Documentation

EP2xxx

EtherCAT Box Modules with digital outputs

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BECKHOFF

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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

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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, DE102004044764, DE102007017835 with corresponding applications or registrations in various other countries.

The TwinCAT Technology is covered, including but not limited to the following patent applications and patents: EP0851348, US6167425 with corresponding applications or registrations in various other countries.

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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 symbols

In this documentation the following symbols are used with an accompanying safety instruction or note. The safety instructions must be read carefully and followed without fail!

 **DANGER**	**Serious risk of injury!** Failure to follow the safety instructions associated with this symbol directly endangers the life and health of persons.
 **WARNING**	**Risk of injury!** Failure to follow the safety instructions associated with this symbol endangers the life and health of persons.
 **CAUTION**	**Personal injuries!** Failure to follow the safety instructions associated with this symbol can lead to injuries to persons.
 **Attention**	**Damage to the environment or devices** Failure to follow the instructions associated with this symbol can lead to damage to the environment or equipment.
 **Note**	**Tip or pointer** This symbol indicates information that contributes to better understanding.

1.3 Documentation issue status

Version	Comment
2.8.0	• EP2817-0008 – Introduction updated • EP2817-0008 – Technical data updated • EP2xxx – Module overview updated
2.7.0	• EP2316-0008 – Process image updated • EP2816-0004 – Process image updated • EP2816-0008 – Process image updated • EP2816-0010 – Process image updated • EP2316-0008, EPP2316-0008 – Configuration updated
2.6.1	• Chapter EP2316-0008, EPP2316-0008 – Configuration updated
2.6.0	• Chapter Digital In-/Outputs M8 and M12 added
2.5.0	• EP2038-000x – Technical data updated
2.4.0	• Conductor losses 7/8” added
2.3.0	• Figure *torque socket wrench* updated • Power Connection updated
2.2.0	• EP2008-0022 added • EP2038-000x added • EP2816-0004 added • EP2349-002x added
2.1.0	• EP2328-0001 added • Technical data updated • Nut torque for connectors extended
2.0.0	• Migration • Technical data updated
1.5.0	• EP2817-0008 added
1.4.0	• EP2316-0003: description of status LEDs updated • EP2809-0021 and EP2809-0022 updated • Overview of EtherCAT cables extended • Mounting notes for BG2000-0000 protection enclosure overworked • Chapter accessories added • EP2028-0032 added • Definitions for the behavior of the outputs in the presence of a short-circuit updated
1.3.0	• ATEX Notes added • Extended temperature range documented for approved modules • EP2316-0003 , EP2809-0021 and EP2809-0022 added • description of power connection updated • description of sensor supply by EP2338 corrected • technical data of 2624-0002 updated • object descriptions for EP2316-0008 and EP2816-0008 / EP2816-0010 added • Overview of EtherCAT cables extended
1.2.0	• EP2308-0002 and EP2624-0002 added • introduction for EP2338-000x updated • technical data: current consumptions added • nut torque for connectors added
1.1.0	• notes about sensor supply corrected
1.0.0	• technical data updated • signal connection updated
0.7	• signal connection extended • description of status LEDs added • explanation of serial number adapted to new standard
0.6	• EP2316-0008 added • EP2338-0001 and EP2338-0002 added • signal connection extended
0.5	• first preliminary version

Firm and hardware version

The documentation refers to the firm and hardware status that was valid at the time it was prepared.

The properties of the modules are subject to continuous development and improvement. Modules having earlier production statuses cannot have the same properties as modules with the latest status. Existing properties, however, are always retained and are not changed, so that these modules can always be replaced by new ones.

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

Syntax of the batch number (D number)

D: WW YY FF HH

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

Example with D No. 29 10 02 01:

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

2 Product overview

2.1 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.

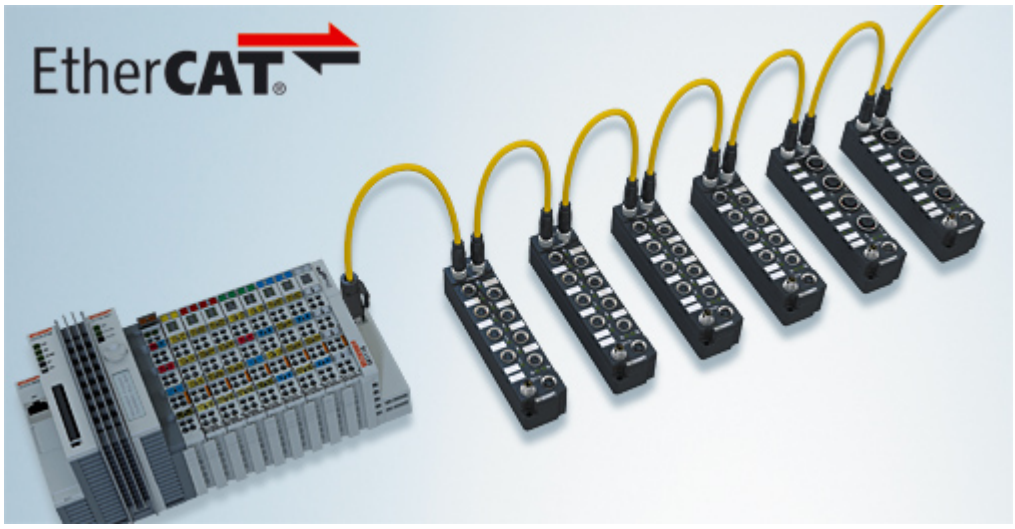


Fig. 1: EtherCAT Box Modules within an EtherCAT network

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

Note	**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.

Note	**XML files** 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.

2.2 EP2xxx Module overview

Digital output modules

Module	Signal connection	Number of outputs	Current	Comment
EP2008-0001 [▶ 16]	8 x M8	8	0.5 A	Maximum of the total of all outputs 4 A
EP2008-0002 [▶ 16]	4 x M12	8	0.5 A	Maximum of the total of all outputs 4 A
EP2008-0022 [▶ 16]	8 x M12	8	0.5 A	Maximum of the total of all outputs 4 A
EP2028-0001 [▶ 20]	8 x M8	8	2.0 A (Σ 4 A)	Maximum of the total of all outputs 4 A
EP2028-0002 [▶ 20]	4 x M12	8	2.0 A (Σ 4 A)	Maximum of the total of all outputs 4 A
EP2028-0032 [▶ 23]	8 x M12	8	2.8 A (Σ 16 A)	Maximum of the total of all outputs 16 A
EP2038-0001 [▶ 26]	8 x M8	8	2.0 A (Σ 4 A)	Maximum of the total of all outputs 4 A
EP2038-0002 [▶ 26]	4 x M12	8	2.0 A (Σ 4 A)	Maximum of the total of all outputs 4 A
EP2624-0002 [▶ 55]	4 x M12	4	0.5 A_{AC} / 2 A_{DC}	Relay module with 4 make contacts
EP2809-0021 [▶ 58]	16 x M8	16	0.5 A (Σ 4 A)	wide body
EP2809-0022 [▶ 59]	16 x M12	16	0.5 A (Σ 4 A)	wide body
EP2816-0004 [▶ 62]	1 x M16, 19-pin	16	0.5 A (Σ 4 A)	Maximum of the total of all outputs 4 A
EP2816-0008 [▶ 68]	1 x D-Sub 25	16	0.5 A (Σ 4 A)	Maximum of the total of all outputs 4 A
EP2816-0010 [▶ 74]	2 x D-Sub 8	16	0.5 A (Σ 4 A)	Maximum of the total of all outputs 4 A
EP2817-0008 [▶ 80]	1 x D-Sub 25	24	0.5 A (Σ 4 A)	Maximum of the total of all outputs 4 A

Digital combination modules

Module	Signal connection	Number of outputs	Current	Number of inputs	Filter
EP2308-0001 [▶ 30]	8 x M8	4	0.5 A	4	3.0 ms
EP2308-0002 [▶ 30]	4 x M12	4	0.5 A	4	3.0 ms
EP2316-0003 [▶ 34]	2 x ZS2001	8	0.5 A	8	10 µs
EP2316-0008 [▶ 35]	1 x D-Sub 25	8	0.5 A	8	10 µs
EP2318-0001 [▶ 30]	8 x M8	4	0.5 A	4	10 µs
EP2318-0002 [▶ 30]	4 x M12	4	0.5 A	4	10 µs
EP2328-0001 [▶ 30]	4 x M8	4	2.0 A (Σ 4 A)	4	3.0 ms
EP2328-0002 [▶ 30]	4 x M12	4	2.0 A (Σ 4 A)	4	3.0 ms
EP2338-0001 [▶ 41]	8 x M8	0 to 8	0.5 A (Σ 4 A)	8 to 0	10 µs
EP2338-0002 [▶ 41]	4 x M12	0 to 8	0.5 A (Σ 4 A)	8 to 0	10 µs
EP2339-0021 [▶ 46]	16 x M8	0 to 16	0.5 A (Σ 4 A)	16 to 0	3.0 ms
EP2339-0022 [▶ 47]	8 x M12	0 to 16	0.5 A (Σ 4 A)	16 to 0	3.0 ms
EP2349-0021 [▶ 51]	16 x M8	0 to 16	0.5 A (Σ 4 A)	16 to 0	10 µs
EP2349-0022 [▶ 51]	8 x M12	0 to 16	0.5 A (Σ 4 A)	16 to 0	10 µs

