by light emitting diodes. The signals are connected via 25-pin D-sub socket.

The sensors are supplied from the box supply voltage U_S. The auxiliary voltage U_P is not used in the input module, but may be connected in order to be relayed downstream.

EP1816-3008 has two internal 3-axis accelerometers with 16 bits and a selectable resolution of ±2 g, ±4 g, ±8 g and ±16 g. The sampling frequency is 1 Hz to 5 KHz. Possible applications include the recording of vibrations and shocks/oscillations, and furthermore inclination measurements in all three axes.

Quick links

Technical data [▶ 38]
Process image [▶ 40]
Dimensions [▶ 48]
Signal connection [▶ 66]
Accelerometers (EP1816-3008) [▶ 75]

3.9.2 EP1816-x008 - Technical data

Technical data	EP1816-0008	EP1816-1008	EP1816-3008
Fieldbus	EtherCAT		
Fieldbus connection	2 x M8 socket (green)		
Number of inputs	16		
Input connections	25-pin Sub-D socket		
Nominal input voltage	24 V_{DC} (-15%/+20%)		
Input filter	10 µs		
"0" Signal voltage	-3...+5 V (EN 61131-2, Typ 3)		
"1" Signal voltage	+11...+30 V (EN 61131-2, Typ 3)		
Input current	typically 3 mA (EN 61131-2, Typ 3)		
Minimum cycle time	-	-	> 500 µs
Diagnostics	-	Undervoltage detection: < 18 V_{DC} for Us and Up	
Supply of the module circuitry	From the control voltage Us		
Current consumption of the module circuitry	typically 120 mA		
Sensor supply	From the control voltage Us		
Current consumption of the sensors	max. 0.5 A, short-circuit-proof overall		
Power supply connection	Power supply: 1 x M8 plug, 4-pin Onward connection: 1 x M8 socket, 4-pin		
Electrical isolation Fieldbus GND_S / GND_P	 500 V no	 500 V yes	
Ambient temperature during operation	-25 .. +60°C -25 .. +55°C according to cURus		
Ambient temperature during storage	-40°C ... +85°C		
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	IP65, IP66, IP67 (according to EN 60529)		
Installation position	variable		
Technical approvals	CE, cURus [▶ 70]		

Accelerometers (EP1816-3008)

Technical data	Accelerometers
Sensor type	Two 3-axis sensors / offset by 90°
Resolution	16 bit raw data; 1 mg / LSB
Measuring range	±2g/±4g/±8g/±16g configurable
Special features	Self-test
Sampling rate	1 Hz to 5 kHz

Maximum transfer rate

The EP1816-3008 reads sensors with sampling rates between 1 Hz and 5 kHz. Since the smallest cycle time is limited to 500 µs due to the internal processing, the resulting maximum transfer rate is 2.5 kHz

3.9.3 EP1816-000x - Scope of supply

Make sure that the following components are included in the scope of delivery:

- 1x EtherCAT Box EP1816-000x
- 2x protective cap for EtherCAT socket, M8, green (pre-assembled)
- 1x protective cap for supply voltage input, M8, transparent (pre-assembled)
- 1x protective cap for supply voltage output, M8, black (pre-assembled)
- 10x labels, blank (1 strip of 10)

Pre-assembled protective caps do not ensure IP67 protection

Protective caps are pre-assembled at the factory to protect connectors during transport. They may not be tight enough to ensure IP67 protection.

Ensure that the protective caps are correctly seated to ensure IP67 protection.

3.9.4 EP1816-0008 - Process image

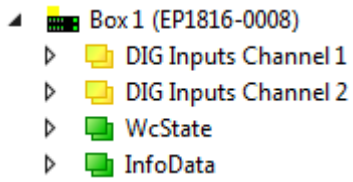


Fig. 21: EP1816-0008 Process image

DIG Inputs Channel 1

You will find the first 8 digital inputs of the module under **DIG Inputs Channel 1**.

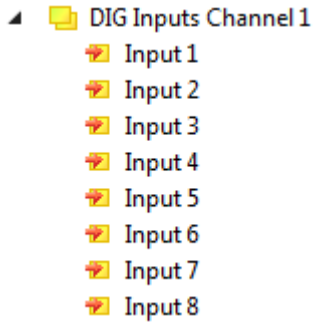


Fig. 22: EP1816-0008 process image, DIG Inputs Channel 1

DIG Inputs Channel 2

You will find the second 8 digital inputs of the module under **DIG Inputs Channel 2**.

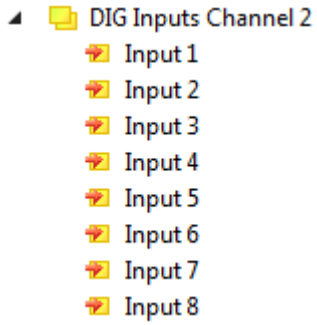


Fig. 23: EP1816-0008 process image, DIG Inputs Channel 2

3.9.5 EP1816-1008 – Process image

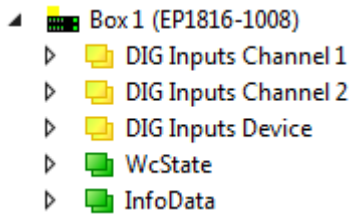


Fig. 24: EP1816-1008 Process image

DIG Inputs Channel 1

You will find the first 8 digital inputs of the module under **DIG Inputs Channel 1**.

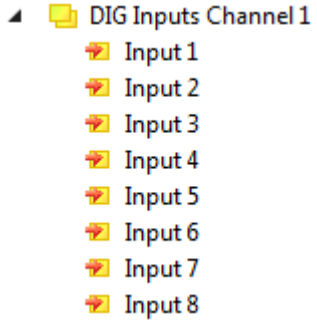


Fig. 25: EP1816-1008 process image, DIG Inputs Channel 1

DIG Inputs Channel 2

You will find the second 8 digital inputs of the module under **DIG Inputs Channel 2**.

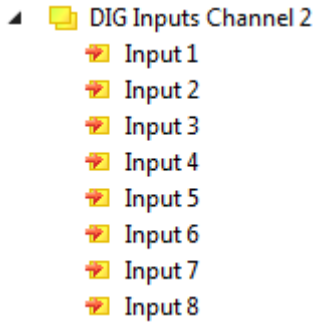


Fig. 26: EP1816-1008 process image, DIG Inputs Channel 2

DIG Inputs Device

The status bits can be found under **DIG Inputs Device**.

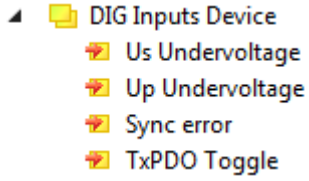


Fig. 27: EP1816-1008 process image, DIG Inputs Device

3.9.6 EP1816-3008 - Process image

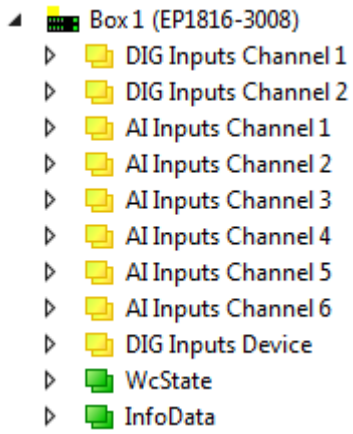


Fig. 28: EP1816-3008 Process image

DIG Inputs Channel 1

You will find the first 8 digital inputs of the module under **DIG Inputs Channel 1**.

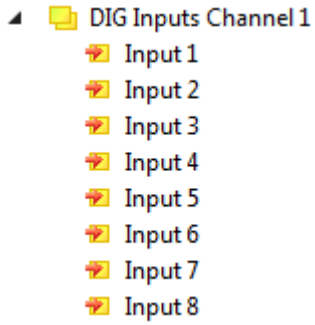


Fig. 29: EP1816-3008 process image, DIG Inputs Channel 1

DIG Inputs Channel 2

You will find the second 8 digital inputs of the module under **DIG Inputs Channel 2**.

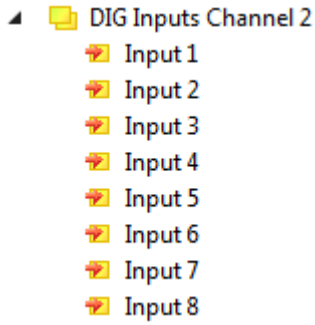


Fig. 30: EP1816-3008 process image, DIG Inputs Channel 2

DIG Inputs Device

The status bits can be found under **DIG Inputs Device**.

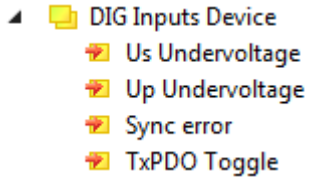


Fig. 31: EP1816-3008 process image, DIG Inputs Device

AI Inputs Channel 1 to 6

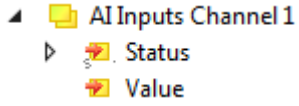


Fig. 32: EP1816-3008 process image, AI inputs

The data for the two accelerometers can be found under **AI inputs Channel**

- Status Error: error relating to the communication with the accelerometer
- Value: 16 bit acceleration value

Assignment of the acceleration axes to variables in the process image [▶ 75]

3.10 EP1859-0042

3.10.1 EP1859-0042 - Introduction

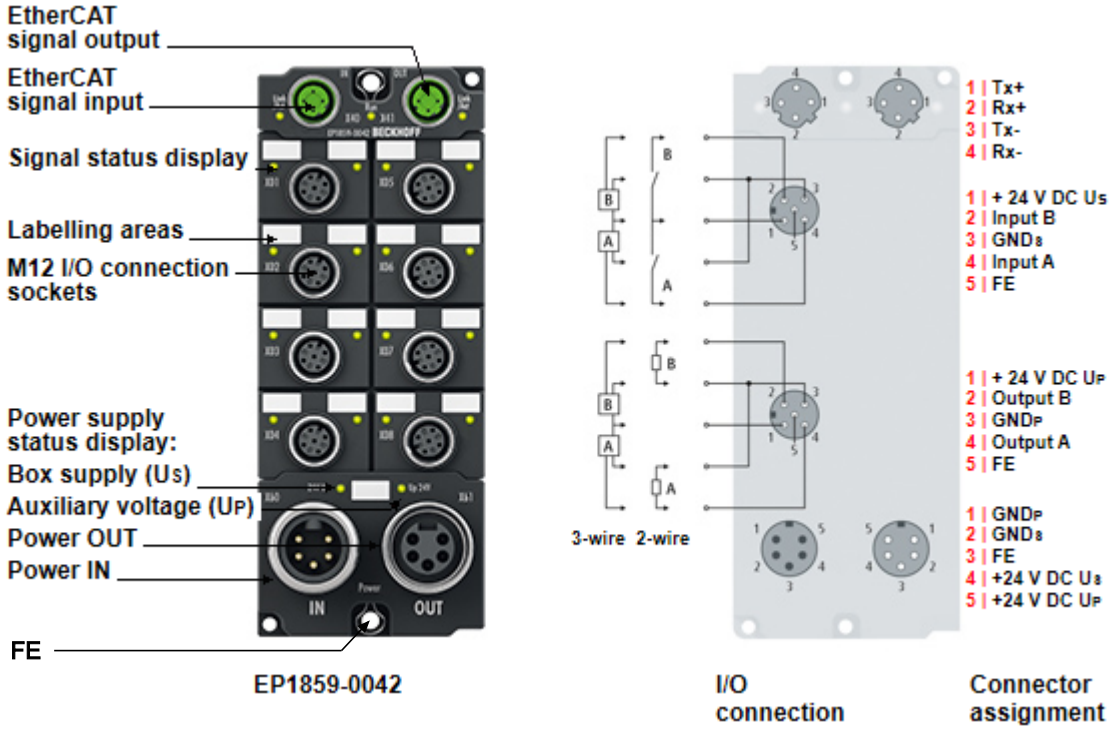
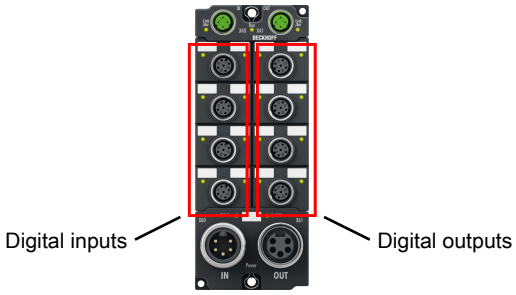


Fig. 33: EP1859-0042

8 x digital input + 8 x digital output 24 V DC, Imax = 0.5 A, 3.0 ms

The EP1859-0042 EtherCAT Box has eight digital inputs (four M12 sockets on the left) and eight digital outputs (four M12 sockets on the right). The inputs have a filter of 3.0 ms. The outputs process load currents up to 0.5 A, are short-circuit proof and protected against polarity reversal. The state of the signals is indicated by light emitting diodes. The signals are connected via M12 screw type connectors.



The sensors are supplied from the box supply voltage U_S. The outputs are supplied via U_P. The outputs are short-circuit proof and protected against inverse connection.

Quick links

Technical data [▶ 45]
Process image [▶ 47]
Dimensions [▶ 50]
Functional earth (FE) [▶ 52]
Signal connection, inputs [▶ 63]: X01, X02, X03, X04
Signal connection, outputs [▶ 69]: X05, X06, X07, X08

3.10.2 EP1859-0042 - Technical data

All values are typical values over the entire temperature range, unless stated otherwise.

Technical data	EP1859-0042
Fieldbus	EtherCAT
Fieldbus connection	2x M12 socket, D-coded, 4-pin, green
Number of inputs	8
Input connections	4x M12 socket: X01, X02, X03, X04
Nominal input voltage	24 V_{DC} (-15%/+20%)
Input filter	3 ms
Signal voltage "0"	-3...+5 V (similar to EN 61131-2, type 3)
Signal voltage "1"	+11...+30 V (similar to EN 61131-2, Type 3)
Input current	6 mA (similar to EN 61131-2, type 3)
Sensor supply	from the control voltage U_S max. 0.5 A in total, short-circuit proof
Number of outputs	8
Output connections	4x M12 socket: X05, X06, X07, X08
Output current	max. 0.5 A per channel, individually short-circuit proof
Load type	Ohmic, inductive, lamp load
Actuator supply	from the peripheral voltage U_P max. 0.5 A in total, short-circuit proof
Power supply connection	Input: 1 x 7/8" plug, 5-pin Downstream connection: 1 x 7/8" socket, 5-pin max. 16 A pro Pin
Supply of the module electronics	from the control voltage U_S
Current consumption of the module electronics	130 mA
Electrical isolation Fieldbus GND_S / GND_P	 500 V yes
Permissible ambient temperature during operation	-25°C…+60°C -25…+55 °C conforms to cURus
Permissible ambient temperature during storage	-40°C…+85°C
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	IP65, IP66, IP67 (conforms to EN 60529)
Installation position	variable
Weight	approx. 440 g
Approvals	CE, cURus in preparation

3.10.3 EP1859-0042 - Scope of supply

Make sure that the following components are included in the scope of delivery:

- 1x EtherCAT Box EP1859-0042
- 2x protective cap for EtherCAT socket, M12 (pre-assembled)
- 1x Protective cap for supply voltage output, 7/8”, black (pre-fitted)
- 10x labels, blank (1 strip of 10)

Pre-assembled protective caps do not ensure IP67 protection

Protective caps are pre-assembled at the factory to protect connectors during transport. They may not be tight enough to ensure IP67 protection.

Ensure that the protective caps are correctly seated to ensure IP67 protection.

3.10.4 EP1859-0042 - Process image

The process image contains a process data object for each digital input.

The name of each process data object contains the name of the socket and the pin number of the corresponding digital input.

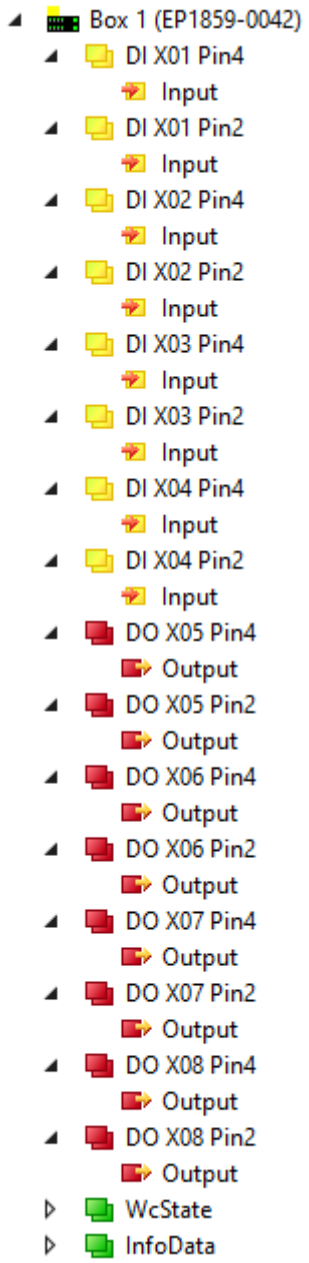


Fig. 34: EP1859-0042 - Process image

4 Mounting and connection

4.1 Mounting

4.1.1 Dimensions EPxxxx-xx0x and EPxxxx-xx1x

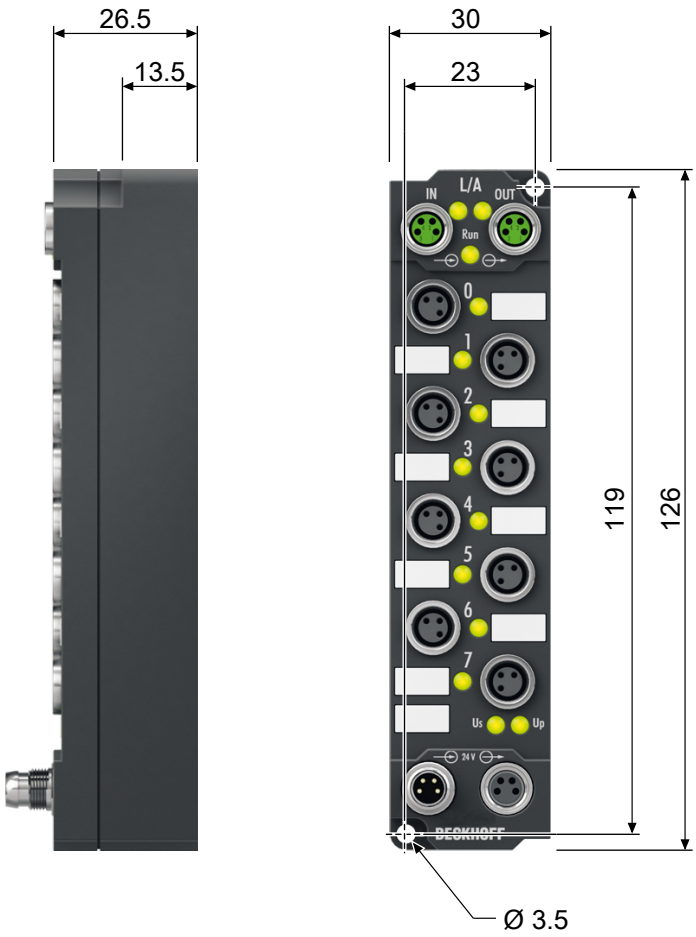


Fig. 35: Dimensions

All dimensions are given in millimeters.