2.3 EP2008-00xx

2.3.1 EP2008 - Introduction

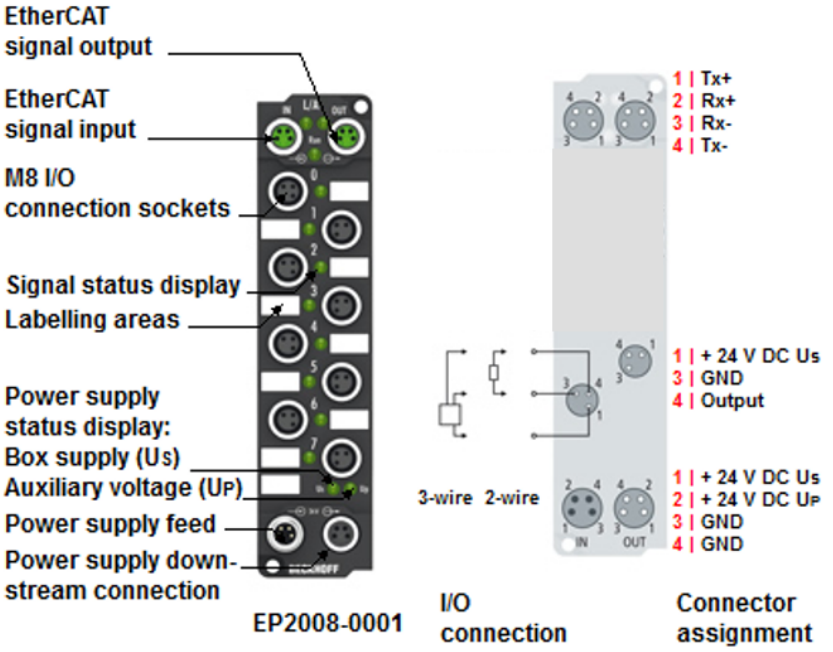


Fig. 4: EP2008-0001

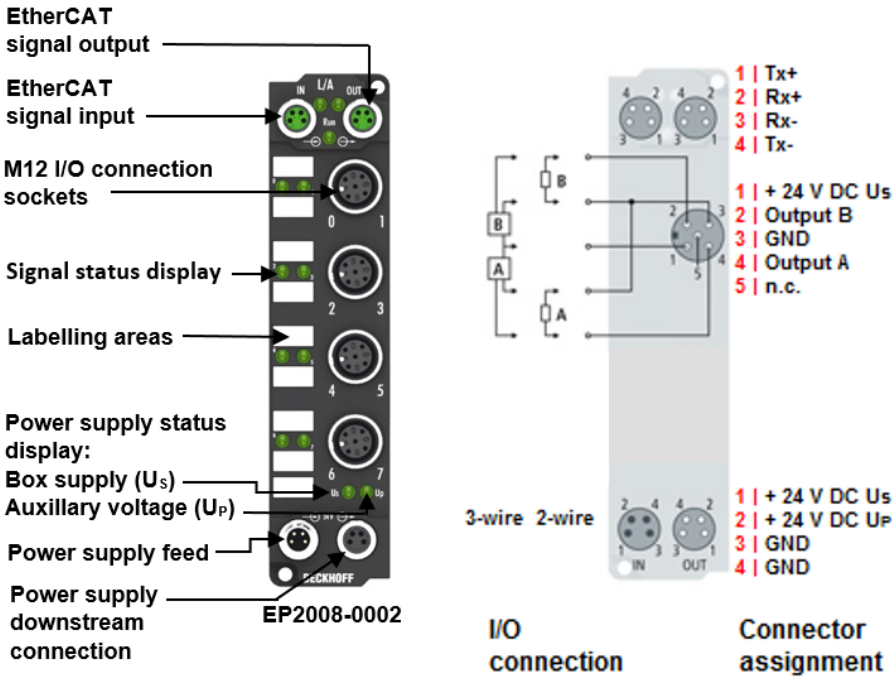


Fig. 5: EP2008-0002

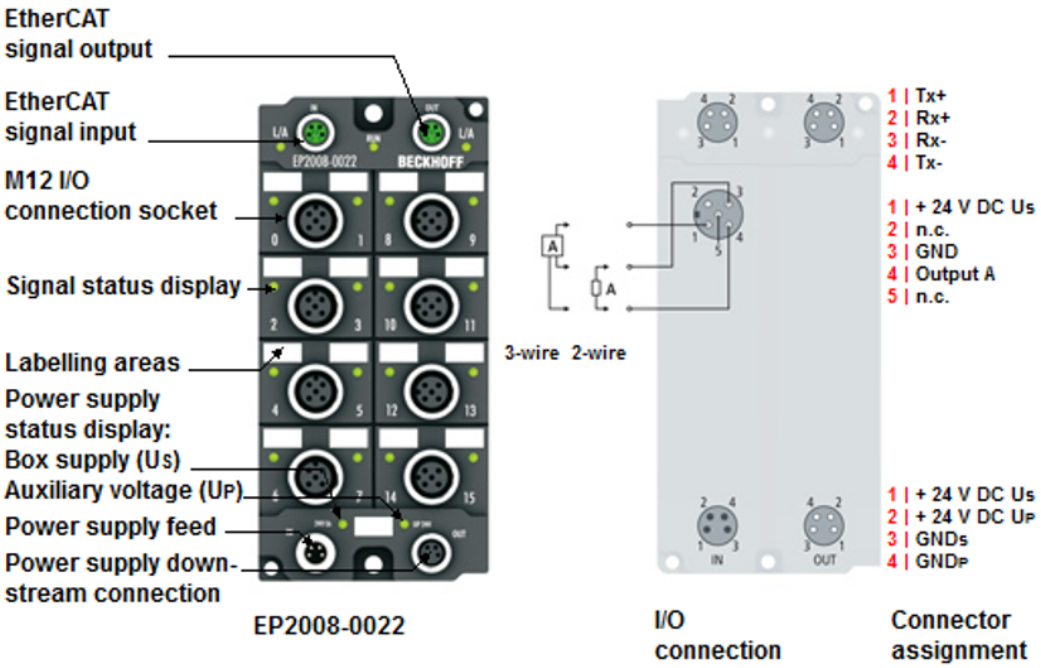


Fig. 6: EP2008-0022

8 digital outputs 24 V_{DC}, I_{max} 0.5 A

The EP2008 EtherCAT Box with digital outputs connects binary control signals from the controller to the actuators at the process level. The 8 outputs handle load currents of up to 0.5 A, and indicate their status through light emitting diodes.

The signals are connected optionally via M8 connectors (EP2008-0001) or M12 connectors (EP2008-0002, EP2008-0022). The outputs are short-circuit proof and protected against inverse connection.

Quick links

Installation [▶ 86]

UL Requirements [▶ 99] for UL approved modules

ATEX - Special conditions [▶ 100] for ATEX approved modules

2.3.2 EP2008 - Technical data

Technical data	EP2008-0001	EP2008-0002	EP2008-0022
Fieldbus	EtherCAT		
Fieldbus connection	2 x M8 socket (green)		
Number of outputs	8		
Output connections [▶ 103]	M8	M12	M12
Load type	ohmic, inductive, lamp load		
Rated output voltage	24 V_{DC} (-15%/+20%)		
Output current	max. 0.5 A each channel		
Short circuit current	typically 1.5 A		
Module electronic supply	derived from control voltage Us		
Module electronic current consumption	typically 120 mA		
Output driver supply	derived from load voltage Up		
Output driver current consumption	typically 8 mA per channel		
Power supply connection	Feed: 1 x M8 plug, 4-pin Onward connection: 1 x M8 socket, 4-pin		
Process image	8 output bits		
Electrical isolation	Control voltage/fieldbus: yes		
Permissible ambient temperature during operation	-25°C ... +60°C 0°C ... +55°C (according to cULus, see UL Requirements [▶ 99]) 0°C ... +55°C (according to ATEX, see special conditions [▶ 100])		
Permissible ambient temperature during storage	-40°C ... +85°C		
Vibration / shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27, EN 60068-2-29		
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, cULus, ATEX		

2.3.3 EP2008-000x - Process image

Channel 1 to Channel 8

You will find the 8 digital outputs from the module (here using the EP2008-0001 as an example) under **Channel 1 to Channel 8**.

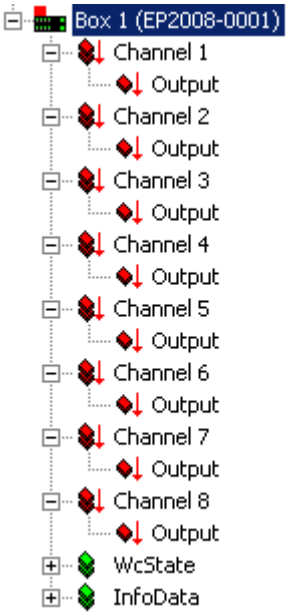


Fig. 7: EP2008-000x, Process image

2.4 EP2028-000x

2.4.1 EP2028 - Introduction

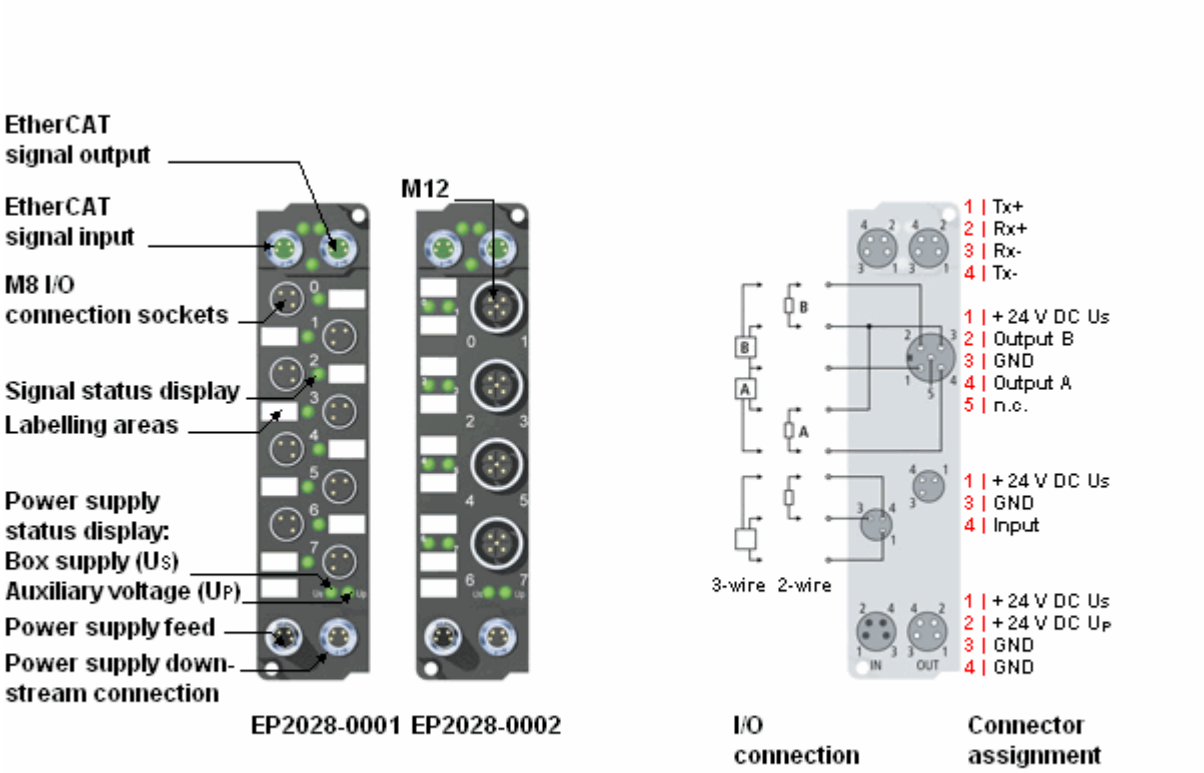


Fig. 8: EP2028

8 digital outputs 24 V_{DC}, I_{max} 2 A (Σ 4 A)

The EP2028 EtherCAT Box with digital outputs connects binary control signals from the controller to the actuators at the process level. The 8 outputs handle load currents of up to 2 A each, although the total current is limited to 4 A. This makes these modules particularly suitable for applications in which not all of the outputs are active at the same time, or in which not all of the actuators draw 2 A signal current.

The signal state is indicated by means of light emitting diodes. The signals are connected optionally via M8 connectors (EP2028-0001) or M12 connectors (EP2028-0002). The outputs are short-circuit proof and protected against inverse connection.

Quick links

Installation [▶ 86]

UL Requirements [▶ 99] for UL approved modules

ATEX - Special conditions [▶ 100] for ATEX approved modules

2.4.2 EP2028 - Technical data

Technical data	EP2028-0001	EP2028-0002
Fieldbus	EtherCAT	
Fieldbus connection	2 x M8 socket (green)	
Number of outputs	8	
Output connections [▶ 103]	M8	M12
Load type	ohmic, inductive, lamp load	
Rated output voltage	24 V_{DC} (-15%/+20%)	
Output current	max. 2.0 A each channel, total current of all outputs max. 4 A	
Short circuit current	max. 4.0 A	
Module electronic supply	derived from control voltage Us	
Module electronic current consumption	typically 120 mA	
Output driver supply	derived from load voltage Up	
Output driver current consumption	typically 8 mA per channel	
Power supply connection	Feed: 1 x M8 plug, 4-pin Onward connection: 1 x M8 socket, 4-pin	
Process image	8 output bits	
Electrical isolation	Control voltage/fieldbus: yes	
Permissible ambient temperature during operation	-25°C ... +60°C 0°C ... +55°C (according to cULus, see UL Requirements [▶ 99]) 0°C ... +55°C (according to ATEX, see special conditions [▶ 100])	
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, cULus, ATEX	

2.4.3 EP2028-000x - Process image

Channel 1 to Channel 8

You will find the 8 digital outputs from the module (here using the EP2028-0001 as an example) under **Channel 1 to Channel 8**.