Housing features

Housing material	PA6 (polyamide)
Sealing compound	polyurethane
Mounting	two fastening holes Ø 3.5 mm for M3
Metal parts	brass, nickel-plated
Contacts	CuZn, gold-plated
Power feed through	max. 4 A
Installation position	variable
Protection class	IP65, IP66, IP67 (conforms to EN 60529) when screwed together
Dimensions (H x W x D)	approx. 126 x 30 x 26.5 mm (without connectors)

4.1.2 Dimensions EPxxxx-xx2x

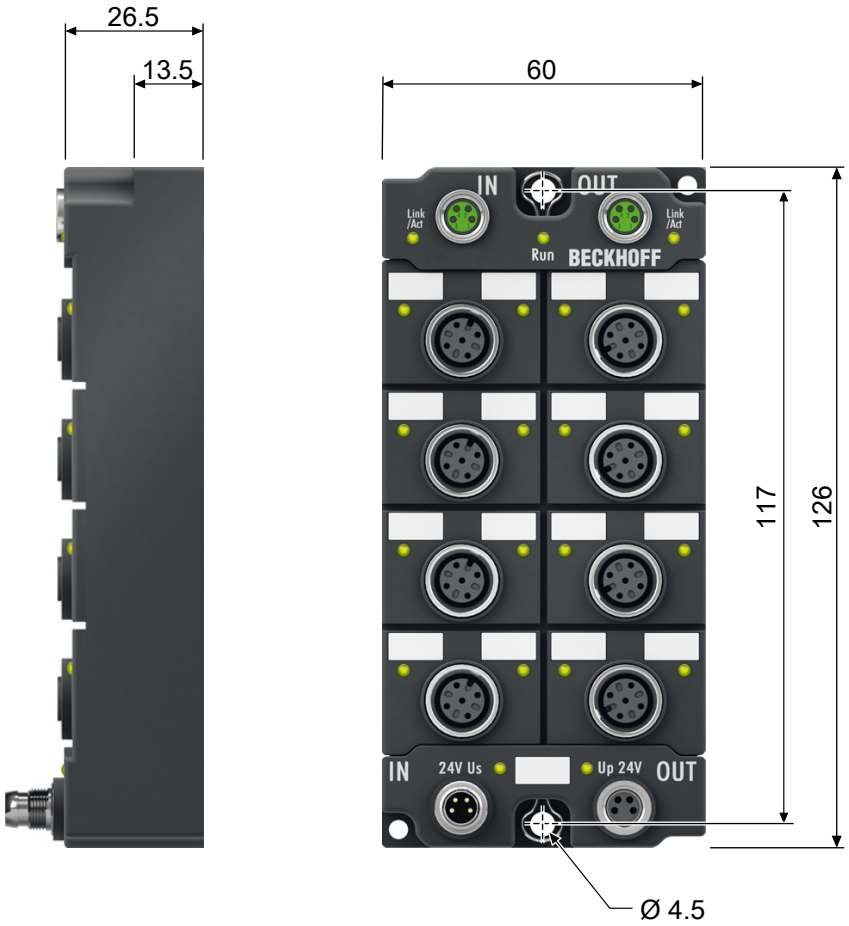


Fig. 36: Dimensions

All dimensions are given in millimeters.

Housing features

Housing material	PA6 (polyamide)
Sealing compound	polyurethane
Mounting	two fastening holes Ø 4.5 mm for M4
Metal parts	brass, nickel-plated
Contacts	CuZn, gold-plated
Power feed through	max. 4 A
Installation position	variable
Protection class	IP65, IP66, IP67 (conforms to EN 60529) when screwed together
Dimensions (H x W x D)	approx. 126 x 60 x 26.5 mm (without connectors)

4.1.3 EPxxxx-xx42 dimensions

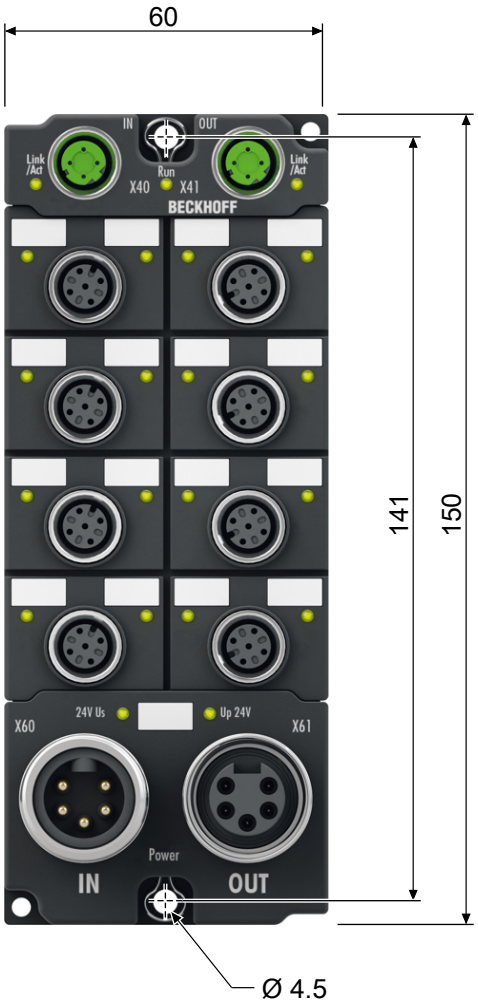


Fig. 37: Dimensions

All dimensions are given in millimeters.

Housing features

Housing material	PA6 (polyamide)
Sealing compound	polyurethane
Mounting	two fastening holes Ø 4.5 mm for M4
Metal parts	brass, nickel-plated
Contacts	CuZn, gold-plated
Power feed through	max. 16 A at 40°C (according to IEC 60512-3)
Installation position	variable
Protection class	IP65, IP66, IP67 (conforms to EN 60529) when screwed together
Dimensions (H x W x D)	approx. 150 x 60 x 26.5 mm (without connectors)

4.1.4 Fixing

Protection of connectors against contamination!

While mounting the modules, protect all connectors, especially the IP-Link, against contamination! Only with connected cables or plugs the protection class IP67 is guaranteed! Unused connectors have to be protected with the right plugs! See for plug sets in the catalogue.

Modules with narrow housing are mounted with two M3 bolts.
Modules with wide housing are mounted with two M3 bolts to the fixing holes located at the corners or mounted with two M4 bolts to the fixing holes located centrally.

The bolts must be longer than 15 mm. The fixing holes of the modules are not threaded.

When assembling, remember that the fieldbus connectors increases the overall height. See chapter accessories.

Mounting Rail ZS5300-0001

The mounting rail ZS5300-0001 (500 mm x 129 mm) allows the time saving assembly of modules.

The rail is made of stainless steel, 1.5 mm thick, with already pre-made M3 threads for the modules. The rail has got 5.3 mm slots to mount it via M5 screws to the machine.

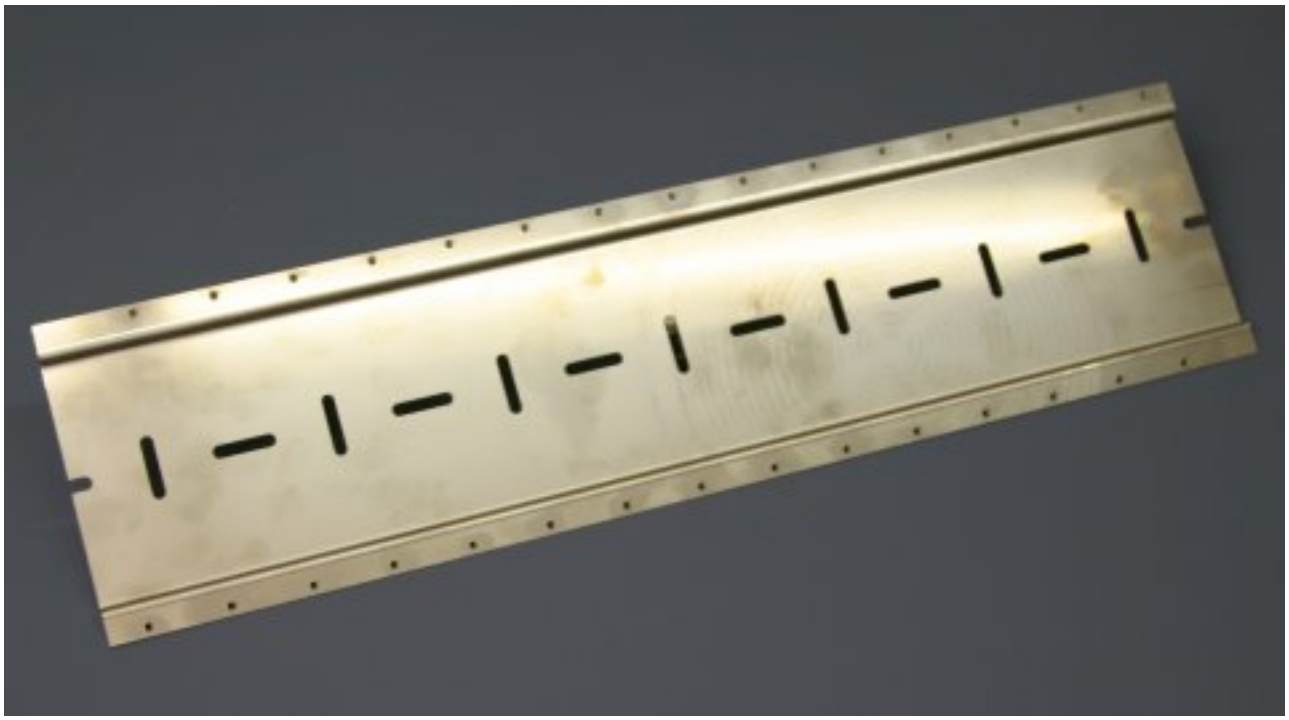


Fig. 38: Mounting Rail ZS5300-000

The mounting rail is 500 mm long, that way 15 narrow modules can be mounted with a distance of 2 mm between two modules. The rail can be cut to length for the application.

Mounting Rail ZS5300-0011

The mounting rail ZS5300-0011 (500 mm x 129 mm) has in addition to the M3 treads also pre-made M4 treads to fix 60 mm wide modules via their middle holes.

Up to 14 narrow or 7 wide modules may be mixed mounted.

4.1.5 Functional earth (FE)

EtherCAT Box modules of types EPxxxx-002x and EPxxxx-0042 must be grounded:

The fastening holes also serve as connections for the functional earth (FE).

Make sure that the box is earthed with low impedance via both fastening screws. You can achieve this, for example, by mounting the box on a grounded machine bed.

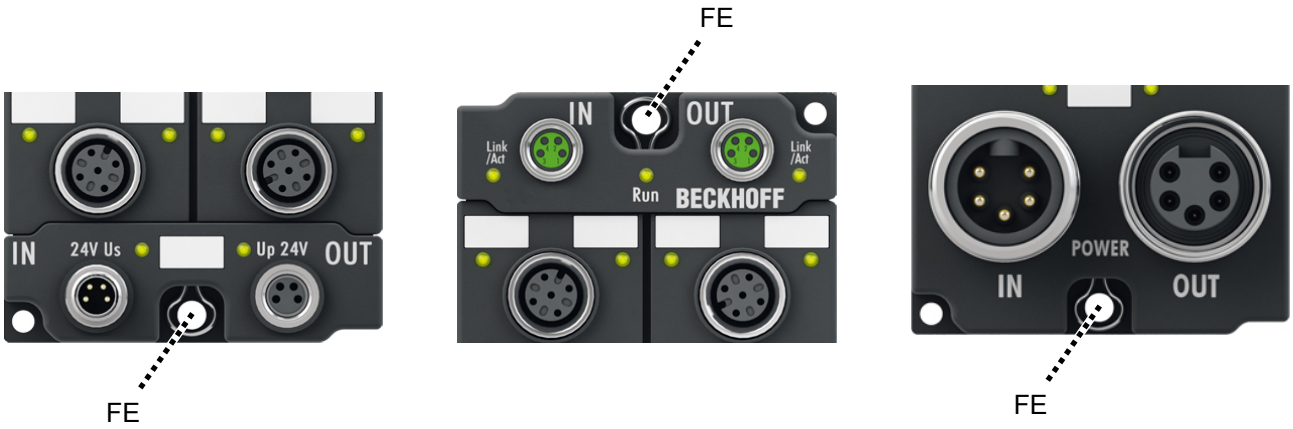


Fig. 39: Functional earth via the fastening holes

4.1.6 Additional checks

The boxes have undergone the following additional tests:

Verification	Explanation
Vibration	10 frequency runs in 3 axes
	5 Hz < f < 60 Hz displacement 0.35 mm, constant amplitude
	60.1 Hz < f < 500 Hz acceleration 5 g, constant amplitude
Shocks	1000 shocks in each direction, in 3 axes
	35 g, 11 ms

4.2 Connections

4.2.1 Tightening torques for plug connectors

Screw connectors tight with a torque wrench. (e.g. ZB8801 from Beckhoff)

Connector diameter	Tightening torque
M8	0.4 Nm
M12	0.6 Nm
7/8”	1.5 Nm

4.2.2 EtherCAT

4.2.2.1 Connectors

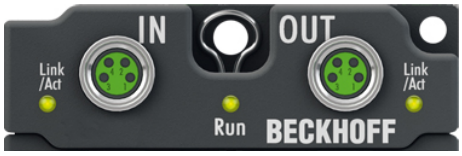
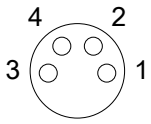
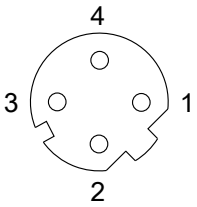
NOTE

Risk of confusion: supply voltages and EtherCAT

Defect possible through incorrect insertion.

- Observe the color coding of the connectors:
  black: Supply voltages
  green: EtherCAT

EtherCAT Box modules have two green M8 or M12 sockets for the incoming and outgoing EtherCAT connections.

M8 sockets		M12 sockets
		
		

Assignment

There are various different standards for the assignment and colors of connectors and cables for EtherCAT.

EtherCAT	Plug connector			Cable		Standard
Signal	M8	M12	RJ45[1]	ZB9010, ZB9020, ZB9030, ZB9032, ZK1090-6292, ZK1090-3xxx-xxxx	ZB9031 and old versions of ZB9030, ZB9032, ZK1090-3xxx-xxxx	TIA-568B
Tx +	Pin 1	Pin 1	Pin 1	yellow[2]	orange/white[3]	white/orange
Tx -	Pin 4	Pin 3	Pin 2	orange[2]	orange[3]	orange
Rx +	Pin 2	Pin 2	Pin 3	white[2]	blue/white[3]	white/green
Rx -	Pin 3	Pin 4	Pin 6	blue[2]	blue[3]	green
Shield	Housing		Shroud	Shield	Shield	Shield

[1]) colored markings according to EN 61918 in the four-pin RJ45 connector ZS1090-0003
[2]) wire colors according to EN 61918
[3]) wire colors

Assimilation of color coding for cable ZB9030, ZB9032 and ZK1090-3xxxx-xxxx (with M8 connectors)

For unification, the prevalent cables ZB9030, ZB9032 and ZK1090-3xxx-xxxx were changed to the colors of EN61918 (yellow, orange, white, blue). So different color coding exists. But the electrical properties are absolutely identical.

4.2.2.2 Status LEDs

L/A (Link/Act)

A green LED labelled "L/A" is located next to each EtherCAT socket. The LED indicates the communication state of the respective socket:

LED	Meaning
off	no connection to the connected EtherCAT device
lit	LINK: connection to the connected EtherCAT device
flashes	ACT: communication with the connected EtherCAT device

Run

Each EtherCAT slave has a green LED labelled "Run". The LED signals the status of the slave in the EtherCAT network:

LED	Meaning
off	Slave is in "Init" state
flashes uniformly	Slave is in "Pre-Operational“ state
flashes sporadically	Slave is in "Safe-Operational" state
lit	Slave is in "Operational" state

Description of the EtherCAT slave states

4.2.2.3 Cables

For connecting EtherCAT devices only shielded Ethernet cables that meet the requirements of at least category 5 (CAT5) according to EN 50173 or ISO/IEC 11801 should be used.

EtherCAT uses four wires for signal transmission.
Thanks to automatic line detection ("Auto MDI-X"), both symmetrical (1:1) or cross-over cables can be used between Beckhoff EtherCAT.

Detailed recommendations for the cabling of EtherCAT devices

4.2.3 Supply voltages

The EtherCAT Box is supplied with two supply voltages.

- **Control voltage U_S**
  Power is supplied to the fieldbus, the processor logic, the inputs and the sensors from the control voltage U_S.
- **Peripheral voltage U_P**
  The peripheral voltage U_P supplies the digital outputs; it can be brought in separately. Hence, if the peripheral voltage is switched off, the fieldbus function as well as the supply and function of the inputs are retained.

Redirection of the supply voltages

The power IN and OUT connections are bridged in the module. Hence, the supply voltages U_s and U_p can be passed from EtherCAT Box to EtherCAT Box in a simple manner.

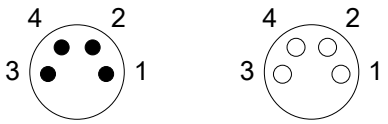
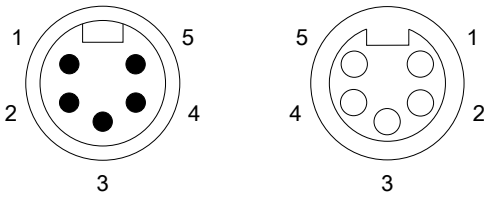
NOTE

Note the maximum current!

Ensure that the permitted current for the connectors is not exceeded when routing the supply voltages U_S and U_P:

M8 connector: max. 4 A
7/8" connector: max 16 A

4.2.3.1 Connectors

<table>
<tr><th>M8 connector</th><th>7/8" connector</th></tr>
<tr><td colspan="2"> 
</td><td> 
</td></tr>
<tr><td colspan="2"> 
</td><td> 
</td></tr>
</table>

Function	M8	7/8"	Description	Core color [1]
U_S	1	4	Control voltage	Brown
U_P	2	5	Peripheral voltage	White
GND_S	3	2	GND to U_S	Blue
GND_P	4	1	GND to U_P	Black
FE	-	3	Functional earth	Grey

[1] The core colors apply to cables of the type: Beckhoff ZK2020-xxxx-xxxx

GND_S and GND_P are linked for modules of the following types:

- EPxxxx-0001
- EPxxxx-0002
- EPxxxx-0008

NOTE

The electrical isolation between GND_S and GND_P can be removed

In some EtherCAT Box modules the ground potentials GND_S and GND_P are linked.

If several EtherCAT Box modules are supplied with the same electrically isolated voltages, check whether there is an EtherCAT Box among them in which the ground potentials are linked.

4.2.3.2 Status LEDs

Fig. 40: Status LEDs for the supply voltages

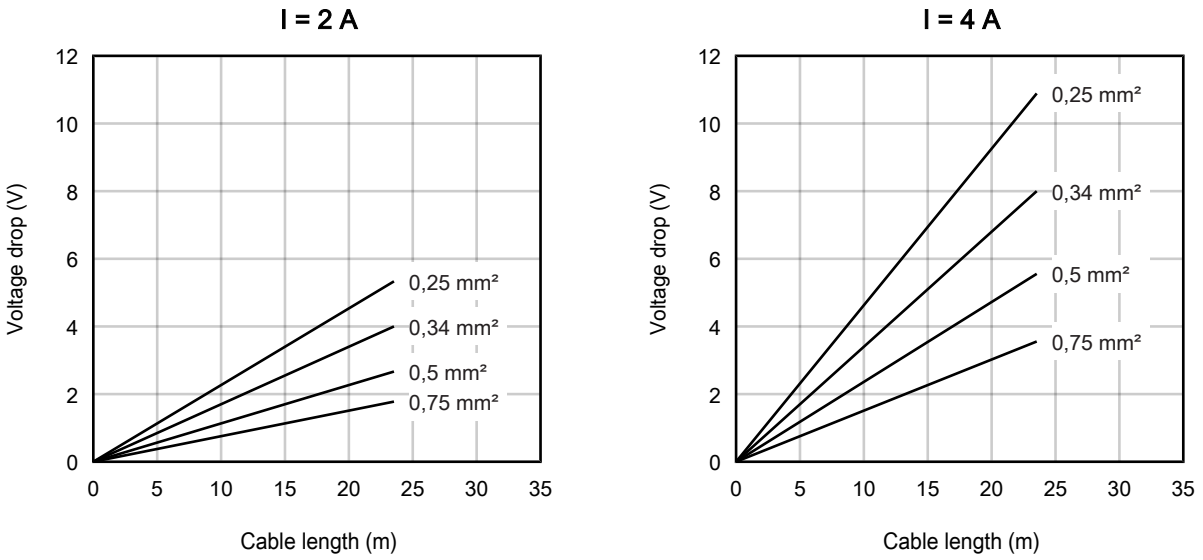
LED	Display	Meaning
U_S (control voltage)	off	Supply voltage U_S is not present
	green illuminated	Supply voltage U_S is present
	red illuminated	Due to overload (current > 0.5 A), the sensor supply generated from the supply voltage U_S was switched off for all sensors supplied from it.
U_P (peripheral voltage)	Off	Supply voltage U_P is not present
	green illuminated	Supply voltage U_P is present
	red illuminated (EP1859-0042 only)	Due to overload (current > 0.5 A), the sensor supply generated from the supply voltage U_P was switched off for all sensors supplied from it.