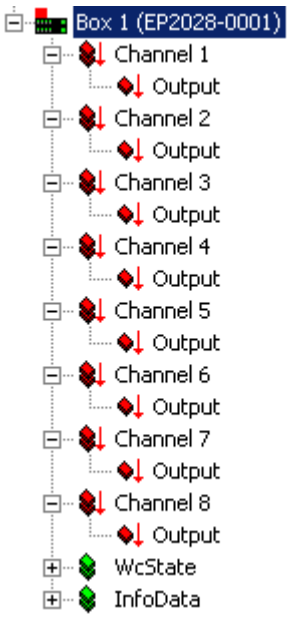


Fig. 9: EP2028-000x, Process image

2.5 EP2028-0032

2.5.1 EP2028-0032 - Introduction

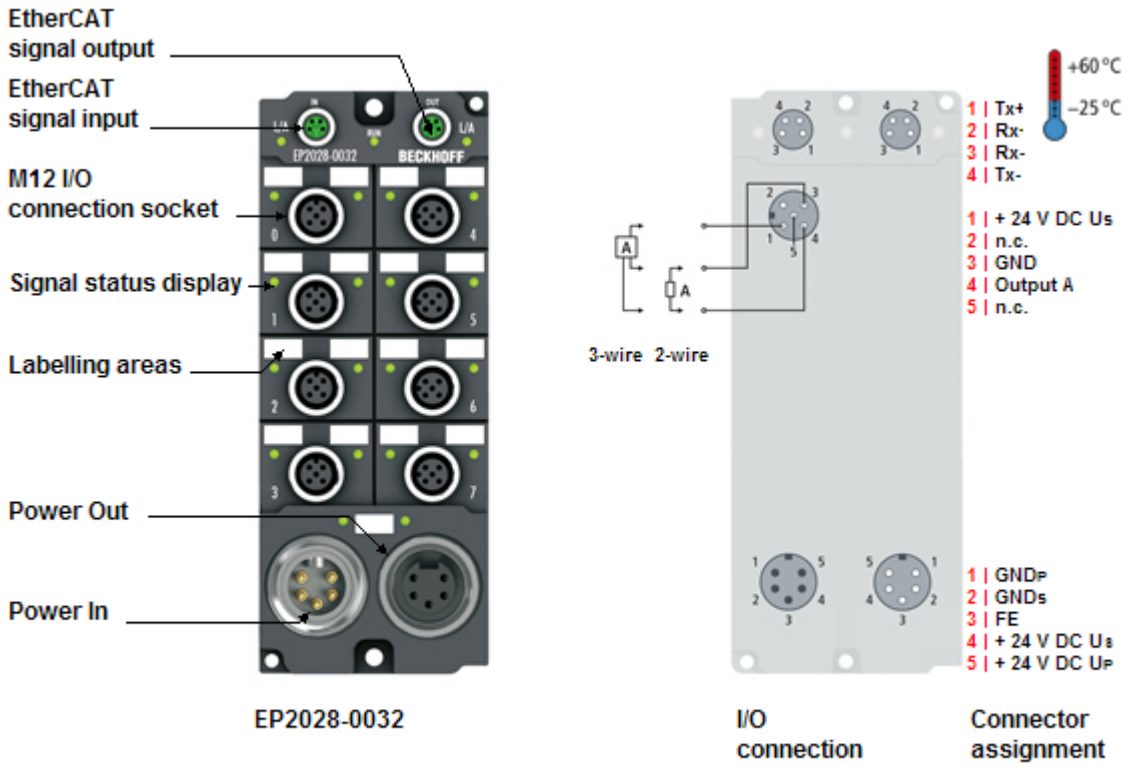


Fig. 10: EP2028-0032

8 digital outputs 24 V_{DC}, I_{max} 2.8 A (Σ 16 A)

The EP2028-0032 EtherCAT Box with digital outputs connects the binary control signals from the controller on to the actuators at the process level.

The eight outputs handle load currents of up to 2.8 A each, although the total current is limited to 16 A. Thence this modules are especially suitable for applications, at which a high utilization factor with high output current is necessary.

The signal state is indicated by means of light emitting diodes. The signals are connected via M12 type connectors. The outputs are short-circuit-proof and protected against inverse connection.

Pin 2 and 4 of channel 0 and 1, channel 2 and 3, channel 4 and 5 as well as channel 6 and 7 are connected. Therefore also actuators witch needs 2 outputs can be connected via one M12 cable.

Quick links

Conductor losses 7/8" [▶ 98]

Installation [▶ 86]

Actuator connection [▶ 104]

UL requirements [▶ 99] for UL approved modules

2.5.2 EP2028-0032 - Technical data

Technical data	EP2028-0032
Fieldbus	EtherCAT
Fieldbus connection	2 x M8 socket (green)
Number of outputs	8
Output connections [▶ 103]	M12
Load type	ohmic, inductive, lamp load
Rated output voltage	24 V_{DC} (-15%/+20%)
Output current	max. 2.8 A each channel, total current of all outputs max. 16 A
Short circuit current	maximal 4,0 A
Module electronic supply	derived from control voltage Us
Module electronic current consumption	typically 120 mA
Output driver supply	derived from load voltage Up
Output driver current consumption	typically 8 mA per channel
Power supply connection	Feed: 1 x 7/8" plug, 5-pin Onward connection: 1 x 7/8" socket, 5-pin
Process image	8 output bits
Electrical isolation	Control voltage / fieldbus: yes
Permissible ambient temperature during operation	-25°C ... +60°C 0°C ... +55°C (according to cULus, see UL-requirements [▶ 99])
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, cULus

2.5.3 EP2028-00xx - Process image

Channel 1 to Channel 8

Under **Channel 1 to Channel 8** you may find the 8 digital outputs of the module (here EP2028-0001 as an example).

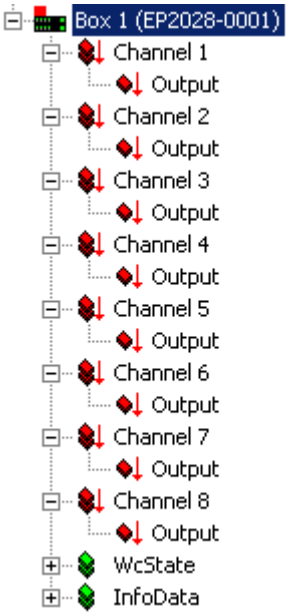


Fig. 11: EP2028-00xx, Process image

2.6 EP2038-000x

2.6.1 EP2038-000x - Introduction

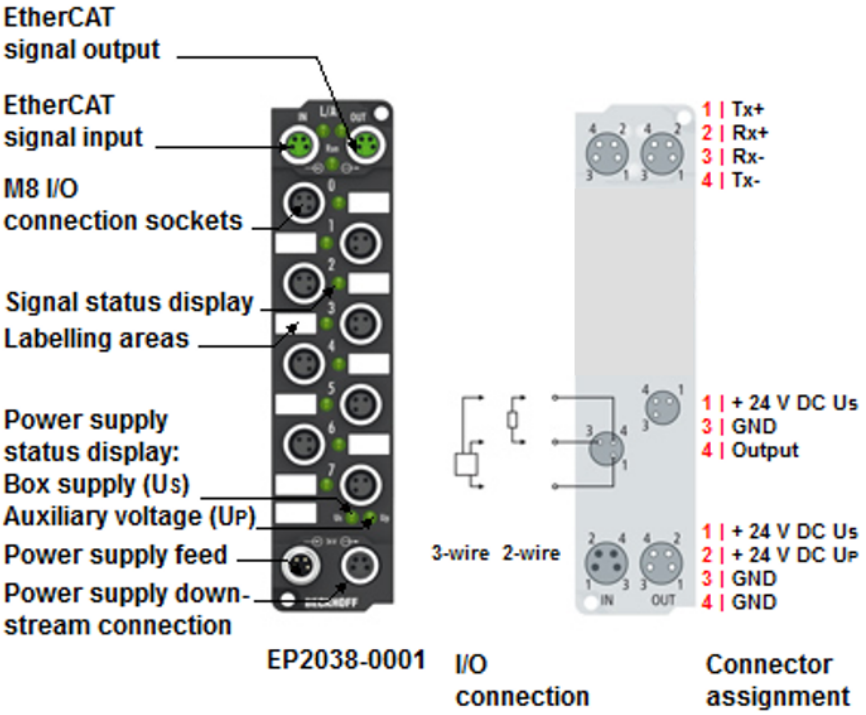


Fig. 12: EP2038-0001

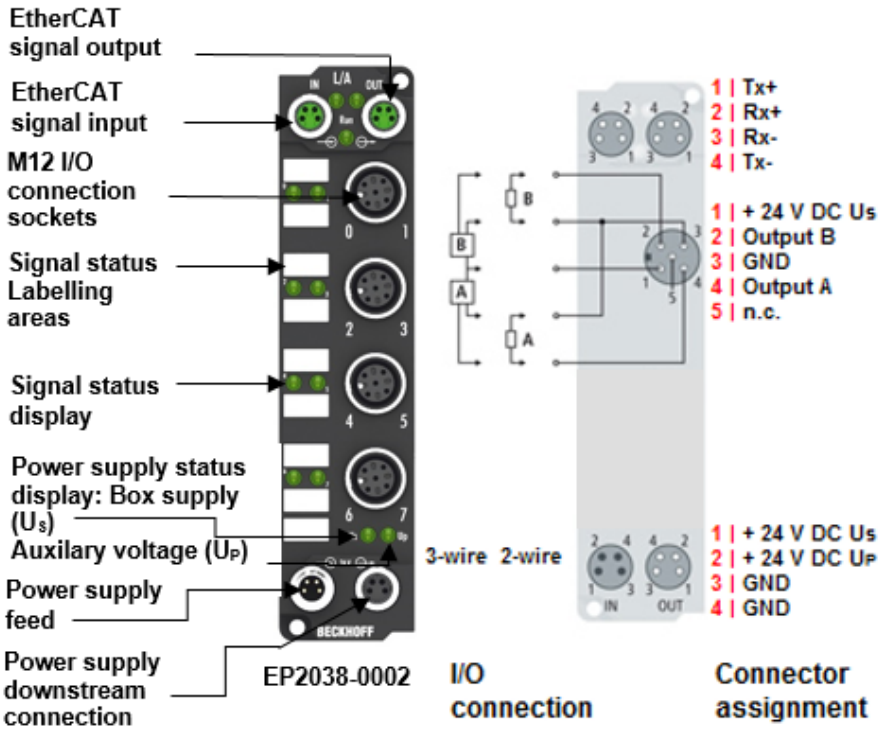


Fig. 13: EP2038-0002

8-channel digital output 24 V_{DC}, I_{MAX} 2 A (∑ 4 A), with diagnostics

The EP2038 EtherCAT Box with digital outputs connects binary control signals from the controller on to the actuators at the process level. The eight outputs handle load currents of up to 2 A each, although the total current is limited to 4 A. This makes these modules particularly suitable for applications in which not all of the outputs are active at the same time, or in which not all of the actuators draw 2 A signal current.

The signal state is indicated by means of light emitting diodes [▶ 28]. The EP2038 offers output diagnostics in the form of short circuit and open circuit detection per channel. The signals are optionally connected via M8 (EP2038-0001) or M12 (EP2038-0002) screw type connectors.

Quick-Links

Installation [▶ 86]

2.6.2 EP2038-000x - Technical data

Technical Data	EP2038-0001	EP2038-0002
Fieldbus	EtherCAT	
Fieldbus connection	2 x M8 socket (green)	
Number of outputs	8	
Output connections	M8	M12
Load type	ohmic, inductive, lamp load	
Rated output voltage	24 V_{DC} (-15 % / +20 %)	
Output current	max. 2 A each channel, total current of all outputs max. 4 A	
Auxiliary power current	typ. 20 mA + load	
Diagnosis	Short-circuit, open load detection (min. load > 200 mA)	
Module electronic supply	derived from control voltage Us	
Module electronic current consumption	typically 120 mA	
Short circuit current	max. 7 A	
Power supply connection	Feed: 1 x M8 plug, 4-pin Onward connection: 1 x M8 socket, 4-pin	
Bit width in the process image	8 outputs + 8 diagnostic inputs	
Electrical isolation	500 V	
Distributed clocks	-	
Weight	approx. 165 g	
Permissible ambient temperature during operation	-25°C ... +60°C	
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	

2.6.3 Status LEDs

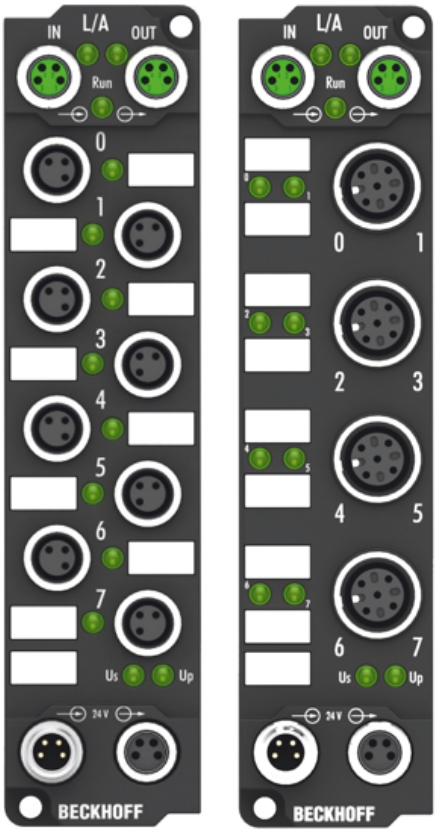


Fig. 14: EP2038-0001, EP2038-0002 - Status LEDs

LED-display

LED	Display	Meaning
STATUS 0-7	Green illuminated	The respective output is active
	Red illuminated	The respective output has an error
Us	off	The power supply voltage, U_S, is not present
	Green illuminated	The power supply voltage, U_S, is present
Up	off	The power supply voltage, U_P, is not present
	Green illuminated	The power supply voltage, U_P, is present

2.6.4 EP2038-0001 Process image

Channel 1 to Channel 8

Under **Diag Channel 1 to Diag Channel 8** are the diagnostic inputs of the 8 digital outputs of the module. Under **Channel 1 to Channel 8** are the 8 digital outputs of the module. (here as an example for the EP2038-0001)

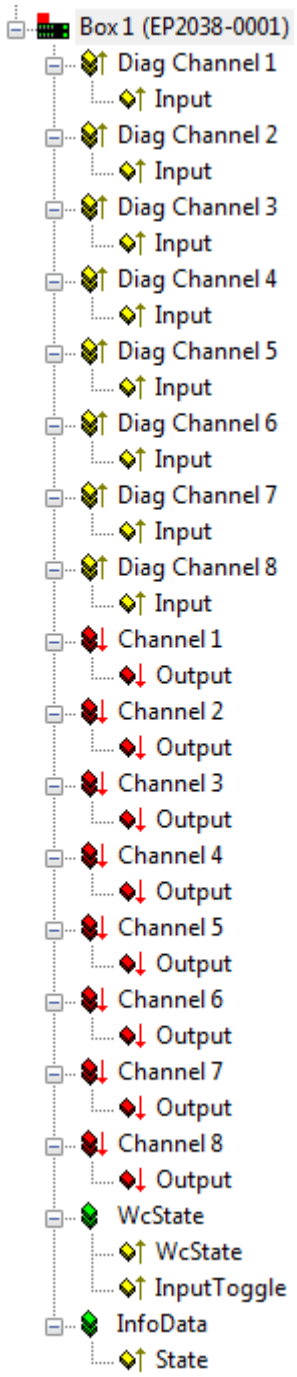


Fig. 15: EP2038-0001-Process image

2.7 EP2308, EP2318, EP2328

2.7.1 EP2308, EP2318, EP2328 - Introduction

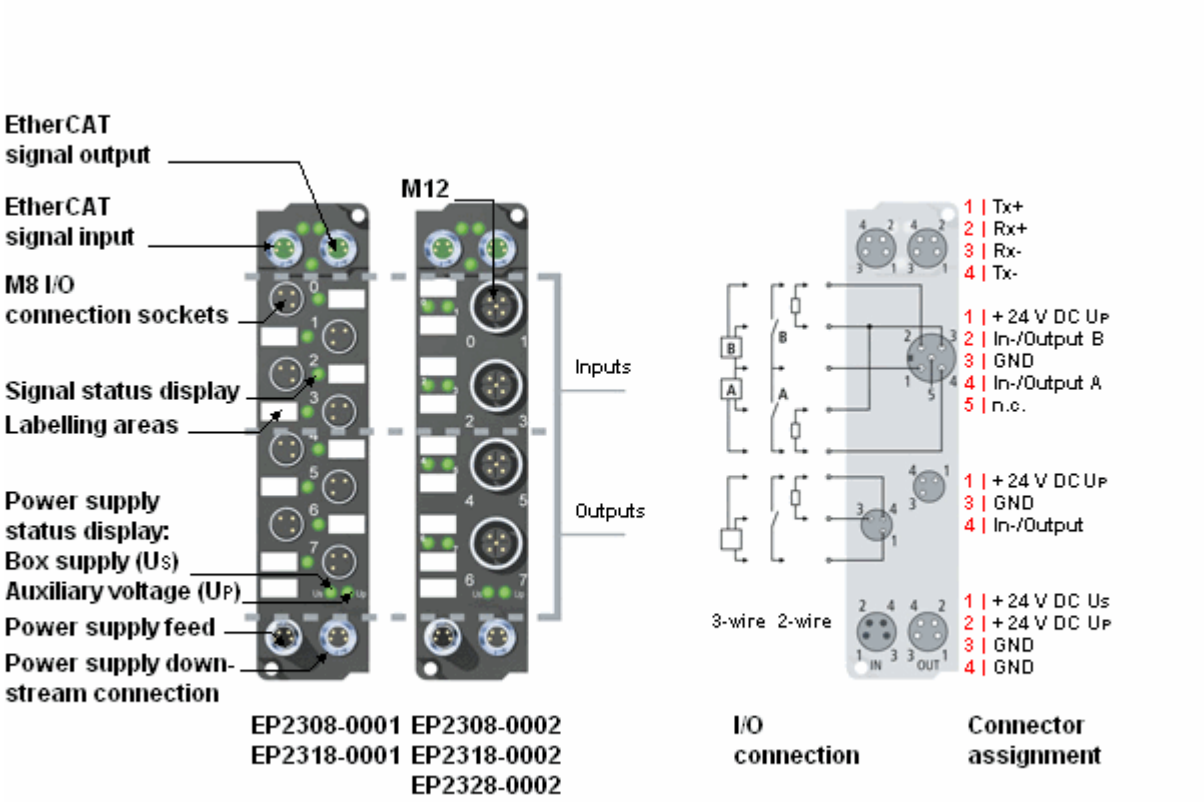


Fig. 16: EP2308, EP2318, EP2328

4 digital inputs, 24 V_{DC}, 4 digital outputs, 24 V_{DC}, I_{max} 0.5 A or 2 A

The EP2308 and EP2318 EtherCAT-Box modules combine four digital inputs and four digital outputs in one device.

The state of each signal is indicated by means of light emitting diodes. The signals are connected, optionally, via M8 connectors (EP23x8-0001) or M12 connectors (EP23x8-0002).