4.2.3.3 Conductor losses

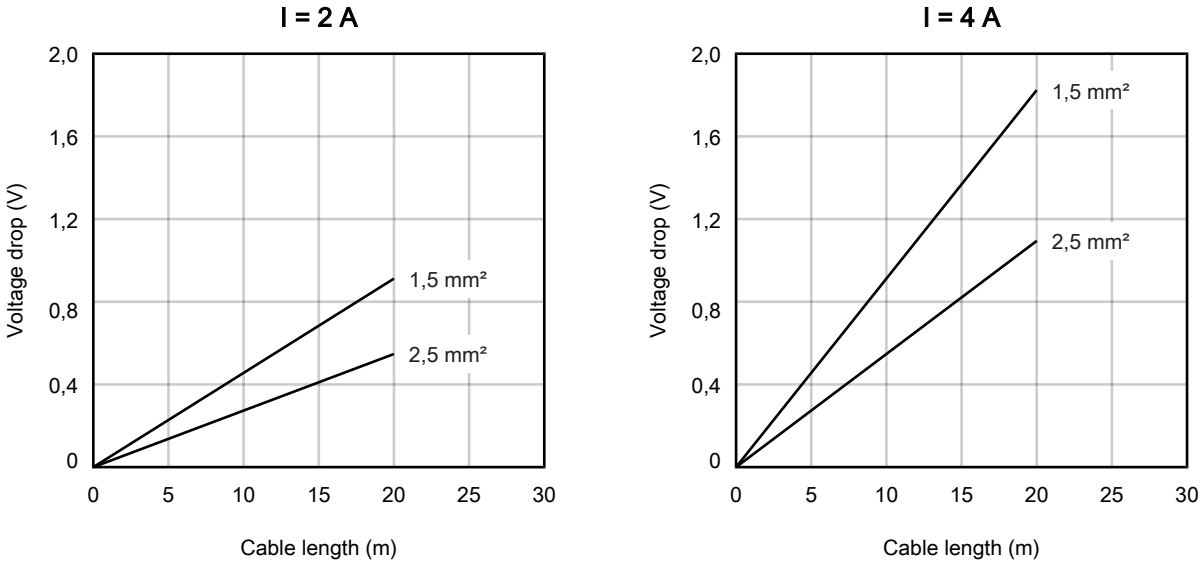
Take into account the voltage drop on the supply line when planning a system. Avoid the voltage drop being so high that the supply voltage at the box lies below the minimum nominal voltage.

Variations in the voltage of the power supply unit must also be taken into account.

Voltage drop on cables with M8 connectors



Voltage drop on cables with 7/8" connectors



4.2.4 Digital inputs

4.2.4.1 M8 sockets

Pin assignment

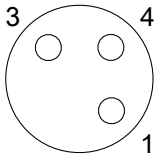


Fig. 41: M8 socket, 3-pin

Pin	Function	Core color [1]
1	U_{S1} [2]	brown
3	GND_S	blue
4	Input	black

[1] The wire colors apply to 3-wire M8 cables from Beckhoff: ZK2000-2xxx

[2] U_{S1} serves as sensor supply voltage. It is branched off from the U_S supply voltage.

Connection examples

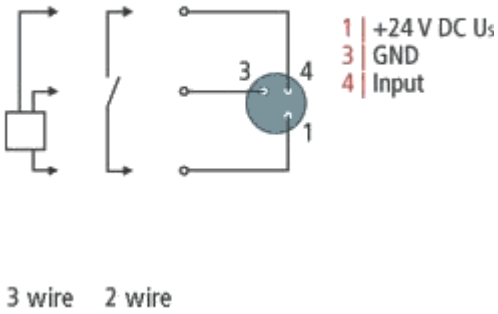


Fig. 42: Digital inputs M8, connection examples

Status LEDs

There is a green LED next to each M8 socket. The LED lights up when a high level is detected at the digital input.

Fig. 43: Status LED at an M8 socket

4.2.4.2 M12 sockets

NOTE

EP1008-0022 and EP18x9-0042 have different pin assignments.

Pin assignment of the digital inputs of EP1008-0022 [▶ 62]
Pin assignment of the digital inputs of EP18x9-0042 [▶ 63]

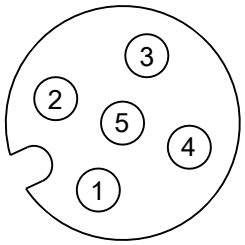


Fig. 44: M12 socket

Pin	Function	Core color [1]
1	U_{S1} [2]	brown
2	Input B	white
3	GND_S	blue
4	Input A	black
5	-	grey

[1] The core colors apply to M12 cables from Beckhoff: ZK2000-5xxx, ZK2000-6xxx, ZK2000-7xxx

[2] U_{S1} serves as sensor supply voltage. It is branched off from the U_S supply voltage.

Connection examples

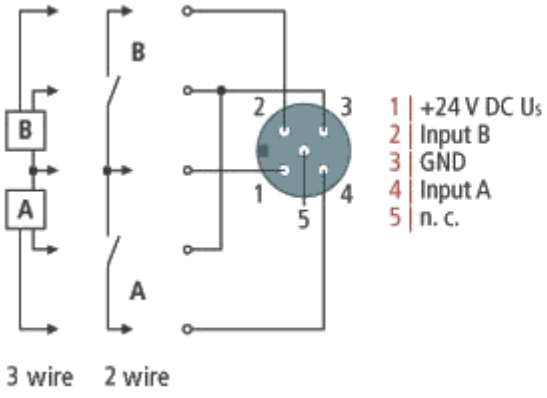


Fig. 45: Digital inputs M12, connection examples

Status LEDs

Each M12 socket has two green LEDs. An LED lights up when a high level is detected at the respective input.

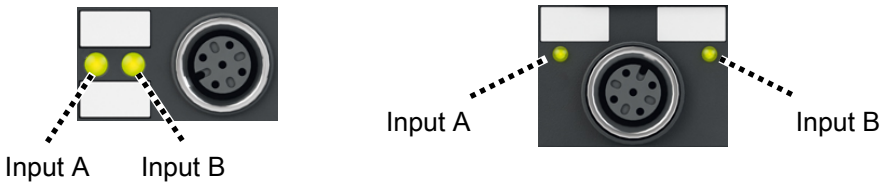


Fig. 46: Status LEDs of M12 sockets

4.2.4.3 M12 sockets of EP1008-0022

NOTE

This pin assignment is only valid for EP1008-0022

Pin assignment of the digital inputs (M12) of other EtherCAT Box modules [▶ 61]

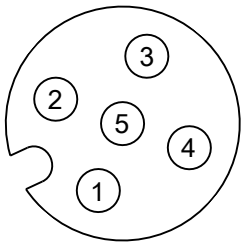


Fig. 47: M12 socket

Pin	Function	Core color [1]
1	U_{S1} [2]	brown
2	-	white
3	GND_S	blue
4	Input	black
5	-	grey

[1] The core colors apply to M12 cables from Beckhoff: ZK2000-5xxx, ZK2000-6xxx, ZK2000-7xxx

[2] U_{S1} serves as sensor supply voltage. It is branched off from the U_S supply voltage.

Connection examples

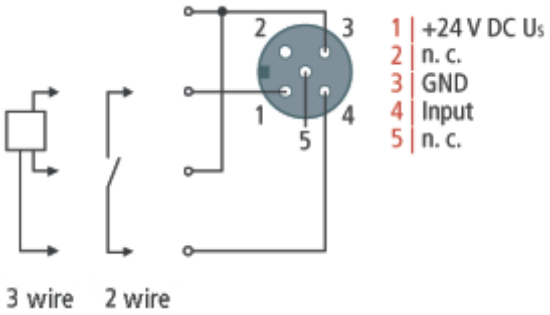


Fig. 48: Digital inputs M12, connection examples

Status LEDs

Each M12 socket has a green LED. The LED lights up when a high level is detected at the digital input.

Fig. 49: Status LED on an M12 socket for EP1008-0022

4.2.4.4 M12 sockets of EP18x9-0042

NOTE

This pin assignment is only valid for EP18x9-0042

Pin assignment of the digital inputs (M12) of other EtherCAT Box modules [▶ 61]
Pin assignment of the digital outputs of EP1859-0042 [▶ 69]

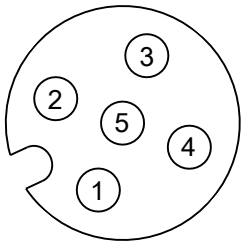


Fig. 50: M12 socket

Pin	EP18x9-0042	Core color [1]
1	U_{S1} [2]	brown
2	Input B	white
3	GND_S	blue
4	Input A	black
5	FE (Functional earth)	grey

[1] The core colors apply to M12 cables from Beckhoff: ZK2000-5xxx, ZK2000-6xxx, ZK2000-7xxx

[2] U_{S1} serves as sensor supply voltage. It is branched off from the U_S supply voltage.

Connection examples

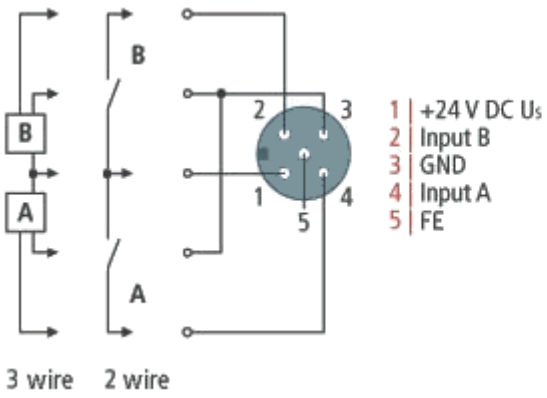


Fig. 51: Digital inputs M12, connection examples

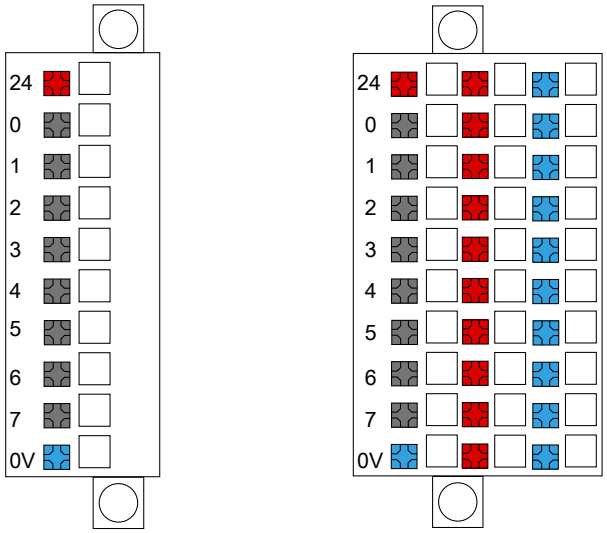
Status LEDs

Each M12 socket has two green LEDs. An LED lights up when a high level is detected at the respective input.

Fig. 52: Status LEDs of M12 sockets

4.2.4.5 Pluggable spring-loaded terminals

Pin assignment



ZS2001-0001
ZS2001-0002

ZS2001-0004

Fig. 53: ZS2001

Contact	Function
0	Input 1
1	Input 2
2	Input 3
3	Input 4
4	Input 5
5	Input 6
6	Input 7
7	Input 8
"24"	U_{S1}
"0V"	GND_S

ZS2001-0004 has three rows with ten terminal contacts each. The first row is occupied as shown in the table. The second and third rows are designed to distribute the supply voltage and ground. See connection examples:

Connection examples

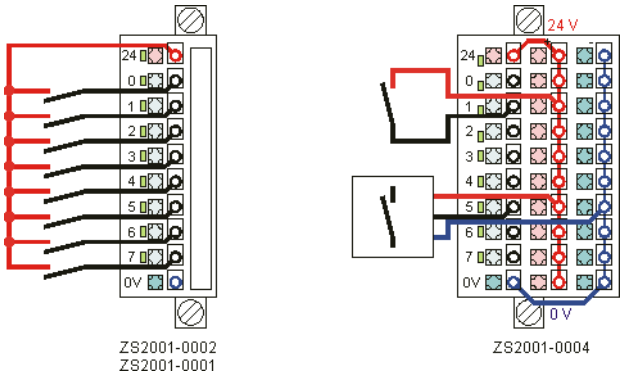


Fig. 54: Digital inputs ZS2001, 8 channels

The diagram shows the connection of 8 sensors in single-wire technology as well as one sensor each in two-wire and three-wire technology.
Please note for ZS2001-0004 connectors: two bridges (24 V and 0 V) are required to supply the terminal points for two- and three-wire connection technology.

Status LEDs

ZS2001-0002 and ZS2001-0004 have a green status LED for each digital input. An LED lights up when a high level is detected at the corresponding input.

4.2.4.6 D-sub sockets, 25-pin

Pin assignment

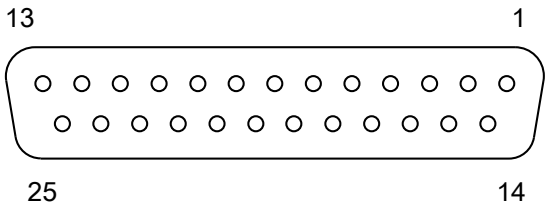


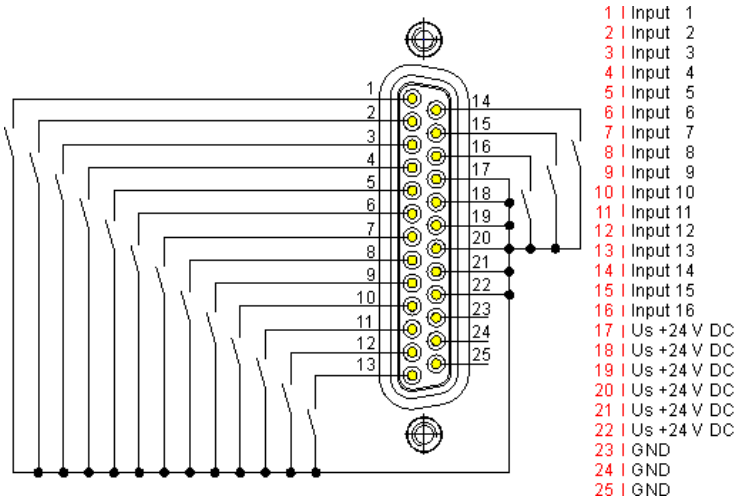
Fig. 55: D-sub socket, 25-pin

Pin	EP1816-0008	EP1816-1008	EP1816-3008
1	Channel 1, Input 1	U_{S1} [1]	U_{S1} [1]
2	Channel 1, Input 2	GND_S	GND_S
3	Channel 1, Input 3	Channel 1, Input 1	Channel 1, Input 1
4	Channel 1, Input 4	Channel 1, Input 2	Channel 1, Input 2
5	Channel 1, Input 5	Channel 1, Input 3	Channel 1, Input 3
6	Channel 1, Input 6	Channel 1, Input 4	Channel 1, Input 4
7	Channel 1, Input 7	Channel 1, Input 5	Channel 1, Input 5
8	Channel 1, Input 8	Channel 1, Input 6	Channel 1, Input 6
9	Channel 2, Input 1	Channel 1, Input 7	Channel 1, Input 7
10	Channel 2, Input 2	Channel 1, Input 8	Channel 1, Input 8
11	Channel 2, Input 3	Channel 2, Input 1	Channel 2, Input 1
12	Channel 2, Input 4	Channel 2, Input 2	Channel 2, Input 2
13	Channel 2, Input 5	Channel 2, Input 3	Channel 2, Input 3
14	Channel 2, Input 6	Channel 2, Input 4	Channel 2, Input 4
15	Channel 2, Input 7	Channel 2, Input 5	Channel 2, Input 5
16	Channel 2, Input 8	Channel 2, Input 6	Channel 2, Input 6
17	U_{S1} [1]	Channel 2, Input 7	Channel 2, Input 7
18	U_{S1} [1]	Channel 2, Input 8	Channel 2, Input 8
19	U_{S1} [1]	U_{S1} [1]	U_{S1} [1]
20	U_{S1} [1]	U_{S1} [1]	U_{S1} [1]
21	U_{S1} [1]	U_{S1} [1]	U_{S1} [1]
22	U_{S1} [1]	U_{S1} [1]	U_{S1} [1]
23	GND_S	GND_S	GND_S
24	GND_S	GND_S	GND_S
25	GND_S	GND_S	GND_S

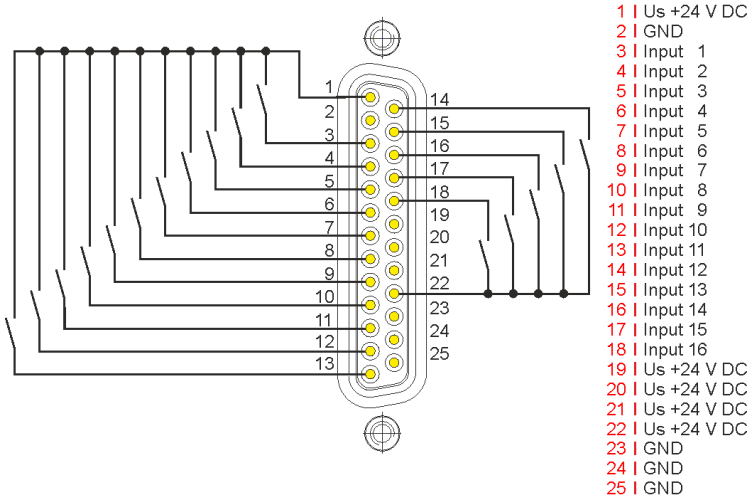
[1] U_{S1} serves as sensor supply voltage. It is branched off from the U_S supply voltage.

Connection examples

EP1816-0008



EP1816-1008



EP1816-3008

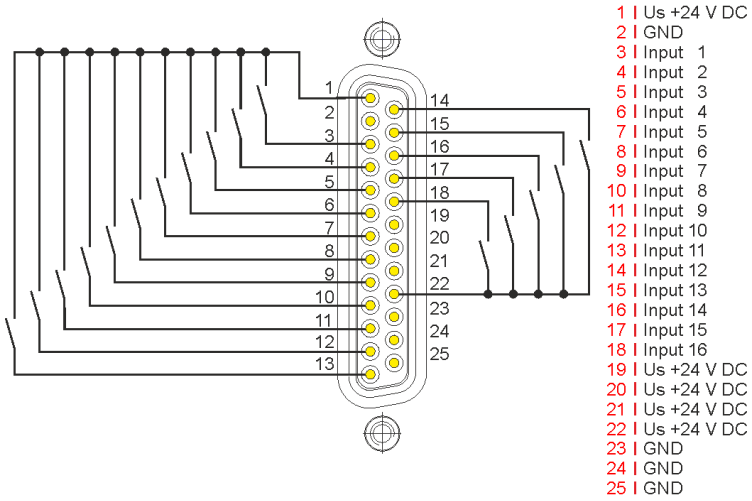


Fig. 56: Digital inputs D-sub, connection examples

Status LEDs

The D-sub socket has two green status LEDs.

Fig. 57: D-sub 25 status LEDs

4.2.5 Digital outputs (EP1859-0042 only)

4.2.5.1 M12 sockets

Pin assignment

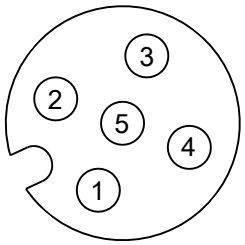


Fig. 58: M12 socket

Pin	Function	Core color [1]
1	U_{P1} [2]	brown
2	Output B	white
3	GND_P	blue
4	Output A	black
5	FE (Functional earth)	grey

[1] The core colors apply to M12 cables from Beckhoff: ZK2000-5xxx, ZK2000-6xxx, ZK2000-7xxx

[2] U_{P1} serves as actuator supply voltage. It is branched off from the U_P supply voltage.

Connection examples

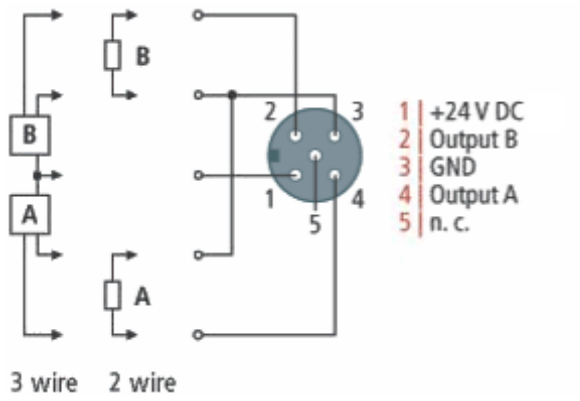


Fig. 59: Digital outputs M12, connection examples

Status LEDs

LEDs indicate the signal state of the outputs.

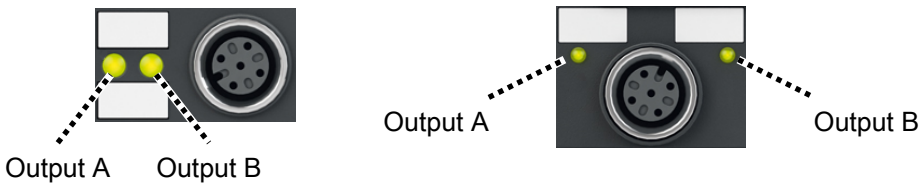


Fig. 60: Status LEDs of M12 sockets

4.3 UL Requirements

The installation of the EtherCAT Box Modules certified by UL has to meet the following requirements.

Supply voltage

⚠ CAUTION

CAUTION!

This UL requirements are valid for all supply voltages of all marked EtherCAT Box Modules!
For the compliance of the UL requirements the EtherCAT Box Modules should only be supplied

- by a 24 V_{DC} supply voltage, supplied by an isolating source and protected by means of a fuse (in accordance with UL248), rated maximum 4 Amp, or
- by a 24 V_{DC} power source, that has to satisfy *NEC class 2*.
  A *NEC class 2* power supply shall not be connected in series or parallel with another (class 2) power source!

⚠ CAUTION

CAUTION!

To meet the UL requirements, the EtherCAT Box Modules must not be connected to unlimited power sources!

Networks

⚠ CAUTION

CAUTION!

To meet the UL requirements, EtherCAT Box Modules must not be connected to telecommunication networks!

Ambient temperature range

⚠ CAUTION

CAUTION!

To meet the UL requirements, EtherCAT Box Modules has to be operated only at an ambient temperature range of 0 to 55°C!

Marking for UL

All EtherCAT Box Modules certified by UL (Underwriters Laboratories) are marked with the following label.

Fig. 61: UL label

4.4 ATEX notes

4.4.1 ATEX - Special conditions

⚠ WARNING

Observe the special conditions for the intended use of EtherCAT Box modules in potentially explosive areas – directive 94/9/EU.

- The certified components are to be installed with a BG2000-0000 or BG2000-0010 protection enclosure [▶ 72] that guarantees a protection against mechanical hazards!
- If the temperatures during rated operation are higher than 70°C at the feed-in points of cables, lines or pipes, or higher than 80°C at the wire branching points, then cables must be selected whose temperature data correspond to the actual measured temperature values!
- Observe the permissible ambient temperature range of 0 to 55°C for the use of EtherCAT Box modules in potentially explosive areas!
- Measures must be taken to protect against the rated operating voltage being exceeded by more than 40% due to short-term interference voltages!
- The connections of the certified components may only be connected or disconnected if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!

Standards

The fundamental health and safety requirements are fulfilled by compliance with the following standards:

- EN 60079-0: 2006
- EN 60079-15: 2005

Marking

The EtherCAT Box modules certified for potentially explosive areas bear the following marking:

II 3 G Ex nA II T4 DEKRA 11ATEX0080 X Ta: 0 - 55°C

or

II 3 G Ex nA nC IIC T4 DEKRA 11ATEX0080 X Ta: 0 - 55°C

Batch number (D number)

The EtherCAT Box modules bear a batch number (D number) that is structured as follows:

D: WW YY FF HH

WW - week of production (calendar week)
YY - year of production
FF - firmware version
HH - hardware version

Example with batch number 29 10 02 01:

29 - week of production 29
10 - year of production 2010
02 - firmware version 02
01 - hardware version 01

4.4.2 BG2000 - EtherCAT Box protection enclosures

⚠ WARNING

Risk of electric shock and damage of device!

Bring the EtherCAT system into a safe, powered down state before starting installation, disassembly or wiring of the modules!

ATEX

⚠ WARNING

Mount a protection enclosure!

To fulfill the special conditions according to ATEX [▶ 71], a BG2000-0000 or BG2000-0010 protection enclosure has to be mounted over the EtherCAT Box.

Installation

Put the cables for EtherCAT, power supply and sensors/actuators through the hole of the protection enclosure.

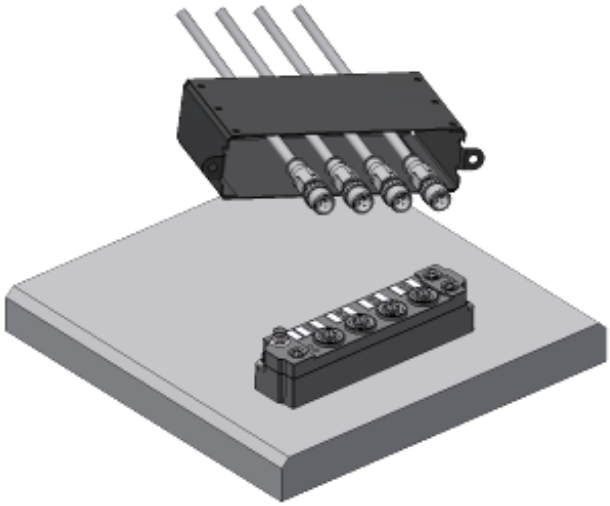


Fig. 62: BG2000 - putting the cables

Fix the wires for EtherCAT, power supply and sensors/actuators to the EtherCAT Box.

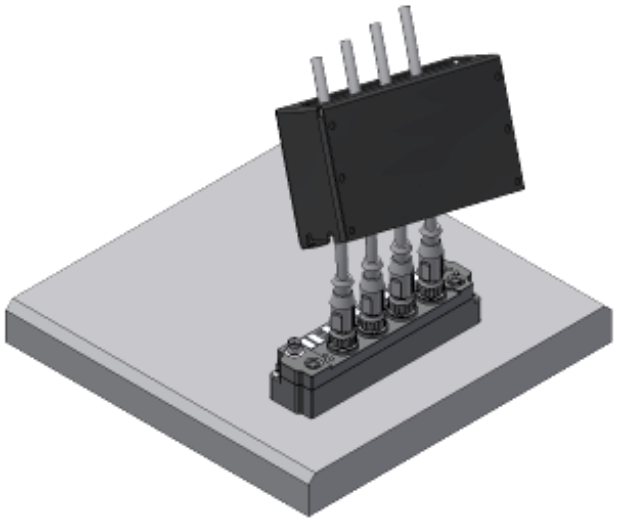


Fig. 63: BG2000 - fixing the cables

Mount the protection enclosure over the EtherCAT Box.

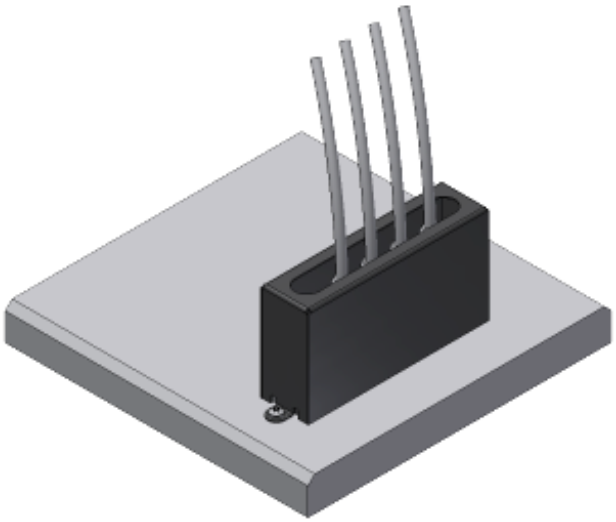


Fig. 64: BG2000 - mounting the protection enclosure

4.4.3 ATEX Documentation

Notes about operation of EtherCAT Box Modules (EPxxxx-xxxx) in potentially explosive areas (ATEX)

Pay also attention to the continuative documentationNotes about operation of EtherCAT Box Modules (EPxxxx-xxxx) in potentially explosive areas (ATEX) that is available in the download area of the Beckhoff homepage http:\\www.beckhoff.com!

5 Commissioning and configuration

5.1 Integration in TwinCAT

The procedure for integration in TwinCAT is described in this Quick start guide.

5.2 Setting the Hot Connect ID (EP1111-0000 only)

The units, tens and hundreds digits of the ID each have their own ID switch. The ID switches are labelled accordingly:

- X 1
- X 10
- X 100

Sample

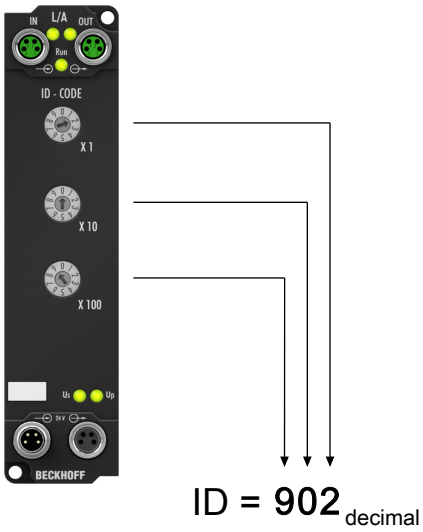


Fig. 65: ID switches sample

5.3 Accelerometers (EP1816-3008)

EP1816-3008 has two accelerometers. Each accelerometer measures the acceleration in three axes.

The accelerometers are offset by 90°. This enables a plausibility check of the measured values.

EP1816-3008 can also convert the measured values into inclination angles: Presentation of the measured values [▶ 76].

Assignment of the acceleration axes to variables in the process image

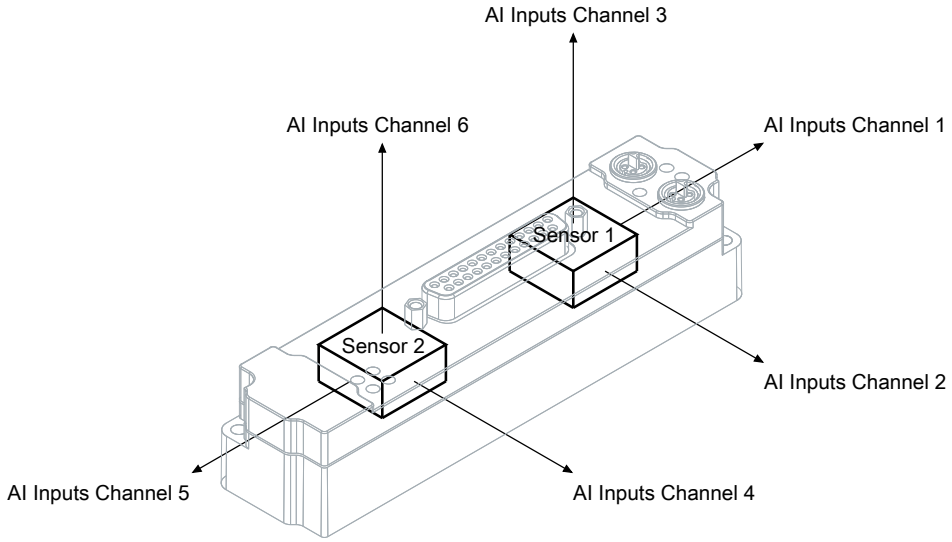


Fig. 66: Acceleration axes of EP1816-3008

Assignment of the inclination axes to variables in the process image

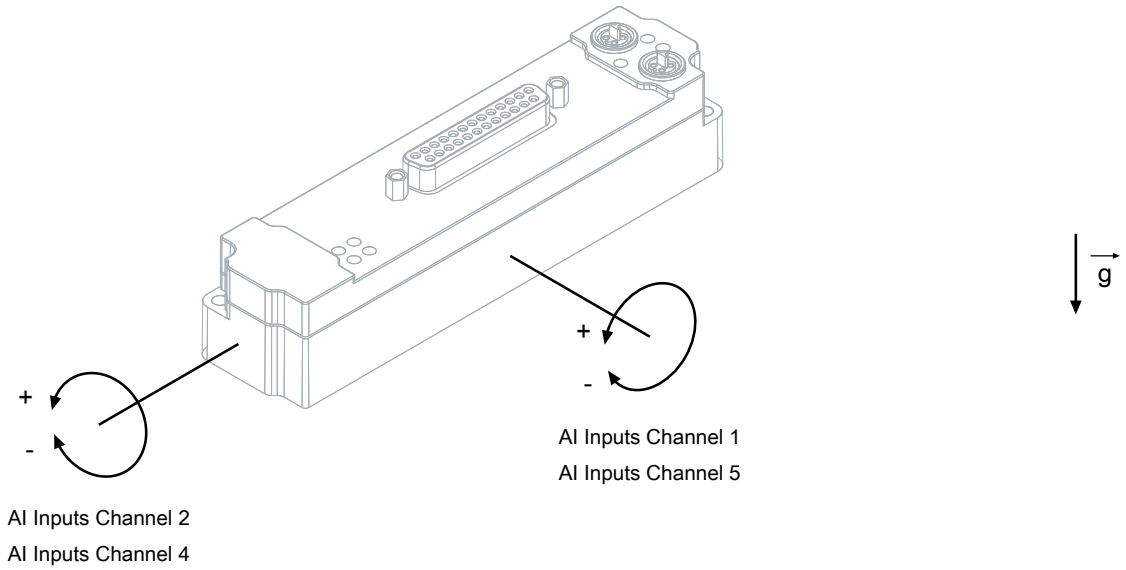


Fig. 67: Inclination axes of EP1816-3008

5.3.1 Parameters

Measuring range

CoE index 8080:11 „Range“

Value	Measuring range
03_{dec} (default)	+/- 2 g
04_{dec}	+/- 4 g
05_{dec}	+/- 8 g
06_{dec}	+/- 16 g

Sampling rate

CoE index 8080:0D „Mode“

Value	Sampling rate
04_{dec}	1 Hz
05_{dec}	10 Hz
06_{dec}	25 Hz
07_{dec}	50 Hz
08_{dec}	100 Hz
09_{dec}	250 Hz
10_{dec}	400 Hz
11_{dec}	1600 Hz
12_{dec} (default)	5000 Hz

Presentation of the measured values

CoE index 8080:1D „Presentation“

Value	Format designation	Description
03_{dec} (default)	Raw Values	The measured acceleration values are output as raw values.
04_{dec}	Horizontal Off-Axis Angle	The measured acceleration values are converted into inclination angles.
05_{dec}	milli G (mG)	The measured acceleration values are output in mg.

5.4 Restoring the delivery state

To restore the delivery state for backup objects in ELxxxx terminals / EPxxxx- and EPPxxxx boxes, the CoE object *Restore default parameters, SubIndex 001* can be selected in the TwinCAT System Manager (Config mode).

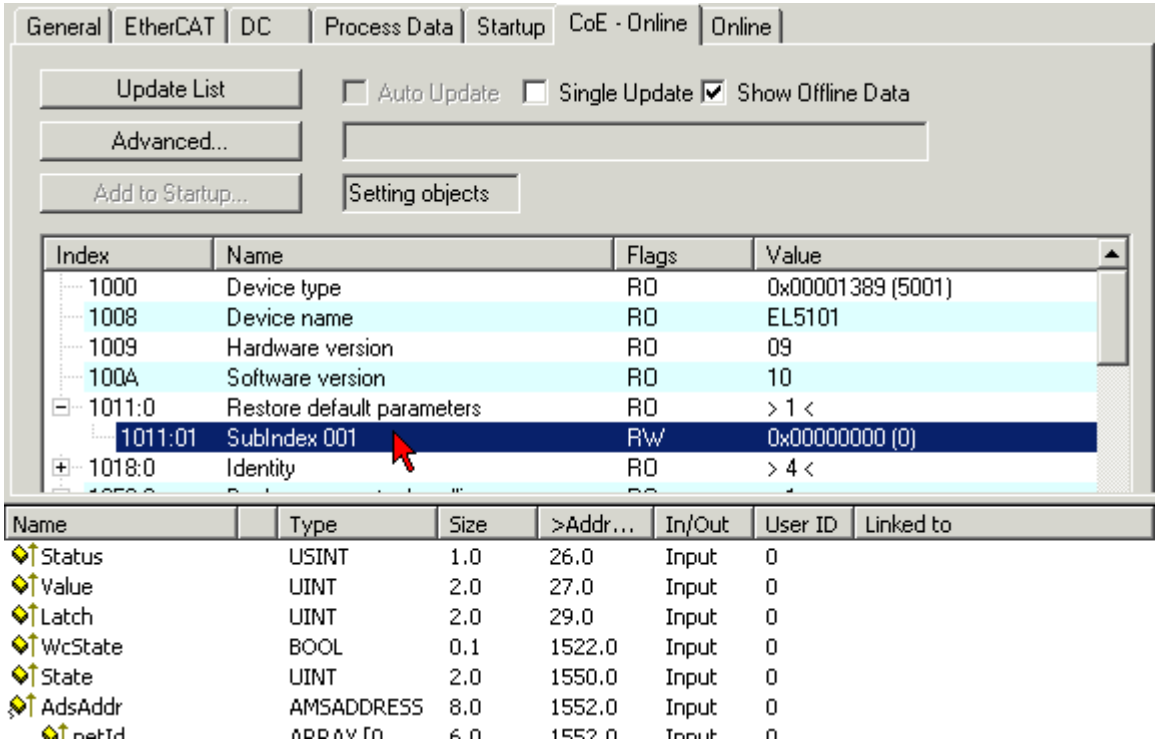


Fig. 68: Selecting the Restore default parameters PDO

Double-click on *SubIndex 001* to enter the Set Value dialog. Enter the value **1684107116** in field *Dec* or the value **0x64616F6C** in field *Hex* and confirm with OK.

All backup objects are reset to the delivery state.

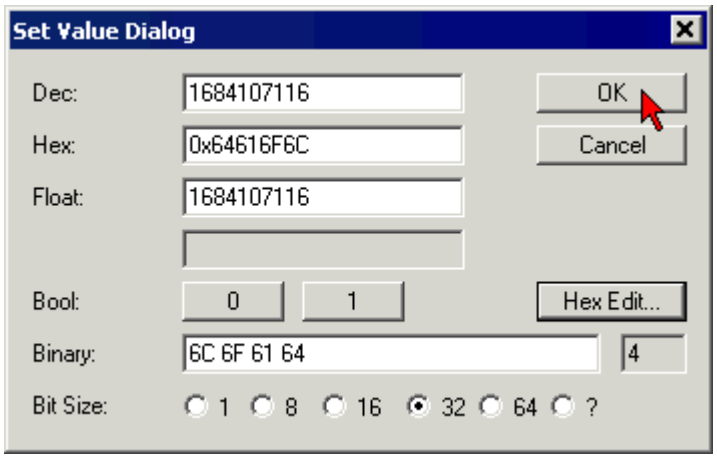


Fig. 69: Entering a restore value in the Set Value dialog

Alternative restore value

In some older terminals / boxes the backup objects can be switched with an alternative restore value:
Decimal value: 1819238756
Hexadecimal value: 0x6C6F6164

An incorrect entry for the restore value has no effect.

5.5 Decommissioning

⚠ WARNING

Risk of electric shock!

Bring the bus system into a safe, de-energized state before starting disassembly of the devices!

Disposal

In order to dispose of the device, it must be removed.

In accordance with the WEEE Directive 2012/19/EU, Beckhoff takes back old devices and accessories in Germany for proper disposal. Transport costs will be borne by the sender.

Return the old devices with the note "for disposal" to:

Beckhoff Automation GmbH & Co. KG
Service Department
Stahlstraße 31
D-33415 Verl

6 CoE parameters (EP1816-xxxx only)

6.1 EP1816-0008 - Object Overview

EtherCAT XML Device Description

The description corresponds to the display of the CoE objects from the EtherCAT XML Device Description. It is strongly recommended to download the latest revision of the corresponding XML file from the Beckhoff website (http://www.beckhoff.com/english/default.htm?download/elconfg.htm) and follow the installation instructions.