Various filter constants are available for the inputs. The outputs handle load currents of up to 0.5 A (EP2308, EP2318) or 2 A (EP2328), are short-circuit proof and protected against inverse polarity.

Quick links

Installation [▶ 86]

UL Requirements [▶ 99] for UL approved modules

ATEX - Special conditions [▶ 100] for ATEX approved modules

2.7.2 EP2308, EP2318 - Technical Data

Technical data	EP2308-0001	EP2308-0002	EP2318-0001	EP2318-0002
Fieldbus	EtherCAT			
Fieldbus connection	2 x M8 socket (green)			
Number of inputs	4			
Input connections [▶ 105]	M8	M12	M8	M12
Nominal input voltage	24 V_{DC} (-15%/+20%)			
Input filter	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)			
Sensor supply	derived from control voltage, max. 0.5 A total, short-circuit proof			
Number of outputs	4			
Output connections [▶ 103]	M8	M12	M8	M12
Load type	ohmic, inductive, lamp load			
Rated output voltage	24 V_{DC} (-15%/+20%)			
Output current	max. 0.5 A each channel			
Short circuit current	max. 1.5 A			
Module electronic supply	derived from control voltage Us			
Module electronic current consumption	typically 120 mA			
Output driver supply	derived from load voltage Up			
Output driver current consumption	typically 8 mA per channel			
Power supply connection	Feed: 1 x M8 plug, 4-pin Onward connection: 1 x M8 socket, 4-pin			
Process image	4 input bits, 4 output bits			
Electrical isolation	Control voltage/fieldbus: yes			
Permissible ambient temperature during operation	-25°C ... +60°C 0°C ... +55°C (according to cULus, see UL Requirements) 0°C ... +55°C (according to ATEX, see special conditions [▶ 100])			
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, cULus, ATEX			

2.7.3 EP2328 - Technical Data

Technical data	EP2328-0001	EP2328-0002
Fieldbus	EtherCAT	
Fieldbus connection	2 x M8 socket (green)	
Number of inputs	4	
Input connections [▶ 105]	M8	M12
Nominal input voltage	24 V_{DC} (-15%/+20%)	
Input filter	3.0 ms	
"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)	
Sensor supply	derived from control voltage, max. 0.5 A total, short-circuit proof	
Number of outputs	4	
Output connections [▶ 103]	M8	M12
Load type	ohmic, inductive, lamp load	
Rated output voltage	24 V_{DC} (-15%/+20%)	
Output current	max. 2.0 A each channel, total current of all outputs max. 4.0 A	
Short circuit current	max. 4.0 A	
Module electronic supply	derived from control voltage Us	
Module electronic current consumption	typically 120 mA	
Output driver supply	derived from load voltage Up	
Output driver current consumption	typically 8 mA per channel	
Power supply connection	Feed: 1 x M8 plug, 4-pin Onward connection: 1 x M8 socket, 4-pin	
Process image	4 input bits, 4 output bits	
Electrical isolation	Control voltage/fieldbus: yes	
Permissible ambient temperature during operation	-25°C ... +60°C 0°C ... +55°C (according to cULus, see UL Requirements) 0°C ... +55°C (according to ATEX, see special conditions [▶ 100])	
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, cULus, ATEX	

2.7.4 EP2308-000x, EP2318-000x - Process image

Digital inputs

You will find the 4 digital inputs to the module (here using the EP2308-0001 as an example) under **Channel 1** to **Channel 4**

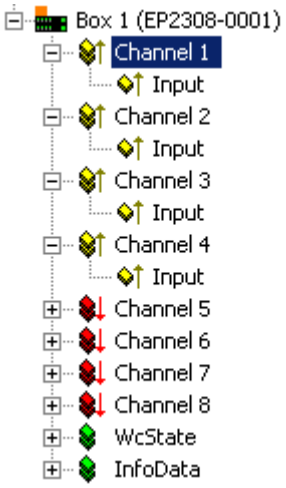


Fig. 17: EP2308-0001, Process image digital inputs

Digital outputs

You will find the 4 digital outputs to the module (here using the EP2308-0001 as an example) under **Channel 5** to **Channel 8**.

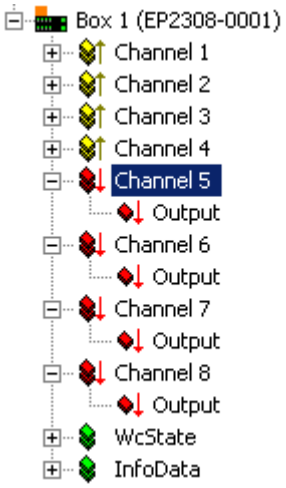


Fig. 18: EP2308-0001, Process image digital outputs

2.8 EP2316-0003, EP2316-0008

2.8.1 EP2316-0003 - Introduction

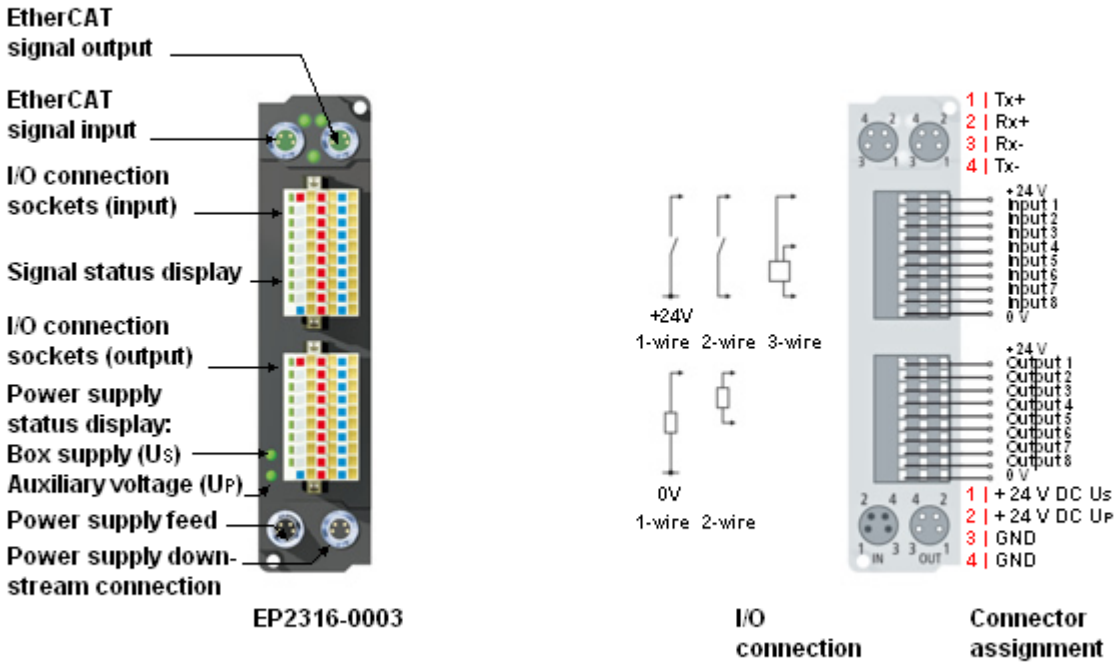


Fig. 19: EP2316-0003

8 digital inputs, 24 V_{DC}, 8 digital outputs, 24 V_{DC}, I_{max} 0.5 A

The EP2316 EtherCAT Box combines eight digital inputs and eight digital outputs in one device. The inputs are available with a 10 µs filter constant.

The outputs handle load currents of up to 0.5 A, are short-circuit proof and protected against inverse polarity. Signal state and status are indicated by means of light emitting diodes.

For the signal connection two ZS2001 connectors [▶ 112] with a spring-loaded system are used, optionally available with 1 or 3 pins. The module is supplied without connectors.