Index		Name	Flags	Default value
1000 [▶ 82]		Device type	RO	0x01181389 (18355081$_{dec}$)
1008 [▶ 82]		Device name	RO	EP1816-0008
1009 [▶ 82]		Hardware version	RO	00
100A [▶ 83]		Software version	RO	01
1011 [▶ 82]:0	**SubIndex**	Restore default parameters	RO	0x01 (1$_{dec}$)
	1011:01	SubIndex 001	RW	0x00000000 (0$_{dec}$)
1018 [▶ 83]:0	**SubIndex**	Identity	RO	0x04 (4$_{dec}$)
	1018:01	Vendor ID	RO	0x00000002 (2$_{dec}$)
	1018:02	Product code	RO	0x07184052 (119029842$_{dec}$)
	1018:03	Revision	RO	0x00100008 (1048584$_{dec}$)
	1018:04	Serial number	RO	0x00000000 (0$_{dec}$)
10F0 [▶ 83]:0	**SubIndex**	Backup parameter handling	RO	0x01 (1$_{dec}$)
	10F0:01	Checksum	RO	0x00000000 (0$_{dec}$)
1A00 [▶ 83]:0	**SubIndex**	DO TxPDO-Map Inputs Ch.1	RO	0x0B (11$_{dec}$)
	1A00:01	SubIndex 001	RO	0x6000:01, 1
	1A00:02	SubIndex 002	RO	0x6000:02, 1
	1A00:03	SubIndex 003	RO	0x6000:03, 1
	1A00:04	SubIndex 004	RO	0x6000:04, 1
	1A00:05	SubIndex 005	RO	0x6000:05, 1
	1A00:06	SubIndex 006	RO	0x6000:06, 1
	1A00:07	SubIndex 007	RO	0x6000:07, 1
	1A00:08	SubIndex 008	RO	0x6000:08, 1
	1A00:09	SubIndex 009	RO	0x0000:00, 5
	1A00:0A	SubIndex 010	RO	0x1C32:20, 1
	1A00:0B	SubIndex 011	RO	0x0000:00, 2
1A01 [▶ 84]:0	**SubIndex**	DO TxPDO-Map Inputs Ch.2	RO	0x0B (11$_{dec}$)
	1A01:01	SubIndex 001	RO	0x6010:01, 1
	1A01:02	SubIndex 002	RO	0x6010:02, 1
	1A01:03	SubIndex 003	RO	0x6010:03, 1
	1A01:04	SubIndex 004	RO	0x6010:04, 1
	1A01:05	SubIndex 005	RO	0x6010:05, 1
	1A01:06	SubIndex 006	RO	0x6010:06, 1
	1A01:07	SubIndex 007	RO	0x6010:07, 1
	1A01:08	SubIndex 008	RO	0x6010:08, 1
	1A01:09	SubIndex 009	RO	0x0000:00, 5
	1A01:0A	SubIndex 010	RO	0x1C32:20, 1
	1A01:0B	SubIndex 011	RO	0x0000:00, 2
1C00 [▶ 84]:0	**SubIndex**	Sync manager type	RO	0x04 (4$_{dec}$)
	1C00:01	SubIndex 001	RO	0x01 (1$_{dec}$)
	1C00:02	SubIndex 002	RO	0x02 (2$_{dec}$)
	1C00:03	SubIndex 003	RO	0x03 (3$_{dec}$)
	1C00:04	SubIndex 004	RO	0x04 (4$_{dec}$)
1C12 [▶ 84]:0	**SubIndex**	RxPDO assign	RO	0x00 (0$_{dec}$)
1C13 [▶ 84]:0	**SubIndex**	TxPDO assign	RO	0x02 (2$_{dec}$)
	1C13:01	SubIndex 001	RO	0x1A00 (6656$_{dec}$)
	1C13:02	SubIndex 002	RO	0x1A01 (6657$_{dec}$)

Index		Name	Flags	Default value
1C33 [▶ 85]:0	**SubIndex**	SM input parameter	RO	0x20 (32_{dec})
	1C33:01	Sync mode	RW	0x0022 (34_{dec})
	1C33:02	Cycle time	RW	0x000186A0 (100000_{dec})
	1C33:03	Shift time	RO	0x00000000 (0_{dec})
	1C33:04	Sync modes supported	RO	0xC007 (49159_{dec})
	1C33:05	Minimum cycle time	RO	0x000124F8 (75000_{dec})
	1C33:06	Calc and copy time	RO	0x00000000 (0_{dec})
	1C33:08	Command	RW	0x0000 (0_{dec})
	1C33:09	Delay time	RO	0x00000000 (0_{dec})
	1C33:0B	SM event missed counter	RO	0x0000 (0_{dec})
	1C33:0C	Cycle exceeded counter	RO	0x0000 (0_{dec})
	1C33:0D	Shift too short counter	RO	0x0000 (0_{dec})
	1C33:20	Sync error	RO	0x00 (0_{dec})
6000 [▶ 86]:0	**SubIndex**	DO Inputs Ch.1	RO	0x0E (14_{dec})
	6000:01	Input 1	RO	0x00 (0_{dec})
	6000:02	Input 2	RO	0x00 (0_{dec})
	6000:03	Input 3	RO	0x00 (0_{dec})
	6000:04	Input 4	RO	0x00 (0_{dec})
	6000:05	Input 5	RO	0x00 (0_{dec})
	6000:06	Input 6	RO	0x00 (0_{dec})
	6000:07	Input 7	RO	0x00 (0_{dec})
	6000:08	Input 8	RO	0x00 (0_{dec})
	6000:0E	Sync Error	RO	0x00 (0_{dec})
6010 [▶ 86]:0	**SubIndex**	DO Inputs Ch.2	RO	0x0E (14_{dec})
	6010:01	Input 1	RO	0x00 (0_{dec})
	6010:02	Input 2	RO	0x00 (0_{dec})
	6010:03	Input 3	RO	0x00 (0_{dec})
	6010:04	Input 4	RO	0x00 (0_{dec})
	6010:05	Input 5	RO	0x00 (0_{dec})
	6010:06	Input 6	RO	0x00 (0_{dec})
	6010:07	Input 7	RO	0x00 (0_{dec})
	6010:08	Input 8	RO	0x00 (0_{dec})
	6010:0E	Sync Error	RO	0x00 (0_{dec})
F000 [▶ 86]:0	**SubIndex**	Modular device profile	RO	0x02 (2_{dec})
	F000:01	Module index distance	RO	0x0010 (16_{dec})
	F000:02	Maximum number of modules	RO	0x0002 (2_{dec})
F008 [▶ 86]		Code word	RW	0x00000000 (0_{dec})
F010 [▶ 86]:0	**SubIndex**	Module list	RW	0x02 (2_{dec})
	F010:01	SubIndex 001	RW	0x00000118 (280_{dec})
	F010:02	SubIndex 002	RW	0x00000118 (280_{dec})

Key

Flags:
RO = Read Only
RW = Read/Write

6.2 EP1816-0008 - Object description and parameterization

Parameterization

The terminal is parameterized via the CoE - Online tab (double-click on the respective object) or via the Process Data tab (allocation of PDOs).

EtherCAT XML Device Description

The display matches that of the CoE objects from the EtherCAT XML Device Description. We recommend downloading the latest XML file from the download area of the Beckhoff website (http://beckhoff.de/german/download/elconfg.htm?id=1983920606140) and installing it according to the installation instructions.

Introduction

The CoE overview contains objects for different intended applications:

- Objects required for parameterization [▶ 82] during commissioning
- Objects intended for regular operation [▶ 82], e.g. through ADS access
- Objects for indicating internal settings [▶ 82] (may be fixed)

The following section first describes the objects required for normal operation, followed by a complete overview of missing objects.

Objects to be parameterized during commissioning

Objects to be parameterized during commissioning

Index 1011 Restore default parameters

Index	Name	Meaning	Data type	Flags	Default
1011:0	Restore default parameters	Restore default parameters	UINT8	RO	0x01 (1_{dec})
1011:01	SubIndex 001	If this object is set to **0x64616F6C** in the set value dialog, all backup objects are reset to their delivery state.	UINT32	RW	0x00000000 (0_{dec})

Objects for regular operation

The EP1816 has no such objects.

Additional objects

Standard objects (0x1000-0x1FFF)

The standard objects have the same meaning for all EtherCAT slaves.

Index 1000 Device type

Index	Name	Meaning	Data type	Flags	Default
1000:0	Device type	Device type of the EtherCAT slave: The Lo-Word contains the CoE profile used (5001). The Hi-Word contains the module profile according to the modular device profile.	UINT32	RO	0x01181389 (18355081_{dec})

Index 1008 Device name

Index	Name	Meaning	Data type	Flags	Default
1008:0	Device name	Device name of the EtherCAT slave	string	RO	EP1816-0008

Index 1009 Hardware version

Index	Name	Meaning	Data type	Flags	Default
1009:0	Hardware version	Hardware version of the EtherCAT slave	string	RO	00

Index 100A Software version

Index	Name	Meaning	Data type	Flags	Default
100A:0	Software version	Firmware version of the EtherCAT slave	string	RO	01

Index 1018 Identity

Index	Name	Meaning	Data type	Flags	Default
1018:0	Identity	Information for identifying the slave	UINT8	RO	0x04 (4_{dec})
1018:01	Vendor ID	Vendor ID of the EtherCAT slave	UINT32	RO	0x00000002 (2_{dec})
1018:02	Product code	Product code of the EtherCAT slave	UINT32	RO	0x07184052 (119029842_{dec})
1018:03	Revision	Revision number of the EtherCAT slave; the low word (bit 0-15) indicates the special terminal number, the high word (bit 16-31) refers to the device description	UINT32	RO	0x00100008 (1048584_{dec})
1018:04	Serial number	Serial number of the EtherCAT slave; the low byte (bit 0-7) of the low word contains the year of production, the high byte (bit 8-15) of the low word contains the week of production, the high word (bit 16-31) is 0	UINT32	RO	0x00000000 (0_{dec})

Index 10F0 Backup parameter handling

Index	Name	Meaning	Data type	Flags	Default
10F0:0	Backup parameter handling	Information for standardized loading and saving of backup entries	UINT8	RO	0x01 (1_{dec})
10F0:01	Checksum	Checksum across all backup entries of the EtherCAT slave	UINT32	RO	0x00000000 (0_{dec})

Index 1A00 DO TxPDO-Map Inputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
1A00:0	DO TxPDO-Map Inputs Ch.1	PDO Mapping TxPDO 1	UINT8	RO	0x0B (11_{dec})
1A00:01	SubIndex 001	1. PDO Mapping entry (object 0x6000 (DO Inputs Ch.1), entry 0x01 (Input 1))	UINT32	RO	0x6000:01, 1
1A00:02	SubIndex 002	2. PDO Mapping entry (object 0x6000 (DO Inputs Ch.1), entry 0x02 (Input 2))	UINT32	RO	0x6000:02, 1
1A00:03	SubIndex 003	3. PDO Mapping entry (object 0x6000 (DO Inputs Ch.1), entry 0x03 (Input 3))	UINT32	RO	0x6000:03, 1
1A00:04	SubIndex 004	4. PDO Mapping entry (object 0x6000 (DO Inputs Ch.1), entry 0x04 (Input 4))	UINT32	RO	0x6000:04, 1
1A00:05	SubIndex 005	5. PDO Mapping entry (object 0x6000 (DO Inputs Ch.1), entry 0x05 (Input 5))	UINT32	RO	0x6000:05, 1
1A00:06	SubIndex 006	6. PDO Mapping entry (object 0x6000 (DO Inputs Ch.1), entry 0x06 (Input 6))	UINT32	RO	0x6000:06, 1
1A00:07	SubIndex 007	7. PDO Mapping entry (object 0x6000 (DO Inputs Ch.1), entry 0x07 (Input 7))	UINT32	RO	0x6000:07, 1
1A00:08	SubIndex 008	8. PDO Mapping entry (object 0x6000 (DO Inputs Ch.1), entry 0x08 (Input 8))	UINT32	RO	0x6000:08, 1
1A00:09	SubIndex 009	9. PDO Mapping entry (5 bits align)	UINT32	RO	0x0000:00, 5
1A00:0A	SubIndex 010	10. PDO Mapping entry (object 0x1C32, entry 0x20)	UINT32	RO	0x1C32:20, 1
1A00:0B	SubIndex 011	11. PDO Mapping entry (2 bits align)	UINT32	RO	0x0000:00, 2

Index 1A01 DO TxPDO-Map Inputs Ch.2

Index	Name	Meaning	Data type	Flags	Default
1A01:0	DO TxPDO-Map Inputs Ch.2	PDO Mapping TxPDO 2	UINT8	RO	0x0B (11_{dec})
1A01:01	SubIndex 001	1. PDO Mapping entry (object 0x6010 (DO Inputs Ch.2), entry 0x01 (Input 1))	UINT32	RO	0x6010:01, 1
1A01:02	SubIndex 002	2. PDO Mapping entry (object 0x6010 (DO Inputs Ch.2), entry 0x02 (Input 2))	UINT32	RO	0x6010:02, 1
1A01:03	SubIndex 003	3. PDO Mapping entry (object 0x6010 (DO Inputs Ch.2), entry 0x03 (Input 3))	UINT32	RO	0x6010:03, 1
1A01:04	SubIndex 004	4. PDO Mapping entry (object 0x6010 (DO Inputs Ch.2), entry 0x04 (Input 4))	UINT32	RO	0x6010:04, 1
1A01:05	SubIndex 005	5. PDO Mapping entry (object 0x6010 (DO Inputs Ch.2), entry 0x05 (Input 5))	UINT32	RO	0x6010:05, 1
1A01:06	SubIndex 006	6. PDO Mapping entry (object 0x6010 (DO Inputs Ch.2), entry 0x06 (Input 6))	UINT32	RO	0x6010:06, 1
1A01:07	SubIndex 007	7. PDO Mapping entry (object 0x6010 (DO Inputs Ch.2), entry 0x07 (Input 7))	UINT32	RO	0x6010:07, 1
1A01:08	SubIndex 008	8. PDO Mapping entry (object 0x6010 (DO Inputs Ch.2), entry 0x08 (Input 8))	UINT32	RO	0x6010:08, 1
1A01:09	SubIndex 009	9. PDO Mapping entry (5 bits align)	UINT32	RO	0x0000:00, 5
1A01:0A	SubIndex 010	10. PDO Mapping entry (object 0x1C32, entry 0x20)	UINT32	RO	0x1C32:20, 1
1A01:0B	SubIndex 011	11. PDO Mapping entry (2 bits align)	UINT32	RO	0x0000:00, 2

Index 1C00 Sync manager type

Index	Name	Meaning	Data type	Flags	Default
1C00:0	Sync manager type	Using the sync managers	UINT8	RO	0x04 (4_{dec})
1C00:01	SubIndex 001	Sync-Manager Type Channel 1: Mailbox Write	UINT8	RO	0x01 (1_{dec})
1C00:02	SubIndex 002	Sync-Manager Type Channel 2: Mailbox Read	UINT8	RO	0x02 (2_{dec})
1C00:03	SubIndex 003	Sync-Manager Type Channel 3: Process Data Write (Outputs)	UINT8	RO	0x03 (3_{dec})
1C00:04	SubIndex 004	Sync-Manager Type Channel 4: Process Data Read (Inputs)	UINT8	RO	0x04 (4_{dec})

Index 1C12 RxPDO assign

Index	Name	Meaning	Data type	Flags	Default
1C12:0	RxPDO assign	PDO Assign Outputs	UINT8	RO	0x00 (0_{dec})

Index 1C13 TxPDO assign

Index	Name	Meaning	Data type	Flags	Default
1C13:0	TxPDO assign	PDO Assign Inputs	UINT8	RO	0x02 (2_{dec})
1C13:01	Subindex 001	1. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RO	0x1A00 (6656_{dec})
1C13:02	Subindex 002	2. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RO	0x1A01 (6657_{dec})

Index 1C33 SM input parameter

Index	Name	Meaning	Data type	Flags	Default
1C33:0	SM input parameter	Synchronization parameters for the inputs	UINT8	RO	0x20 (32_{dec})
1C33:01	Sync mode	Current synchronization mode: • 0: Free Run • 1: Synchronous with SM 3 Event (no outputs available) • 2: DC - Synchron with SYNC0 Event • 3: DC - Synchron with SYNC1 Event • 34: Synchronous with SM 2 Event (outputs available)	UINT16	RW	0x0022 (34_{dec})
1C33:02	Cycle time	Cycle time (in ns): • Synchron with SM 2 Event: Master cycle time • DC mode: SYNC0/SYNC1 Cycle Time	UINT32	RW	0x000186A0 (100000_{dec})
1C33:03	Shift time	Time between SYNC0 event and reading of the inputs (in ns, only DC mode)	UINT32	RO	0x00000000 (0_{dec})
1C33:04	Sync modes supported	Supported synchronization modes: • Bit 0: free run is supported • Bit 1: Synchronous with SM 2 Event is supported (outputs available) • Bit 1: Synchronous with SM 3 Event is supported (no outputs available) • Bit 2-3 = 01: DC mode is supported • Bit 4-5 = 01: Input shift through local event (outputs available) • Bit 4-5 = 10: Input shift with SYNC1 event (no outputs available) • Bit 14 = 1: dynamic times (measurement through writing of 1C32:08 [▶ 85])	UINT16	RO	0xC007 (49159_{dec})
1C33:05	Minimum cycle time	Minimum cycle time (in ns)	UINT32	RO	0x000124F8 (75000_{dec})
1C33:06	Calc and copy time	Time between reading of the inputs and availability of the inputs for the master (in ns, only DC mode)	UINT32	RO	0x00000000 (0_{dec})
1C33:08	Command	• 0: Measurement of the local cycle time is stopped • 1: Measurement of the local cycle time is started The entries 1C33:03 [▶ 85], 1C33:06 [▶ 85], 1C33:07, 1C33:09 [▶ 85] are updated with the maximum measured values. For a subsequent measurement the measured values are reset	UINT16	RW	0x0000 (0_{dec})
1C33:09	Delay time	Time between SYNC1 event and reading of the inputs (in ns, only DC mode)	UINT32	RO	0x00000000 (0_{dec})
1C33:0B	SM event missed counter	Number of missed SM events in OPERATIONAL (DC mode only)	UINT16	RO	0x0000 (0_{dec})
1C33:0C	Cycle exceeded counter	Number of occasions the cycle time was exceeded in OPERATIONAL (cycle was not completed in time or the next cycle began too early)	UINT16	RO	0x0000 (0_{dec})
1C33:0D	Shift too short counter	Number of occasions that the interval between SYNC0 and SYNC1 event was too short (DC mode only)	UINT16	RO	0x0000 (0_{dec})
1C33:20	Sync error	The synchronization was not correct in the last cycle (outputs were output too late; DC mode only)	boolean	RO	0x00 (0_{dec})

Profile-specific objects (0x6000-0xFFFF)

The profile-specific objects have the same meaning for all EtherCAT slaves that support the profile 5001.

Index 6000 DO Inputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
6000:0	DO Inputs Ch.1		UINT8	RO	0x0E (14_{dec})
6000:01	Input 1		boolean	RO	0x00 (0_{dec})
6000:02	Input 2		boolean	RO	0x00 (0_{dec})
6000:03	Input 3		boolean	RO	0x00 (0_{dec})
6000:04	Input 4		boolean	RO	0x00 (0_{dec})
6000:05	Input 5		boolean	RO	0x00 (0_{dec})
6000:06	Input 6		boolean	RO	0x00 (0_{dec})
6000:07	Input 7		boolean	RO	0x00 (0_{dec})
6000:08	Input 8		boolean	RO	0x00 (0_{dec})
6000:0E	Sync Error		boolean	RO	0x00 (0_{dec})

Index 6010 DO Inputs Ch.2

Index	Name	Meaning	Data type	Flags	Default
6010:0	DO Inputs Ch.2		UINT8	RO	0x0E (14_{dec})
6010:01	Input 1		boolean	RO	0x00 (0_{dec})
6010:02	Input 2		boolean	RO	0x00 (0_{dec})
6010:03	Input 3		boolean	RO	0x00 (0_{dec})
6010:04	Input 4		boolean	RO	0x00 (0_{dec})
6010:05	Input 5		boolean	RO	0x00 (0_{dec})
6010:06	Input 6		boolean	RO	0x00 (0_{dec})
6010:07	Input 7		boolean	RO	0x00 (0_{dec})
6010:08	Input 8		boolean	RO	0x00 (0_{dec})
6010:0E	Sync Error		boolean	RO	0x00 (0_{dec})

Index F000 Modular device profile

Index	Name	Meaning	Data type	Flags	Default
F000:0	Modular device profile	General information for the modular device profile	UINT8	RO	0x02 (2_{dec})
F000:01	Module index distance	Index distance of the objects of the individual channels	UINT16	RO	0x0010 (16_{dec})
F000:02	Maximum number of modules	Number of channels	UINT16	RO	0x0002 (2_{dec})

Index F008 Code word

Index	Name	Meaning	Data type	Flags	Default
F008:0	Code word		UINT32	RW	0x00000000 (0_{dec})

Index F010 Module list

Index	Name	Meaning	Data type	Flags	Default
F010:0	Module list		UINT8	RW	0x02 (2_{dec})
F010:01	SubIndex 001		UINT32	RW	0x00000118 (280_{dec})
F010:02	SubIndex 002		UINT32	RW	0x00000118 (280_{dec})

6.3 EP1816-3008 - Object overview

EtherCAT XML Device Description

The display matches that of the CoE objects from the EtherCAT XML Device Description. We recommend downloading the latest XML file from the download area on the Beckhoff website (http://www.beckhoff.de/german/default.htm?download/elconfg.htm) and installing it according to the installation instructions.

Index (hex)		Name	Flags	Default value
1000 [▶ 95]		Device type	RO	0x00001389 (5001_{dec})
1008 [▶ 95]		Device name	RO	EP1816-3008
1009 [▶ 95]		Hardware version	RO	
100A [▶ 95]		Software version	RO	03
1011:0 [▶ 95]	**Subindex**	Restore default parameters	RO	0x01 (1_{dec})
	0x1011:01	SubIndex 001	RW	0x00000000 (0_{dec})
1018:0 [▶ 95]	**Subindex**	Identity	RO	0x04 (4_{dec})
	0x1018:01	Vendor ID	RO	0x00000002 (2_{dec})
	0x1018:02	Product code	RO	0x05E44052 (98844754_{dec})
	01018:03	Revision	RO	0x00000000 (0_{dec})
	0x1018:04	Serial number	RO	0x00000000 (0_{dec})
10F0:0 [▶ 95]	**Subindex**	Backup parameter handling	RO	0x01 (1_{dec})
	0x10F0:01	Checksum	RO	0x00000000 (0_{dec})
1A00:0 [▶ 96]	**Subindex**	DIG TxPDO-Map Inputs Ch.1	RO	0x09 (9_{dec})
	0x1A00:01	SubIndex 001	RO	0x6000:01, 1
	0x1A00:02	SubIndex 002	RO	0x6000:02, 1
	0x1A00:03	SubIndex 003	RO	0x6000:03, 1
	0x1A00:04	SubIndex 004	RO	0x6000:04, 1
	0x1A00:05	SubIndex 005	RO	0x6000:05, 1
	0x1A00:06	SubIndex 006	RO	0x6000:06, 1
	0x1A00:07	SubIndex 007	RO	0x6000:07, 1
	0x1A00:08	SubIndex 008	RO	0x6000:08, 1
	0x1A00:09	SubIndex 009	RO	0x0000:00, 8
1A01:0 [▶ 96]	**Subindex**	DIG TxPDO-Map Inputs Ch.2	RO	0x09 (9_{dec})
	0x1A01:01	SubIndex 001	RO	0x6010:01, 1
	0x1A01:02	SubIndex 002	RO	0x6010:02, 1
	0x1A01:03	SubIndex 003	RO	0x6010:03, 1
	0x1A01:04	SubIndex 004	RO	0x6010:04, 1
	0x1A01:05	SubIndex 005	RO	0x6010:05, 1
	0x1A01:06	SubIndex 006	RO	0x6010:06, 1
	0x1A01:07	SubIndex 007	RO	0x6010:07, 1
	0x1A01:08	SubIndex 008	RO	0x6010:08, 1
	0x1A01:09	SubIndex 009	RO	0x0000:00, 8
1A02:0 [▶ 96]	**Subindex**	AI TxPDO-Map Inputs Ch.1	RO	0x05 (5_{dec})
	0x1A02:01	SubIndex 001	RO	0x0000:00, 6
	0x1A02:02	SubIndex 002	RO	0x6020:07, 1
	0x1A02:03	SubIndex 003	RO	0x0000:00, 8
	0x1A02:04	SubIndex 004	RO	0x6020:10, 1
	0x1A02:05	SubIndex 005	RO	0x6020:11, 16
1A03:0 [▶ 97]	**Subindex**	AI TxPDO-Map Inputs Ch.2	RO	0x05 (5_{dec})
	0x1A03:01	SubIndex 001	RO	0x0000:00, 6
	0x1A03:02	SubIndex 002	RO	0x6030:07, 1
	0x1A03:03	SubIndex 003	RO	0x0000:00, 8
	0x1A03:04	SubIndex 004	RO	0x6030:10, 1
	0x1A03:05	SubIndex 005	RO	0x6030:11, 16

Index (hex)		Name	Flags	Default value
1A04:0 [▶ 97]	**Subindex**	AI TxPDO-Map Inputs Ch.3	RO	0x05 (5_{dec})
	0x1A04:01	SubIndex 001	RO	0x0000:00, 6
	0x1A04:02	SubIndex 002	RO	0x6040:07, 1
	0x1A04:03	SubIndex 003	RO	0x0000:00, 8
	0x1A04:04	SubIndex 004	RO	0x6040:10, 1
	0x1A04:05	SubIndex 005	RO	0x6040:11, 16
1A05:0 [▶ 97]	**Subindex**	AI TxPDO-Map Inputs Ch.4	RO	0x05 (5_{dec})
	0x1A05:01	SubIndex 001	RO	0x0000:00, 6
	0x1A05:02	SubIndex 002	RO	0x6050:07, 1
	0x1A05:03	SubIndex 003	RO	0x0000:00, 8
	0x1A05:04	SubIndex 004	RO	0x6050:10, 1
	0x1A05:05	SubIndex 005	RO	0x6050:11, 16
1A06:0 [▶ 97]	**Subindex**	AI TxPDO-Map Inputs Ch.5	RO	0x05 (5_{dec})
	0x1A06:01	SubIndex 001	RO	0x0000:00, 6
	0x1A06:02	SubIndex 002	RO	0x6060:07, 1
	0x1A06:03	SubIndex 003	RO	0x0000:00, 8
	0x1A06:04	SubIndex 004	RO	0x6060:10, 1
	0x1A06:05	SubIndex 005	RO	0x6060:11, 16
1A07:0 [▶ 98]	**Subindex**	AI TxPDO-Map Inputs Ch.6	RO	0x05 (5_{dec})
	0x1A07:01	SubIndex 001	RO	0x0000:00, 6
	0x1A07:02	SubIndex 002	RO	0x6070:07, 1
	0x1A07:03	SubIndex 003	RO	0x0000:00, 8
	0x1A07:04	SubIndex 004	RO	0x6070:10, 1
	0x1A07:05	SubIndex 005	RO	0x6070:11, 16
1A08:0 [▶ 98]	**Subindex**	DIG TxPDO-Map Inputs Device	RO	0x04 (4_{dec})
	0x1A08:01	SubIndex 001	RO	0xF600:01, 1
	0x1A08:02	SubIndex 002	RO	0xF600:02, 1
	0x1A08:03	SubIndex 003	RO	0x0000:00, 13
	0x1A08:04	SubIndex 004	RO	0xF600:10, 1
1C00:0 [▶ 98]	**Subindex**	Sync manager type	RO	0x04 (4_{dec})
	0x1C00:01	SubIndex 001	RO	0x01 (1_{dec})
	0x1C00:02	SubIndex 002	RO	0x02 (2_{dec})
	0x1C00:03	SubIndex 003	RO	0x03 (3_{dec})
	0x1C00:04	SubIndex 004	RO	0x04 (4_{dec})
1C12:0 [▶ 98]	**Subindex**	RxPDO assign	RO	0x00 (0_{dec})
1C13:0 [▶ 98]	**Subindex**	TxPDO assign	RO	0x09 (9_{dec})
	0x1C13:01	SubIndex 001	RO	0x1A00 (6656_{dec})
	0x1C13:02	SubIndex 002	RO	0x1A01 (6657_{dec})
	0x1C13:03	SubIndex 003	RO	0x1A02 (6658_{dec})
	0x1C13:04	SubIndex 004	RO	0x1A03 (6659_{dec})
	0x1C13:05	SubIndex 005	RO	0x1A04 (6660_{dec})
	0x1C13:06	SubIndex 006	RO	0x1A05 (6661_{dec})
	0x1C13:07	SubIndex 007	RO	0x1A06 (6662_{dec})
	0x1C13:08	SubIndex 008	RO	0x1A07 (6663_{dec})
	0x1C13:09	SubIndex 009	RO	0x1A08 (6664_{dec})

Index (hex)		Name	Flags	Default value
1C33:0 [▶ 99]	**Subindex**	SM input parameter	RO	0x20 (32_{dec})
	0x1C33:01	Sync mode	RW	0x0022 (34_{dec})
	0x1C33:02	Cycle time	RW	0x003D0900 (4000000_{dec})
	0x1C33:03	Shift time	RO	0x00000000 (0_{dec})
	0x1C33:04	Sync modes supported	RO	0xC007 (49159_{dec})
	0x1C33:05	Minimum cycle time	RO	0x00030D40 (200000_{dec})
	0x1C33:06	Calc and copy time	RO	0x00000000 (0_{dec})
	0x1C33:07	Minimum delay time	RO	0x00000000 (0_{dec})
	0x1C33:08	Command	RW	0x0000 (0_{dec})
	0x1C33:09	Maximum delay time	RO	0x00000000 (0_{dec})
	0x1C33:0B	SM event missed counter	RO	0x0000 (0_{dec})
	0x1C33:0C	Cycle exceeded counter	RO	0x0000 (0_{dec})
	0x1C33:0D	Shift too short counter	RO	0x0000 (0_{dec})
	0x1C33:20	Sync error	RO	0x00 (0_{dec})
6000:0 [▶ 100]	**Subindex**	DIG Inputs Ch.1	RO	0x08 (8_{dec})
	0x6000:01	Input 1	RO	0x00 (0_{dec})
	0x6000:02	Input 2	RO	0x00 (0_{dec})
	0x6000:03	Input 3	RO	0x00 (0_{dec})
	0x6000:04	Input 4	RO	0x00 (0_{dec})
	0x6000:05	Input 5	RO	0x00 (0_{dec})
	0x6000:06	Input 6	RO	0x00 (0_{dec})
	0x6000:07	Input 7	RO	0x00 (0_{dec})
	0x6000:08	Input 8	RO	0x00 (0_{dec})
6010:0 [▶ 100]	**Subindex**	DIG Inputs Ch.2	RO	0x08 (8_{dec})
	0x6010:01	Input 1	RO	0x00 (0_{dec})
	0x6010:02	Input 2	RO	0x00 (0_{dec})
	0x6010:03	Input 3	RO	0x00 (0_{dec})
	0x6010:04	Input 4	RO	0x00 (0_{dec})
	0x6010:05	Input 5	RO	0x00 (0_{dec})
	0x6010:06	Input 6	RO	0x00 (0_{dec})
	0x6010:07	Input 7	RO	0x00 (0_{dec})
	0x6010:08	Input 8	RO	0x00 (0_{dec})
6020:0 [▶ 100]	**Subindex**	AI Inputs Ch.1	RO	0x11 (17_{dec})
	0x6020:07	Error	RO	0x00 (0_{dec})
	0x6020:10	TxPDO Toggle	RO	0x00 (0_{dec})
	0x6020:11	Value	RO	0x0000 (0_{dec})
6030:0 [▶ 100]	**Subindex**	AI Inputs Ch.2	RO	0x11 (17_{dec})
	0x6030:07	Error	RO	0x00 (0_{dec})
	0x6030:10	TxPDO Toggle	RO	0x00 (0_{dec})
	0x6030:11	Value	RO	0x0000 (0_{dec})
6040:0 [▶ 100]	**Subindex**	AI Inputs Ch.3	RO	0x11 (17_{dec})
	0x6040:07	Error	RO	0x00 (0_{dec})
	0x6040:10	TxPDO Toggle	RO	0x00 (0_{dec})
	0x6040:11	Value	RO	0x0000 (0_{dec})
6050:0 [▶ 101]	**Subindex**	AI Inputs Ch.4	RO	0x11 (17_{dec})
	0x6050:07	Error	RO	0x00 (0_{dec})
	0x6050:10	TxPDO Toggle	RO	0x00 (0_{dec})
	0x6050:11	Value	RO	0x0000 (0_{dec})
6060:0 [▶ 101]	**Subindex**	AI Inputs Ch.5	RO	0x11 (17_{dec})
	0x6060:07	Error	RO	0x00 (0_{dec})
	0x6060:10	TxPDO Toggle	RO	0x00 (0_{dec})
	0x6060:11	Value	RO	0x0000 (0_{dec})
6070:0 [▶ 101]	**Subindex**	AI Inputs Ch.6	RO	0x11 (17_{dec})
	0x6070:07	Error	RO	0x00 (0_{dec})
	0x6070:10	TxPDO Toggle	RO	0x00 (0_{dec})
	0x6070:11	Value	RO	0x0000 (0_{dec})

Index (hex)		Name	Flags	Default value
8020:0 [▶ 92]	**Subindex**	AI Settings Ch.1	RW	0x18 (24_{dec})
	0x8020:01	Enable user scale	RW	0x00 (0_{dec})
	0x8020:0A	Enable user calibration	RW	0x00 (0_{dec})
	0x8020:0B	Enable vendor calibration	RW	0x00 (0_{dec})
	0x8020:11	User scale offset	RW	0x0000 (0_{dec})
	0x8020:12	User scale gain	RW	0x02A00000 (44040192_{dec})
	0x8020:17	User calibration offset	RW	0x0000 (0_{dec})
	0x8020:18	User calibration gain	RW	0x0000 (0_{dec})
802F:0 [▶ 92]	**Subindex**	AI Vendor data Ch.1	RW	0x02 (2_{dec})
	0x802F:01	Calibration Offset	RW	0x0000 (0_{dec})
	0x802F:02	Calibration Gain	RW	0x0000 (0_{dec})
8030:0 [▶ 92]	**Subindex**	AI Settings Ch.2	RW	0x18 (24_{dec})
	0x8030:01	Enable user scale	RW	0x00 (0_{dec})
	0x8030:0A	Enable user calibration	RW	0x00 (0_{dec})
	0x8030:0B	Enable vendor calibration	RW	0x00 (0_{dec})
	0x8030:11	User scale offset	RW	0x0000 (0_{dec})
	0x8030:12	User scale gain	RW	0x02A00000 (44040192_{dec})
	0x8030:17	User calibration offset	RW	0x0000 (0_{dec})
	0x8030:18	User calibration gain	RW	0x0000 (0_{dec})
803F:0 [▶ 92]	**Subindex**	AI Vendor data Ch.2	RW	0x02 (2_{dec})
	0x803F:01	Calibration Offset	RW	0x0000 (0_{dec})
	0x803F:02	Calibration Gain	RW	0x0000 (0_{dec})
8040:0 [▶ 93]	**Subindex**	AI Settings Ch.3	RW	0x18 (24_{dec})
	0x8040:01	Enable user scale	RW	0x00 (0_{dec})
	0x8040:0A	Enable user calibration	RW	0x00 (0_{dec})
	0x8040:0B	Enable vendor calibration	RW	0x00 (0_{dec})
	0x8040:11	User scale offset	RW	0x0000 (0_{dec})
	0x8040:12	User scale gain	RW	0x02A00000 (44040192_{dec})
	0x8040:17	User calibration offset	RW	0x0000 (0_{dec})
	0x8040:18	User calibration gain	RW	0x0000 (0_{dec})
804F:0 [▶ 93]	**Subindex**	AI Vendor data Ch.3	RW	0x02 (2_{dec})
	0x804F:01	Calibration Offset	RW	0x0000 (0_{dec})
	0x804F:02	Calibration Gain	RW	0x0000 (0_{dec})
8050:0 [▶ 93]	**Subindex**	AI Settings Ch.4	RW	0x18 (24_{dec})
	0x8050:01	Enable user scale	RW	0x00 (0_{dec})
	0x8050:0A	Enable user calibration	RW	0x00 (0_{dec})
	0x8050:0B	Enable vendor calibration	RW	0x00 (0_{dec})
	0x8050:11	User scale offset	RW	0x0000 (0_{dec})
	0x8050:12	User scale gain	RW	0x02A00000 (44040192_{dec})
	0x8050:17	User calibration offset	RW	0x0000 (0_{dec})
	0x8050:18	User calibration gain	RW	0x0000 (0_{dec})
805F:0 [▶ 93]	**Subindex**	AI Vendor data Ch.4	RW	0x02 (2_{dec})
	0x805F:01	Calibration Offset	RW	0x0000 (0_{dec})
	0x805F:02	Calibration Gain	RW	0x0000 (0_{dec})
8060:0 [▶ 93]	**Subindex**	AI Settings Ch.5	RW	0x18 (24_{dec})
	0x8060:01	Enable user scale	RW	0x00 (0_{dec})
	0x8060:0A	Enable user calibration	RW	0x00 (0_{dec})
	0x8060:0B	Enable vendor calibration	RW	0x00 (0_{dec})
	0x8060:11	User scale offset	RW	0x0000 (0_{dec})
	0x8060:12	User scale gain	RW	0x02A00000 (44040192_{dec})
	0x8060:17	User calibration offset	RW	0x0000 (0_{dec})
	0x8060:18	User calibration gain	RW	0x0000 (0_{dec})
806F:0 [▶ 94]	**Subindex**	AI Vendor data Ch.5	RW	0x02 (2_{dec})
	0x806F:01	Calibration Offset	RW	0x0000 (0_{dec})
	0x806F:02	Calibration Gain	RW	0x0000 (0_{dec})

Index (hex)		Name	Flags	Default value
8070:0 [▶ 94]	**Subindex**	AI Settings Ch.6	RW	0x18 (24_{dec})
	0x8070:01	Enable user scale	RW	0x00 (0_{dec})
	0x8070:0A	Enable user calibration	RW	0x00 (0_{dec})
	0x8070:0B	Enable vendor calibration	RW	0x00 (0_{dec})
	0x8070:11	User scale offset	RW	0x0000 (0_{dec})
	0x8070:12	User scale gain	RW	0x02A00000 (44040192_{dec})
	0x8070:17	User calibration offset	RW	0x0000 (0_{dec})
	0x8070:18	User calibration gain	RW	0x0000 (0_{dec})
807F:0 [▶ 94]	**Subindex**	AI Vendor data Ch.6	RW	0x02 (2_{dec})
	0x807F:01	Calibration Offset	RW	0x0000 (0_{dec})
	0x807F:02	Calibration Gain	RW	0x0000 (0_{dec})
8080:0 [▶ 94]	**Subindex**	SAI Settings	RW	0x11 (17_{dec})
	0x8080:0D	Mode	RW	0x0000 (0_{dec})
	0x8080:11	Range	RW	0x0000 (0_{dec})
F000:0 [▶ 101]	**Subindex**	Modular device profile	RO	0x02 (2_{dec})
	0xF000:01	Module index distance	RO	0x0010 (16_{dec})
	0xF000:02	Maximum number of modules	RO	0x0009 (9_{dec})
F008 [▶ 101]		Code word	RW	0x00000000 (0_{dec})
F010:0 [▶ 101]	**Subindex**	Module list	RW	0x09 (9_{dec})
	0xF010:01	SubIndex 001	RW	0x00000118 (280_{dec})
	0xF010:02	SubIndex 002	RW	0x00000118 (280_{dec})
	0xF010:03	SubIndex 003	RW	0x0000012C (300_{dec})
	0xF010:04	SubIndex 004	RW	0x0000012C (300_{dec})
	0xF010:05	SubIndex 005	RW	0x0000012C (300_{dec})
	0xF010:06	SubIndex 006	RW	0x0000012C (300_{dec})
	0xF010:07	SubIndex 007	RW	0x0000012C (300_{dec})
	0xF010:08	SubIndex 008	RW	0x0000012C (300_{dec})
	0xF010:09	SubIndex 009	RW	0x00000168 (360_{dec})
F600:0 [▶ 102]	**Subindex**	DIG Inputs	RO	0x10 (16_{dec})
	0xF600:01	Us Undervoltage	RO	0x00 (0_{dec})
	0xF600:02	Up Undervoltage	RO	0x00 (0_{dec})
	0xF600:10	TxPDO Toggle	RO	0x00 (0_{dec})

Key

Flags:
RO (Read Only): this object can be read only
RW (Read/Write): this object can be read and written to

6.4 EP1816-3008 - Object description and parameterization

Parameterization

The terminal is parameterized via the CoE - Online tab (double-click on the respective object) or via the Process Data tab (allocation of PDOs).

EtherCAT XML Device Description

The display matches that of the CoE objects from the EtherCAT XML Device Description. We recommend downloading the latest XML file from the download area of the Beckhoff website and installing it according to installation instructions.

Introduction

The CoE overview contains objects for different intended applications:

- Objects required for parameterization during [▶ 92] commissioning

- Objects for indicating internal settings [▶ 94] (may be fixed)
- Further profile-specific objects [▶ 100]indicating inputs, outputs and status information

The following section first describes the objects required for normal operation, followed by a complete overview of missing objects.