Quick links

Installation [▶ 86]

Configuration [▶ 127]

2.8.2 EP2316-0008 - Introduction

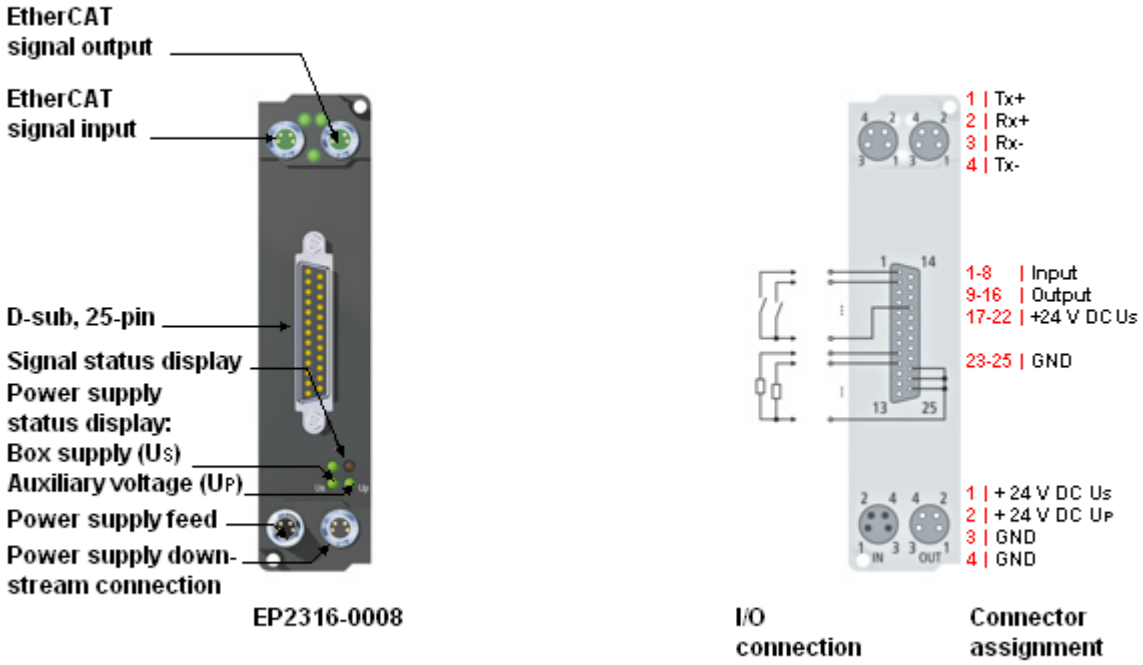


Fig. 20: EP2316-0008

8 digital inputs, 24 V_{DC}, 8 digital outputs, 24 V_{DC}, I_{max} 0.5 A

The EP2316 EtherCAT Box combines eight digital inputs and eight digital outputs in one device. The inputs are available with a 10 µs filter constant.

The outputs handle load currents of up to 0.5 A, are short-circuit proof and protected against inverse polarity.

The signal connection is made through a 25-pin sub-D socket.

The signal state and the status are displayed in groups by light emitting diodes.

Quick links

Installation [▶ 86]

Configuration [▶ 127]

UL Requirements [▶ 99] for UL approved modules

2.8.3 EP2316-000x - Technical Data

Technical data		EP2316-0003	EP2316-0008
Fieldbus		EtherCAT	
Fieldbus connection		2 x M8 socket (green)	
Number of inputs		8	
Input connections		ZS2001 Connector [▶ 111]	25 pin SUB-D socket (pins 1 - 8) [▶ 110]
Nominal input voltage		24 V_{DC} (-15%/+20%)	
Input filter		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)	
Sensor supply		derived from control voltage, max. 0.5 A total, short-circuit proof	
Number of outputs		8	
Output connections		ZS2001 Connector [▶ 111]	25 pin SUB-D socket (pins 9 - 16) [▶ 110]
Load type		ohmic, inductive, lamp load	
Rated output voltage		24 V_{DC} (-15%/+20%)	
Output current		max. 0.5 A each channel, individually short-circuit proof, total current of all outputs max. 4 A	
Short circuit current		max. 1.5 A	
Module electronic supply		derived from control voltage Us	
Module electronic current consumption		typically 120 mA	
Output driver supply		derived from load voltage Up	
Output driver current consumption		max. 30 mA for all channels	
Power supply connection		Feed: 1 x M8 plug, 4-pin Onward connection: 1 x M8 socket, 4-pin	
Process image	Process data	8 input bits, 8 output bits	
	Diagnostic	8 diagnostic input bits	
Electrical isolation		Control voltage/fieldbus: yes	
Permissible ambient temperature during operation		-25°C ... +60°C	-25°C ... +60°C 0°C ... +55°C (according to cULus, see UL Requirements)
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		IP20	IP65, IP66, IP67 (conforms to EN 60529)
Installation position		variable	
Approvals		CE	CE, cULus

2.8.4 EP2316-0008 - Status LEDs

Fig. 21: EP2316-0008 - Status-LEDs

LED display

LED	Display	Meaning
STATUS 1-8	Green illuminated	A signal (24 V) is present at a least one of the inputs for channels 1-8
STATUS 9-16	Green illuminated	at least one of the outputs for channel 9-16 is set
	Red illuminated	at least one of the outputs for channel 9-16 has a fault
Us	off	The power supply voltage, Us, is not present
	Green illuminated	The power supply voltage, Us, is present
Up	off	The power supply voltage, Up, is not present
	Green illuminated	The power supply voltage, Up, is present

2.8.5 EP2316-0008 - Process image

DIG Inputs

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

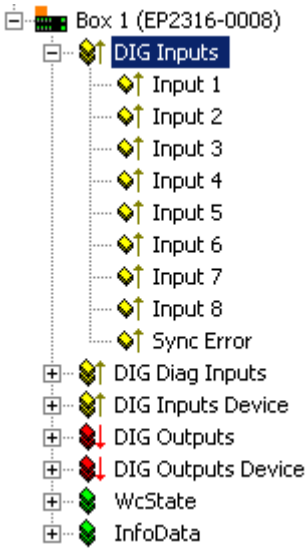


Fig. 22: EP2316-0008, DIG Inputs

DIG Diag Inputs

You will find the diagnostic inputs for the module's 8 digital outputs under **DIG Diag Inputs**.

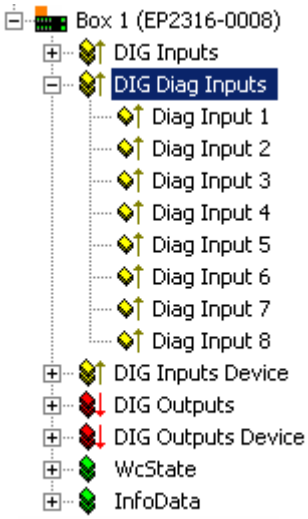


Fig. 23: EP2316-0008, DIG Diag Inputs

Diag Input n

Displays an error at output n.

DIG Inputs Device

You will find the module's status inputs under **DIG Inputs Device**.

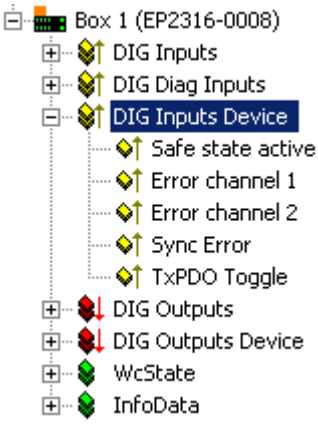


Fig. 24: EP2316-0008, DIG Inputs Device

Safe state active

Displays that the save state is active. The display works only if the network transmits process data, that means only in the network states Safe-Operational (Safe-OP) und Operational (OP), but not in the network state INIT.

Error channel X

Displays an error at channel X.

Sync Error

See EtherCAT System Documentation. The EtherCAT System Documentation is available for download at the Beckhoff Homepage.

TxPDO Toggle

See EtherCAT System Documentation.

DIG Outputs

You will find the 8 digital outputs of the module under **DIG Outputs**.

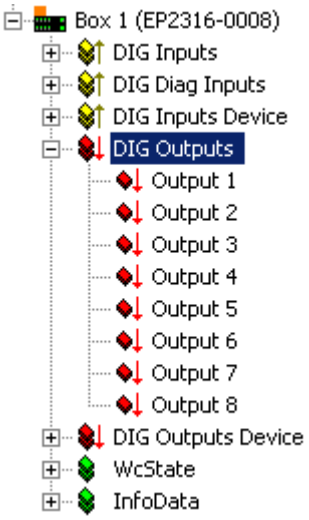


Fig. 25: EP2316-0008, DIG Outputs

DIG Outputs Device

You will find the module's control outputs under **DIG Outputs Device**.

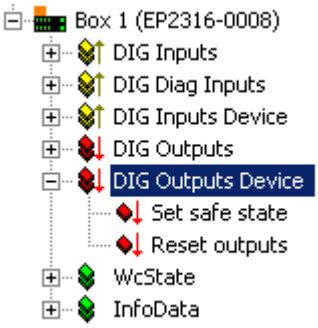


Fig. 26: EP2316-0008, DIG Outputs Device

Set safe state

Sets the module to safe state.

Reset outputs

Resets bits „Error channel X“ of the module. The outputs are activated again.