6.4.1 Objects to be parameterized during commissioning

Index 8020 AI Settings Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
8020:0	AI Settings Ch.1		UINT8	RO	0x18 (24_{dec})
8020:01	Enable user scale		BOOLEAN	RW	0x00 (0_{dec})
8020:0A	Enable user calibration		BOOLEAN	RW	0x00 (0_{dec})
8020:0B	Enable vendor calibration		BOOLEAN	RW	0x00 (0_{dec})
8020:11	User scale offset		INT16	RW	0x0000 (0_{dec})
8020:12	User scale gain		INT32	RW	0x02A00000 (44040192_{dec})
8020:17	User calibration offset		INT16	RW	0x0000 (0_{dec})
8020:18	User calibration gain		INT16	RW	0x0000 (0_{dec})

Index 802F AI Vendor data Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
802F:0	AI Vendor data Ch.1		UINT8	RO	0x02 (2_{dec})
802F:01	Calibration Offset		INT16	RW	0x0000 (0_{dec})
802F:02	Calibration Gain		INT16	RW	0x0000 (0_{dec})

Index 8030 AI Settings Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
8030:0	AI Settings Ch.2		UINT8	RO	0x18 (24_{dec})
8030:01	Enable user scale		BOOLEAN	RW	0x00 (0_{dec})
8030:0A	Enable user calibration		BOOLEAN	RW	0x00 (0_{dec})
8030:0B	Enable vendor calibration		BOOLEAN	RW	0x00 (0_{dec})
8030:11	User scale offset		INT16	RW	0x0000 (0_{dec})
8030:12	User scale gain		INT32	RW	0x02A00000 (44040192_{dec})
8030:17	User calibration offset		INT16	RW	0x0000 (0_{dec})
8030:18	User calibration gain		INT16	RW	0x0000 (0_{dec})

Index 803F AI Vendor data Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
803F:0	AI Vendor data Ch.2		UINT8	RO	0x02 (2_{dec})
803F:01	Calibration Offset		INT16	RW	0x0000 (0_{dec})
803F:02	Calibration Gain		INT16	RW	0x0000 (0_{dec})

Index 8040 AI Settings Ch.3

Index (hex)	Name	Meaning	Data type	Flags	Default
8040:0	AI Settings Ch.3		UINT8	RO	0x18 (24_{dec})
8040:01	Enable user scale		BOOLEAN	RW	0x00 (0_{dec})
8040:0A	Enable user calibration		BOOLEAN	RW	0x00 (0_{dec})
8040:0B	Enable vendor calibration		BOOLEAN	RW	0x00 (0_{dec})
8040:11	User scale offset		INT16	RW	0x0000 (0_{dec})
8040:12	User scale gain		INT32	RW	0x02A00000 (44040192_{dec})
8040:17	User calibration offset		INT16	RW	0x0000 (0_{dec})
8040:18	User calibration gain		INT16	RW	0x0000 (0_{dec})

Index 804F AI Vendor data Ch.3

Index (hex)	Name	Meaning	Data type	Flags	Default
804F:0	AI Vendor data Ch.3		UINT8	RO	0x02 (2_{dec})
804F:01	Calibration Offset		INT16	RW	0x0000 (0_{dec})
804F:02	Calibration Gain		INT16	RW	0x0000 (0_{dec})

Index 8050 AI Settings Ch.4

Index (hex)	Name	Meaning	Data type	Flags	Default
8050:0	AI Settings Ch.4		UINT8	RO	0x18 (24_{dec})
8050:01	Enable user scale		BOOLEAN	RW	0x00 (0_{dec})
8050:0A	Enable user calibration		BOOLEAN	RW	0x00 (0_{dec})
8050:0B	Enable vendor calibration		BOOLEAN	RW	0x00 (0_{dec})
8050:11	User scale offset		INT16	RW	0x0000 (0_{dec})
8050:12	User scale gain		INT32	RW	0x02A00000 (44040192_{dec})
8050:17	User calibration offset		INT16	RW	0x0000 (0_{dec})
8050:18	User calibration gain		INT16	RW	0x0000 (0_{dec})

Index 805F AI Vendor data Ch.4

Index (hex)	Name	Meaning	Data type	Flags	Default
805F:0	AI Vendor data Ch.4		UINT8	RO	0x02 (2_{dec})
805F:01	Calibration Offset		INT16	RW	0x0000 (0_{dec})
805F:02	Calibration Gain		INT16	RW	0x0000 (0_{dec})

Index 8060 AI Settings Ch.5

Index (hex)	Name	Meaning	Data type	Flags	Default
8060:0	AI Settings Ch.5		UINT8	RO	0x18 (24_{dec})
8060:01	Enable user scale		BOOLEAN	RW	0x00 (0_{dec})
8060:0A	Enable user calibration		BOOLEAN	RW	0x00 (0_{dec})
8060:0B	Enable vendor calibration		BOOLEAN	RW	0x00 (0_{dec})
8060:11	User scale offset		INT16	RW	0x0000 (0_{dec})
8060:12	User scale gain		INT32	RW	0x02A00000 (44040192_{dec})
8060:17	User calibration offset		INT16	RW	0x0000 (0_{dec})
8060:18	User calibration gain		INT16	RW	0x0000 (0_{dec})

Index 806F AI Vendor data Ch.5

Index (hex)	Name	Meaning	Data type	Flags	Default
806F:0	AI Vendor data Ch.5		UINT8	RO	0x02 (2_{dec})
806F:01	Calibration Offset		INT16	RW	0x0000 (0_{dec})
806F:02	Calibration Gain		INT16	RW	0x0000 (0_{dec})

Index 8070 AI Settings Ch.6

Index (hex)	Name	Meaning	Data type	Flags	Default
8070:0	AI Settings Ch.6		UINT8	RO	0x18 (24_{dec})
8070:01	Enable user scale		BOOLEAN	RW	0x00 (0_{dec})
8070:0A	Enable user calibration		BOOLEAN	RW	0x00 (0_{dec})
8070:0B	Enable vendor calibration		BOOLEAN	RW	0x00 (0_{dec})
8070:11	User scale offset		INT16	RW	0x0000 (0_{dec})
8070:12	User scale gain		INT32	RW	0x02A00000 (44040192_{dec})
8070:17	User calibration offset		INT16	RW	0x0000 (0_{dec})
8070:18	User calibration gain		INT16	RW	0x0000 (0_{dec})

Index 807F AI Vendor data Ch.6

Index (hex)	Name	Meaning	Data type	Flags	Default
807F:0	AI Vendor data Ch.6		UINT8	RO	0x02 (2_{dec})
807F:01	Calibration Offset		INT16	RW	0x0000 (0_{dec})
807F:02	Calibration Gain		INT16	RW	0x0000 (0_{dec})

Index 8080 SAI Settings

Index (hex)	Name	Meaning		Data type	Flags	Default
8080:0	SAI Settings			UINT8	RO	0x11 (17_{dec})
8080:0D	Mode	permitted values:		UINT16	RW	0x0000 (0_{dec})
		4	1 Hz			
		5	10 Hz			
		6	25 Hz			
		7	50 Hz			
		8	100 Hz			
		9	200 Hz			
		10	400 Hz			
		11	1600 Hz			
		12	5000 Hz			
8080:11	Range	permitted values:		UINT16	RW	0x0000 (0_{dec})
		3	+/- 2G			
		4	+/- 4G			
		5	+/- 8G			
		6	+/-16G			

6.4.2 Standard objects (0x1000-0x1FFF)

The standard objects have the same meaning for all EtherCAT slaves.

Index 1000Device type

Index (hex)	Name	Meaning	Data type	Flags	Default
1000:0	Device type	Device type of the EtherCAT slave: The Lo-Word contains the CoE profile used (5001). The Hi-Word contains the module profile according to the modular device profile.	UINT32	RO	0x00001389 (5001_{dec})

Index 1008Device name

Index (hex)	Name	Meaning	Data type	Flags	Default
1008:0	Device name	Device name of the EtherCAT slave	STRING	RO	EP1816-3008

Index 1009Hardware version

Index (hex)	Name	Meaning	Data type	Flags	Default
1009:0	Hardware version	Hardware version of the EtherCAT slave	STRING	RO	

Index 100ASoftware version

Index (hex)	Name	Meaning	Data type	Flags	Default
100A:0	Software version	Firmware version of the EtherCAT slave	STRING	RO	03

Index 1011 Restore default parameters

Index (hex)	Name	Meaning	Data type	Flags	Default
1011:0	Restore default parameters		UINT8	RO	0x01 (1_{dec})
1011:01	SubIndex 001		UINT32	RW	0x00000000 (0_{dec})

Index 1018Identity

Index (hex)	Name	Meaning	Data type	Flags	Default
1018:0	Identity	Information for identifying the slave	UINT8	RO	0x04 (4_{dec})
1018:01	Vendor ID	Vendor ID of the EtherCAT slave	UINT32	RO	0x00000002 (2_{dec})
1018:02	Product code	Product code of the EtherCAT slave	UINT32	RO	0x05E44052 (98844754_{dec})
1018:03	Revision	Revision number of the EtherCAT slave; the low word (bit 0-15) indicates the special terminal number, the high word (bit 16-31) refers to the device description	UINT32	RO	0x00000000 (0_{dec})
1018:04	Serial number	Serial number of the EtherCAT slave; the low byte (bit 0-7) of the low word contains the year of production, the high byte (bit 8-15) of the low word contains the week of production, the high word (bit 16-31) is 0	UINT32	RO	0x00000000 (0_{dec})

Index 10F0 Backup parameter handling

Index (hex)	Name	Meaning	Data type	Flags	Default
10F0:0	Backup parameter handling		UINT8	RO	0x01 (1_{dec})
10F0:01	Checksum		UINT32	RO	0x00000000 (0_{dec})

Index 1A00 DIG TxPDO-Map Inputs Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
1A00:0	DIG TxPDO-Map Inputs Ch.1	PDO Mapping TxPDO 1	UINT8	RO	0x09 (9_{dec})
1A00:01	SubIndex 001	1. PDO Mapping entry (object 0x6000 (DIG Inputs Ch.1), entry 0x01 (Input 1))	UINT32	RO	0x6000:01, 1
1A00:02	SubIndex 002	2. PDO Mapping entry (object 0x6000 (DIG Inputs Ch.1), entry 0x02 (Input 2))	UINT32	RO	0x6000:02, 1
1A00:03	SubIndex 003	3. PDO Mapping entry (object 0x6000 (DIG Inputs Ch.1), entry 0x03 (Input 3))	UINT32	RO	0x6000:03, 1
1A00:04	SubIndex 004	4. PDO Mapping entry (object 0x6000 (DIG Inputs Ch.1), entry 0x04 (Input 4))	UINT32	RO	0x6000:04, 1
1A00:05	SubIndex 005	5. PDO Mapping entry (object 0x6000 (DIG Inputs Ch.1), entry 0x05 (Input 5))	UINT32	RO	0x6000:05, 1
1A00:06	SubIndex 006	6. PDO Mapping entry (object 0x6000 (DIG Inputs Ch.1), entry 0x06 (Input 6))	UINT32	RO	0x6000:06, 1
1A00:07	SubIndex 007	7. PDO Mapping entry (object 0x6000 (DIG Inputs Ch.1), entry 0x07 (Input 7))	UINT32	RO	0x6000:07, 1
1A00:08	SubIndex 008	8. PDO Mapping entry (object 0x6000 (DIG Inputs Ch.1), entry 0x08 (Input 8))	UINT32	RO	0x6000:08, 1
1A00:09	SubIndex 009	9. PDO Mapping entry (5 bits align)	UINT32	RO	0x0000:00, 8

Index 1A01 DIG TxPDO-Map Inputs Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
1A01:0	DIG TxPDO-Map Inputs Ch.2	PDO Mapping TxPDO 2	UINT8	RO	0x09 (9_{dec})
1A01:01	SubIndex 001	1. PDO Mapping entry (object 0x6010 (DIG Inputs Ch.2), entry 0x01 (Input 1))	UINT32	RO	0x6010:01, 1
1A01:02	SubIndex 002	2. PDO Mapping entry (object 0x6010 (DIG Inputs Ch.2), entry 0x02 (Input 2))	UINT32	RO	0x6010:02, 1
1A01:03	SubIndex 003	3. PDO Mapping entry (object 0x6010 (DIG Inputs Ch.2), entry 0x03 (Input 3))	UINT32	RO	0x6010:03, 1
1A01:04	SubIndex 004	4. PDO Mapping entry (object 0x6010 (DIG Inputs Ch.2), entry 0x04 (Input 4))	UINT32	RO	0x6010:04, 1
1A01:05	SubIndex 005	5. PDO Mapping entry (object 0x6010 (DIG Inputs Ch.2), entry 0x05 (Input 5))	UINT32	RO	0x6010:05, 1
1A01:06	SubIndex 006	6. PDO Mapping entry (object 0x6010 (DIG Inputs Ch.2), entry 0x06 (Input 6))	UINT32	RO	0x6010:06, 1
1A01:07	SubIndex 007	7. PDO Mapping entry (object 0x6010 (DIG Inputs Ch.2), entry 0x07 (Input 7))	UINT32	RO	0x6010:07, 1
1A01:08	SubIndex 008	8. PDO Mapping entry (object 0x6010 (DIG Inputs Ch.2), entry 0x08 (Input 8))	UINT32	RO	0x6010:08, 1
1A01:09	SubIndex 009	9. PDO Mapping entry (5 bits align)	UINT32	RO	0x0000:00, 8

Index 1A02 AI TxPDO-Map Inputs Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
1A02:0	AI TxPDO-Map Inputs Ch.1	PDO Mapping TxPDO 3	UINT8	RO	0x05 (5_{dec})
1A02:01	SubIndex 001	1. PDO Mapping entry (13 bits align)	UINT32	RO	0x0000:00, 6
1A02:02	SubIndex 002	2. PDO Mapping entry (object 0x1C33 (SM input parameter), entry 0x20 (Sync error))	UINT32	RO	0x6020:07, 1
1A02:03	SubIndex 003	3. PDO Mapping entry (1 bits align)	UINT32	RO	0x0000:00, 8
1A02:04	SubIndex 004	4. PDO Mapping entry (object 0x6020 (AI Inputs Ch.1), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x6020:10, 1
1A02:05	SubIndex 005	5. PDO Mapping entry (object 0x6020 (AI Inputs Ch.1), entry 0x11 (Value))	UINT32	RO	0x6020:11, 16

Index 1A03 AI TxPDO-Map Inputs Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
1A03:0	AI TxPDO-Map Inputs Ch.2	PDO Mapping TxPDO 4	UINT8	RO	0x05 (5_{dec})
1A03:01	SubIndex 001	1. PDO Mapping entry (13 bits align)	UINT32	RO	0x0000:00, 6
1A03:02	SubIndex 002	2. PDO Mapping entry (object 0x1C33 (SM input parameter), entry 0x20 (Sync error))	UINT32	RO	0x6030:07, 1
1A03:03	SubIndex 003	3. PDO Mapping entry (1 bits align)	UINT32	RO	0x0000:00, 8
1A03:04	SubIndex 004	4. PDO Mapping entry (object 0x6030 (AI Inputs Ch.2), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x6030:10, 1
1A03:05	SubIndex 005	5. PDO Mapping entry (object 0x6030 (AI Inputs Ch.2), entry 0x11 (Value))	UINT32	RO	0x6030:11, 16

Index 1A04 AI TxPDO-Map Inputs Ch.3

Index (hex)	Name	Meaning	Data type	Flags	Default
1A04:0	AI TxPDO-Map Inputs Ch.3	PDO Mapping TxPDO 5	UINT8	RO	0x05 (5_{dec})
1A04:01	SubIndex 001	1. PDO Mapping entry (13 bits align)	UINT32	RO	0x0000:00, 6
1A04:02	SubIndex 002	2. PDO Mapping entry (object 0x1C33 (SM input parameter), entry 0x20 (Sync error))	UINT32	RO	0x6040:07, 1
1A04:03	SubIndex 003	3. PDO Mapping entry (1 bits align)	UINT32	RO	0x0000:00, 8
1A04:04	SubIndex 004	4. PDO Mapping entry (object 0x6040 (AI Inputs Ch.3), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x6040:10, 1
1A04:05	SubIndex 005	5. PDO Mapping entry (object 0x6040 (AI Inputs Ch.3), entry 0x11 (Value))	UINT32	RO	0x6040:11, 16

Index 1A05 AI TxPDO-Map Inputs Ch.4

Index (hex)	Name	Meaning	Data type	Flags	Default
1A05:0	AI TxPDO-Map Inputs Ch.4	PDO Mapping TxPDO 6	UINT8	RO	0x05 (5_{dec})
1A05:01	SubIndex 001	1. PDO Mapping entry (13 bits align)	UINT32	RO	0x0000:00, 6
1A05:02	SubIndex 002	2. PDO Mapping entry (object 0x1C33 (SM input parameter), entry 0x20 (Sync error))	UINT32	RO	0x6050:07, 1
1A05:03	SubIndex 003	3. PDO Mapping entry (1 bits align)	UINT32	RO	0x0000:00, 8
1A05:04	SubIndex 004	4. PDO Mapping entry (object 0x6050 (AI Inputs Ch.4), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x6050:10, 1
1A05:05	SubIndex 005	5. PDO Mapping entry (object 0x6050 (AI Inputs Ch.4), entry 0x11 (Value))	UINT32	RO	0x6050:11, 16

Index 1A06 AI TxPDO-Map Inputs Ch.5

Index (hex)	Name	Meaning	Data type	Flags	Default
1A06:0	AI TxPDO-Map Inputs Ch.5	PDO Mapping TxPDO 7	UINT8	RO	0x05 (5_{dec})
1A06:01	SubIndex 001	1. PDO Mapping entry (13 bits align)	UINT32	RO	0x0000:00, 6
1A06:02	SubIndex 002	2. PDO Mapping entry (object 0x1C33 (SM input parameter), entry 0x20 (Sync error))	UINT32	RO	0x6060:07, 1
1A06:03	SubIndex 003	3. PDO Mapping entry (1 bits align)	UINT32	RO	0x0000:00, 8
1A06:04	SubIndex 004	4. PDO Mapping entry (object 0x6060 (AI Inputs Ch.5), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x6060:10, 1
1A06:05	SubIndex 005	5. PDO Mapping entry (object 0x6060 (AI Inputs Ch.5), entry 0x11 (Value))	UINT32	RO	0x6060:11, 16

Index 1A07 AI TxPDO-Map Inputs Ch.6

Index (hex)	Name	Meaning	Data type	Flags	Default
1A07:0	AI TxPDO-Map Inputs Ch.6	PDO Mapping TxPDO 8	UINT8	RO	0x05 (5_{dec})
1A07:01	SubIndex 001	1. PDO Mapping entry (13 bits align)	UINT32	RO	0x0000:00, 6
1A07:02	SubIndex 002	2. PDO Mapping entry (object 0x1C33 (SM input parameter), entry 0x20 (Sync error))	UINT32	RO	0x6070:07, 1
1A07:03	SubIndex 003	3. PDO Mapping entry (1 bits align)	UINT32	RO	0x0000:00, 8
1A07:04	SubIndex 004	4. PDO Mapping entry (object 0x6070 (AI Inputs Ch.6), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x6070:10, 1
1A07:05	SubIndex 005	5. PDO Mapping entry (object 0x6070 (AI Inputs Ch.6), entry 0x11 (Value))	UINT32	RO	0x6070:11, 16

Index 1A08 DIG TxPDO-Map Inputs Device

Index (hex)	Name	Meaning	Data type	Flags	Default
1A08:0	DIG TxPDO-Map Inputs Device	PDO Mapping TxPDO 9	UINT8	RO	0x04 (4_{dec})
1A08:01	SubIndex 001	1. PDO Mapping entry (object 0xF600 (DIG Inputs), entry 0x01 (Us Undervoltage))	UINT32	RO	0xF600:01, 1
1A08:02	SubIndex 002	2. PDO Mapping entry (object 0xF600 (DIG Inputs), entry 0x02 (Up Undervoltage))	UINT32	RO	0xF600:02, 1
1A08:03	SubIndex 003	3. PDO Mapping entry (11 bits align)	UINT32	RO	0x0000:00, 13
1A08:04	SubIndex 004	4. PDO Mapping entry (object 0xF600 (DIG Inputs), entry 0x0E (Sync error))	UINT32	RO	0xF600:10, 1

Index 1C00Sync manager type

Index (hex)	Name	Meaning	Data type	Flags	Default
1C00:0	Sync manager type	Using the sync managers	UINT8	RO	0x04 (4_{dec})
1C00:01	SubIndex 001	Sync-Manager Type Channel 1: Mailbox Write	UINT8	RO	0x01 (1_{dec})
1C00:02	SubIndex 002	Sync-Manager Type Channel 2: Mailbox Read	UINT8	RO	0x02 (2_{dec})
1C00:03	SubIndex 003	Sync-Manager Type Channel 3: Process Data Write (Outputs)	UINT8	RO	0x03 (3_{dec})
1C00:04	SubIndex 004	Sync-Manager Type Channel 4: Process Data Read (Inputs)	UINT8	RO	0x04 (4_{dec})

Index 1C12 RxPDO assign

Index (hex)	Name	Meaning	Data type	Flags	Default
1C12:0	RxPDO assign	PDO Assign Outputs	UINT8	RO	0x00 (0_{dec})

Index 1C13 TxPDO assign

Index (hex)	Name	Meaning	Data type	Flags	Default
1C13:0	TxPDO assign	PDO Assign Inputs	UINT8	RO	0x09 (9_{dec})
1C13:01	Subindex 001	1. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RO	0x1A00 (6656_{dec})
1C13:02	Subindex 002	2. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RO	0x1A01 (6657_{dec})
1C13:03	Subindex 003	3. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RO	0x1A02 (6658_{dec})
1C13:04	Subindex 004	4. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RO	0x1A03 (6659_{dec})
1C13:05	Subindex 005	5. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RO	0x1A04 (6660_{dec})
1C13:06	Subindex 006	6. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RO	0x1A05 (6661_{dec})
1C13:07	Subindex 007	7. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RO	0x1A06 (6662_{dec})
1C13:08	Subindex 008	8. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RO	0x1A07 (6663_{dec})
1C13:09	Subindex 009	9. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RO	0x1A08 (6664_{dec})

Index 1C33SM input parameter

Index (hex)	Name	Meaning	Data type	Flags	Default
1C33:0	SM input parameter	Synchronization parameters for the inputs	UINT8	RO	0x20 (32_{dec})
1C33:01	Sync mode	Current synchronization mode: • 0: Free Run • 1: Synchronous with SM 3 Event (no outputs available) • 2: DC - Synchron with SYNC0 Event • 3: DC - Synchron with SYNC1 Event • 34: Synchronous with SM 2 Event (outputs available)	UINT16	RW	0x0022 (34_{dec})
1C33:02	Cycle time	as 0x1C32:02	UINT32	RW	0x003D0900 (4000000_{dec})
1C33:03	Shift time	Time between SYNC0 event and reading of the inputs (in ns, only DC mode)	UINT32	RO	0x00000000 (0_{dec})
1C33:04	Sync modes supported	Supported synchronization modes: • Bit 0: free run is supported • Bit 1: Synchronous with SM 2 Event is supported (outputs available) • Bit 1: Synchronous with SM 3 Event is supported (no outputs available) • Bit 2-3 = 01: DC mode is supported • Bit 4-5 = 01: Input shift through local event (outputs available) • Bit 4-5 = 10: Input shift with SYNC1 event (no outputs available) • Bit 14 = 1: dynamic times (measurement through writing of 0x1C32:08 or 0x1C33:08)	UINT16	RO	0xC007 (49159_{dec})
1C33:05	Minimum cycle time	as 0x1C32:05	UINT32	RO	0x00030D40 (200000_{dec})
1C33:06	Calc and copy time	Time between reading of the inputs and availability of the inputs for the master (in ns, only DC mode)	UINT32	RO	0x00000000 (0_{dec})
1C33:07	Minimum delay time		UINT32	RO	0x00000000 (0_{dec})
1C33:08	Command	as 0x1C32:08	UINT16	RW	0x0000 (0_{dec})
1C33:09	Maximum delay time	Time between SYNC1 event and reading of the inputs (in ns, only DC mode)	UINT32	RO	0x00000000 (0_{dec})
1C33:0B	SM event missed counter	as 0x1C32:11	UINT16	RO	0x0000 (0_{dec})
1C33:0C	Cycle exceeded counter	as 0x1C32:12	UINT16	RO	0x0000 (0_{dec})
1C33:0D	Shift too short counter	as 0x1C32:13	UINT16	RO	0x0000 (0_{dec})
1C33:20	Sync error	as 0x1C32:32	BOOLEAN	RO	0x00 (0_{dec})

6.4.3 Profile-specific objects (0x6000-0xFFFF)

The profile-specific objects have the same meaning for all EtherCAT slaves that support the profile 5001.

Index 6000 DIG Inputs Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
6000:0	DIG Inputs Ch.1		UINT8	RO	0x08 (8_{dec})
6000:01	Input 1		BOOLEAN	RO	0x00 (0_{dec})
6000:02	Input 2		BOOLEAN	RO	0x00 (0_{dec})
6000:03	Input 3		BOOLEAN	RO	0x00 (0_{dec})
6000:04	Input 4		BOOLEAN	RO	0x00 (0_{dec})
6000:05	Input 5		BOOLEAN	RO	0x00 (0_{dec})
6000:06	Input 6		BOOLEAN	RO	0x00 (0_{dec})
6000:07	Input 7		BOOLEAN	RO	0x00 (0_{dec})
6000:08	Input 8		BOOLEAN	RO	0x00 (0_{dec})

Index 6010 DIG Inputs Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
6010:0	DIG Inputs Ch.2		UINT8	RO	0x08 (8_{dec})
6010:01	Input 1		BOOLEAN	RO	0x00 (0_{dec})
6010:02	Input 2		BOOLEAN	RO	0x00 (0_{dec})
6010:03	Input 3		BOOLEAN	RO	0x00 (0_{dec})
6010:04	Input 4		BOOLEAN	RO	0x00 (0_{dec})
6010:05	Input 5		BOOLEAN	RO	0x00 (0_{dec})
6010:06	Input 6		BOOLEAN	RO	0x00 (0_{dec})
6010:07	Input 7		BOOLEAN	RO	0x00 (0_{dec})
6010:08	Input 8		BOOLEAN	RO	0x00 (0_{dec})

Index 6020 AI Inputs Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
6020:0	AI Inputs Ch.1		UINT8	RO	0x11 (17_{dec})
6020:07	Error		BOOLEAN	RO	0x00 (0_{dec})
6020:10	TxPDO Toggle		BOOLEAN	RO	0x00 (0_{dec})
6020:11	Value		INT16	RO	0x0000 (0_{dec})

Index 6030 AI Inputs Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
6030:0	AI Inputs Ch.2		UINT8	RO	0x11 (17_{dec})
6030:07	Error		BOOLEAN	RO	0x00 (0_{dec})
6030:10	TxPDO Toggle		BOOLEAN	RO	0x00 (0_{dec})
6030:11	Value		INT16	RO	0x0000 (0_{dec})

Index 6040 AI Inputs Ch.3

Index (hex)	Name	Meaning	Data type	Flags	Default
6040:0	AI Inputs Ch.3		UINT8	RO	0x11 (17_{dec})
6040:07	Error		BOOLEAN	RO	0x00 (0_{dec})
6040:10	TxPDO Toggle		BOOLEAN	RO	0x00 (0_{dec})
6040:11	Value		INT16	RO	0x0000 (0_{dec})

Index 6050 AI Inputs Ch.4

Index (hex)	Name	Meaning	Data type	Flags	Default
6050:0	AI Inputs Ch.4		UINT8	RO	0x11 (17_{dec})
6050:07	Error		BOOLEAN	RO	0x00 (0_{dec})
6050:10	TxPDO Toggle		BOOLEAN	RO	0x00 (0_{dec})
6050:11	Value		INT16	RO	0x0000 (0_{dec})

Index 6060 AI Inputs Ch.5

Index (hex)	Name	Meaning	Data type	Flags	Default
6060:0	AI Inputs Ch.5		UINT8	RO	0x11 (17_{dec})
6060:07	Error		BOOLEAN	RO	0x00 (0_{dec})
6060:10	TxPDO Toggle		BOOLEAN	RO	0x00 (0_{dec})
6060:11	Value		INT16	RO	0x0000 (0_{dec})

Index 6070 AI Inputs Ch.6

Index (hex)	Name	Meaning	Data type	Flags	Default
6070:0	AI Inputs Ch.6		UINT8	RO	0x11 (17_{dec})
6070:07	Error		BOOLEAN	RO	0x00 (0_{dec})
6070:10	TxPDO Toggle		BOOLEAN	RO	0x00 (0_{dec})
6070:11	Value		INT16	RO	0x0000 (0_{dec})

Index F000 Modular device profile

Index (hex)	Maximum number of modules>Name	Meaning	UINT16>Data type	RO>Flags	0x0009 (9_{dec})>Default
F000:0	Modular device profile	General information for the modular device profile	UINT8	RO	0x02 (2_{dec})
F000:01	Module index distance		UINT16	RO	0x0010 (16_{dec})
F000:02	Maximum number of modules		UINT16	RO	0x0009 (9_{dec})

Index F008 Code word

Index (hex)	Name	Meaning	Data type	Flags	Default
F008:0	Code word		UINT32	RW	0x00000000 (0_{dec})

Index F010 Module list

Index (hex)	Name	Meaning	Data type	Flags	Default
F010:0	Module list		UINT8	RW	0x09 (9_{dec})
F010:01	SubIndex 001		UINT32	RW	0x00000118 (280_{dec})
F010:02	SubIndex 002		UINT32	RW	0x00000118 (280_{dec})
F010:03	SubIndex 003		UINT32	RW	0x0000012C (300_{dec})
F010:04	SubIndex 004		UINT32	RW	0x0000012C (300_{dec})
F010:05	SubIndex 005		UINT32	RW	0x0000012C (300_{dec})
F010:06	SubIndex 006		UINT32	RW	0x0000012C (300_{dec})
F010:07	SubIndex 007		UINT32	RW	0x0000012C (300_{dec})
F010:08	SubIndex 008		UINT32	RW	0x0000012C (300_{dec})
F010:09	SubIndex 009		UINT32	RW	0x00000168 (360_{dec})

Index F600 DIG Inputs

Index (hex)	Name	Meaning	Data type	Flags	Default
F600:0	DIG Inputs		UINT8	RO	0x10 (16_{dec})
F600:01	Us Undervoltage		BOOLEAN	RO	0x00 (0_{dec})
F600:02	Up Undervoltage		BOOLEAN	RO	0x00 (0_{dec})
F600:10	TxPDO Toggle		BOOLEAN	RO	0x00 (0_{dec})

7 Appendix

7.1 General operating conditions

Protection degrees (IP-Code)

The standard IEC 60529 (DIN EN 60529) defines the degrees of protection in different classes.

1. Number: dust protection and touch guard	Definition
0	Non-protected
1	Protected against access to hazardous parts with the back of a hand. Protected against solid foreign objects of Ø 50 mm
2	Protected against access to hazardous parts with a finger. Protected against solid foreign objects of Ø 12.5 mm.
3	Protected against access to hazardous parts with a tool. Protected against solid foreign objects Ø 2.5 mm.
4	Protected against access to hazardous parts with a wire. Protected against solid foreign objects Ø 1 mm.
5	Protected against access to hazardous parts with a wire. Dust-protected. Intrusion of dust is not totally prevented, but dust shall not penetrate in a quantity to interfere with satisfactory operation of the device or to impair safety.
6	Protected against access to hazardous parts with a wire. Dust-tight. No intrusion of dust.

2. Number: water* protection	Definition
0	Non-protected
1	Protected against water drops
2	Protected against water drops when enclosure tilted up to 15°.
3	Protected against spraying water. Water sprayed at an angle up to 60° on either side of the vertical shall have no harmful effects.
4	Protected against splashing water. Water splashed against the disclosure from any direction shall have no harmful effects
5	Protected against water jets
6	Protected against powerful water jets
7	Protected against the effects of temporary immersion in water. Intrusion of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed in water for 30 min. in 1 m depth.

*) These protection classes define only protection against water!

Chemical Resistance

The Resistance relates to the Housing of the IP 67 modules and the used metal parts. In the table below you will find some typical resistance.

Character	Resistance
Steam	at temperatures >100°C: not resistant
Sodium base liquor (ph-Value > 12)	at room temperature: resistant > 40°C: not resistant
Acetic acid	not resistant
Argon (technical clean)	resistant

Key

- resistant: Lifetime several months
- non inherently resistant: Lifetime several weeks
- not resistant: Lifetime several hours resp. early decomposition

7.2 EtherCAT Box- / EtherCAT P Box - Accessories

Fixing

Ordering information	Description
ZS5300-0001	Mounting rail (500 mm x 129 mm)

Marking material, plugs

Ordering information	Description
ZS5000-0000	Fieldbus Box set M8 (contact labels, plugs)
ZS5000-0002	Fieldbus Box set M12 (contact labels, plugs)
ZS5000-0010	plugs M8, IP67 (50 pieces)
ZS5000-0020	plugs M12, IP67 (50 pieces)
ZS5100-0000	marking labels, not printed, 4 stripes at 10 pieces
ZS5100-xxxx	printed marking labels, on request

Tools

Ordering information	Description
ZB8800	torque wrench for M8 cables with knurl, incl. ratchet
ZB8800-0001	M12 ratchet for torque wrench ZB8800
ZB8800-0002	M8 ratchet (field assembly) for torque wrench ZB8800
ZB8801-0000	torque wrench for hexagonal plugs, adjustable
ZB8801-0001	torque cable key, M8/wrench size 9, for torque wrench ZB8801-0000
ZB8801-0002	torque cable key, M12/wrench size 13, for torque wrench ZB8801-0000
ZB8801-0003	torque cable key, M12 field assembly/wrench size 13, for torque wrench ZB8801-0000

Further accessories

Further accessories may be found at the price list for Beckhoff fieldbus components and at the internet under https://www.beckhoff.com

7.3 Version identification of EtherCAT devices

Designation

A Beckhoff EtherCAT device has a 14-digit designation, made up of

- family key
- type
- version
- revision

Example	Family	Type	Version	Revision
EL3314-0000-0016	EL terminal (12 mm, non-pluggable 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 mentioned above result in the **technical designation**. EL3314-0000-0016 is used in the example below.
- EL3314-0000 is the order identifier, in the case of “-0000” usually abbreviated to EL3314. “-0016” is the EtherCAT revision.
- The **order identifier** is made up of
  - family key (EL, EP, CU, ES, KL, CX, etc.)
  - type (3314)
  - version (-0000)
- The **revision** -0016 shows the technical progress, such as the extension of features with regard to the EtherCAT communication, and is managed by Beckhoff.
  In principle, a device with a higher revision can replace a device with a lower revision, unless specified otherwise, e.g. in the documentation.
  Associated and synonymous with each revision there is usually a description (ESI, EtherCAT Slave Information) in the form of an XML file, which is available for download from the Beckhoff web site.
  From 2014/01 the revision is shown on the outside of the IP20 terminals, see Fig. *“EL5021 EL terminal, standard IP20 IO device with batch number and revision ID (since 2014/01)”*.
- The type, version and revision are read as decimal numbers, even if they are technically saved in hexadecimal.

Identification number

Beckhoff EtherCAT devices from the different lines have different kinds of identification numbers:

Production lot/batch number/serial number/date code/D number

The serial number 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 of a batch.

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

KK - week of production (CW, calendar week)
YY - year of production
FF - firmware version
HH - hardware version

Example with
Ser. no.: 12063A02: 12 - production week 12 06 - production year 2006 3A - firmware version 3A 02 - hardware version 02

Exceptions can occur in the **IP67 area**, where the following syntax can be used (see respective device documentation):

Syntax: D ww yy x y z u

D - prefix designation
ww - calendar week
yy - year
x - firmware version of the bus PCB
y - hardware version of the bus PCB
z - firmware version of the I/O PCB
u - hardware version of the I/O PCB

Example: D.22081501 calendar week 22 of the year 2008 firmware version of bus PCB: 1 hardware version of bus PCB: 5 firmware version of I/O PCB: 0 (no firmware necessary for this PCB) hardware version of I/O PCB: 1

Unique serial number/ID, ID number

In addition, in some series each individual module has its own unique serial number.

See also the further documentation in the area

- IP67: EtherCAT Box
- Safety: TwinSafe
- Terminals with factory calibration certificate and other measuring terminals

Examples of markings

Fig. 70: EL5021 EL terminal, standard IP20 IO device with serial/ batch number and revision ID (since 2014/01)

Fig. 71: EK1100 EtherCAT coupler, standard IP20 IO device with serial/ batch number

Fig. 72: CU2016 switch with serial/ batch number

Fig. 73: EL3202-0020 with serial/ batch number 26131006 and unique ID-number 204418

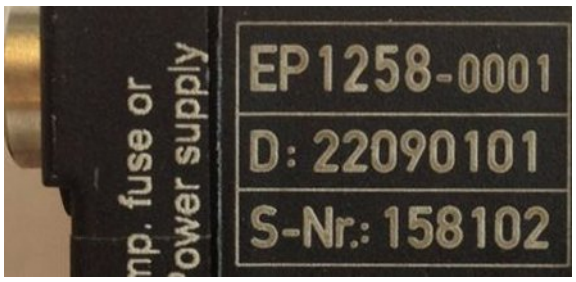


Fig. 74: EP1258-00001 IP67 EtherCAT Box with batch number/ date code 22090101 and unique serial number 158102

Fig. 75: EP1908-0002 IP67 EtherCAT Safety Box with batch number/ date code 071201FF and unique serial number 00346070

Fig. 76: EL2904 IP20 safety terminal with batch number/ date code 50110302 and unique serial number 00331701

Fig. 77: ELM3604-0002 terminal with unique ID number (QR code) 100001051 and serial/ batch number 44160201

7.3.1 Beckhoff Identification Code (BIC)

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

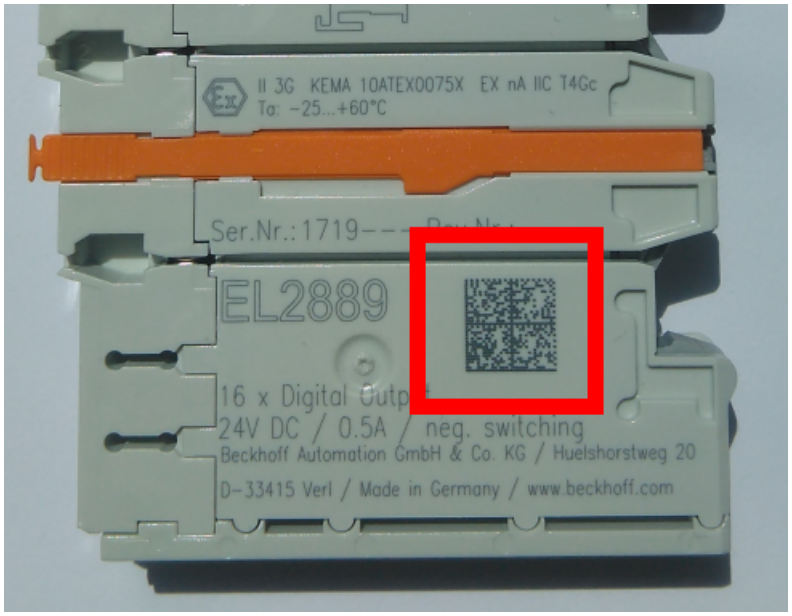


Fig. 78: BIC as data matrix code (DMC, code scheme ECC200)

The BIC will be introduced step by step across all product groups.

Depending on the product, it can be found in the following places:

- 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 also be used by the customer for handling and product management.

Each piece of information can be uniquely identified using the so-called data identifier (ANSI MH10.8.2-2016). The data identifier is followed by a character string. Both together have a maximum length according to the table below. If the information is shorter, spaces are added to it. The data under positions 1 to 4 are always available.

The following information is contained:

Item no.	Type of information	Explanation	Data identifier	Number of digits incl. data identifier	Example
1	Beckhoff order number	**Beckhoff order number**	1P	8	1P072222
2	Beckhoff Traceability Number (BTN)	**Unique serial number, see note below**	S	12	SBTNk4p562d7
3	Article description	**Beckhoff article description, e.g. EL1008**	1K	32	1KEL1809
4	Quantity	**Quantity in packaging unit, e.g. 1, 10, etc.**	Q	6	Q1
5	Batch number	Optional: Year and week of production	2P	14	2P401503180016
6	ID/serial number	Optional: Present-day serial number system, e.g. with safety products	51S	12	51S678294104
7	Variant number	Optional: Product variant number on the basis of standard products	30P	32	30PF971, 2*K183
...					

Further types of information and data identifiers are used by Beckhoff and serve internal processes.

Structure of the BIC

Example of composite information from item 1 to 4 and 6. The data identifiers are marked in red for better display:

BTN

An important component of the BIC is the Beckhoff Traceability Number (BTN, item no. 2). The BTN is a unique serial number consisting of eight characters that will replace all other serial number systems at Beckhoff in the long term (e.g. batch designations on IO components, previous serial number range for safety products, etc.). The BTN will also be introduced step by step, so it may happen that the BTN is not yet coded in the BIC.

NOTE

This information has been carefully prepared. However, the procedure described is constantly being further developed. We reserve the right to revise and change procedures and documentation at any time and without prior notice. No claims for changes can be made from the information, illustrations and descriptions in this information.

7.4 Support and Service

Beckhoff and their partners around the world offer comprehensive support and service, making available fast and competent assistance with all questions related to Beckhoff products and system solutions.

Beckhoff's branch offices and representatives

Please contact your Beckhoff branch office or representative for local support and service on Beckhoff products!

The addresses of Beckhoff's branch offices and representatives round the world can be found on her internet pages:
http://www.beckhoff.com

You will also find further documentation for Beckhoff components there.

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Beckhoff Support

Support offers you comprehensive technical assistance, helping you not only with the application of individual Beckhoff products, but also with other, wide-ranging services:

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- design, programming and commissioning of complex automation systems
- and extensive training program for Beckhoff system components

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Beckhoff Service

The Beckhoff Service Center supports you in all matters of after-sales service:

- on-site service
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- spare parts service
- hotline service

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