2.9 EP2338-x00x

2.9.1 EP2338 - Introduction

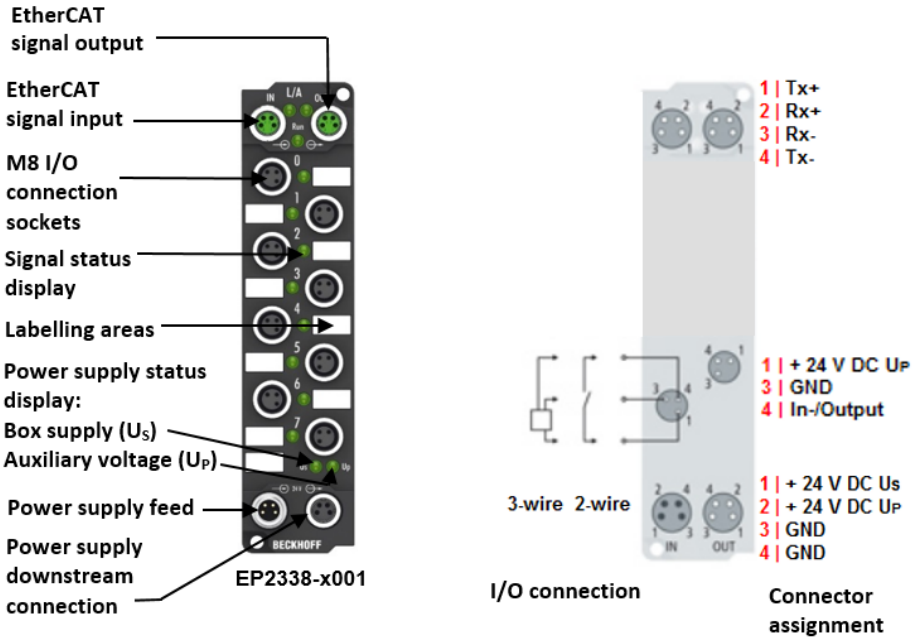


Fig. 27: EP2338-0001, EP2338-1001

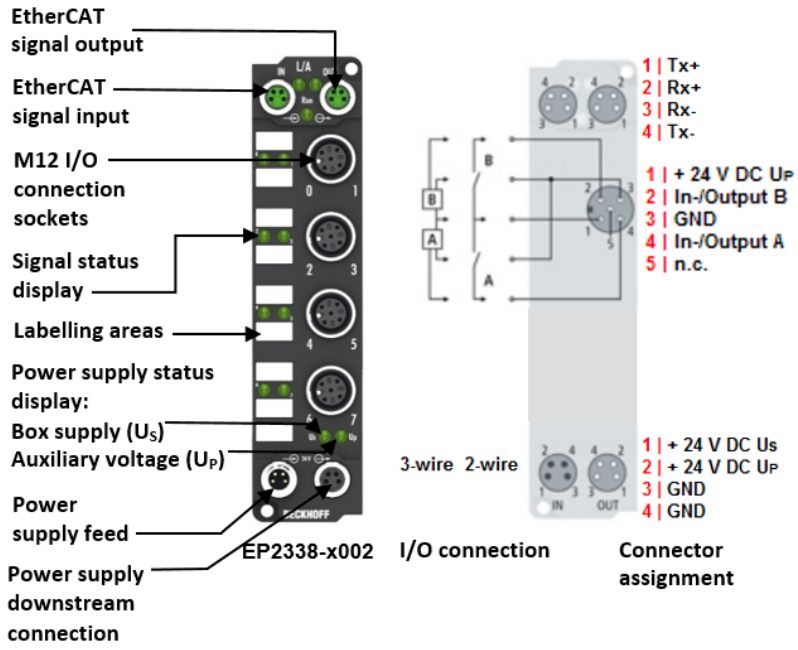


Fig. 28: EP2338-0002, EP2338-1002

8 digital in or outputs, 24 V_{DC}

The EP2338 EtherCAT Box has eight digital channels, each of which can optionally be operated as an input or as an output. A configuration if a channel should be used as input or as an output is not necessary; the input circuit is internally connected to the output driver, so a set output is displayed automatically to the input process image.

The outputs handle load currents of up to 0.5 A, are short-circuit proof and protected against inverse polarity.

The filter constant of the inputs is 10 µs (EP2338-0001, EP2338-0002) or the filter constant is 3 ms (EP2338-1001, EP2338-1002).

The state of each signal is indicated by means of light emitting diodes. The signals are connected, optionally, via M8 connectors (EP2338-x001) or M12 connectors (EP2338-x002).

Note	**The connected sensors are powered via Up, not from Us** The EtherCAT Box EP2338 supplies digital sensors in contrast to many other modules from the auxiliary voltage Up, not from the Control voltage Us! This happens because the connectors can be used alternatively as input or as output. Anyway an overload of the sensor supply (current > 0.5 A) is here also displayed by red shining of the LED Us.

Attention	**For switch off in the event of a fault do no external sensor power supply** If the design of your installation is such that the power supply voltage Up is switched off in the event of a fault, you must not power the connected sensors externally, but only through the EP23x8! Otherwise, when the Up energy is switched off, the EP23x8 can continue to draw energy from the external sensor power supply, and the outputs will not be switched off!

Quick links

Installation [▶ 86]

UL Requirements [▶ 99] for UL approved modules

ATEX - Special conditions [▶ 100] for ATEX approved modules

2.9.2 EP2338 - Technical Data

Technical data	EP2338-0001	EP2338-1001	EP2338-0002	EP2338-1002
Fieldbus	EtherCAT			
Fieldbus connection	2 x M8 socket (green)			
Number of outputs	8 to 0			
Output connections [▶ 106]	M8		M12	
Load type	ohmic, inductive, lamp load			
Rated output voltage	24 V_{DC} (-15%/+20%)			
Output current	max. 0.5 A each channel			
Short circuit current	max. 1.5 A			
Module electronic supply	derived from control voltage Us			
Module electronic current consumption	typically 120 mA			
Output driver supply	derived from load voltage Up			
Output driver current consumption	typically 20 mA			
Number of inputs	0 to 8			
Input connections [▶ 106]	M8		M12	
Nominal input voltage	24 V_{DC} (-15%/+20%)			
Input filter	10 µs	3 ms	10 µs	3 ms
"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)			
Sensor supply	derived from auxiliary voltage Up, 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, 8 output bits			
Electrical isolation	Control voltage/fieldbus: yes			
Permissible ambient temperature during operation	-25°C ... +60°C 0°C ... +55°C (according to cULus, see UL Requirements) 0°C ... +55°C (according to ATEX, see special conditions [▶ 100])			
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, cULus, ATEX			

2.9.3 EP2338-x00x - Process image

DI Inputs

You will find the 8 digital inputs to the module (here using the EP2338-0001 as an example) under **Channel 1** to **Channel 8**.

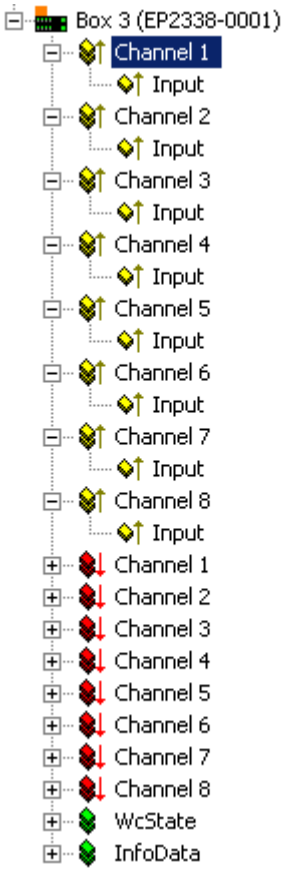


Fig. 29: EP2338-x00x, Process image, DI Inputs

DO Outputs

You will find the 8 digital outputs to the module (here using the EP2338-0001 as an example) under **Channel 1** to **Channel 8**.

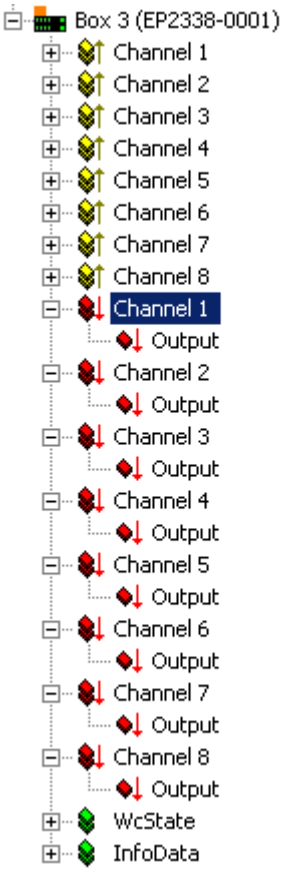


Fig. 30: EP2338-x00x, Process image, DO Outputs

2.10 EP2339-002x

2.10.1 EP2339-0021 - Introduction

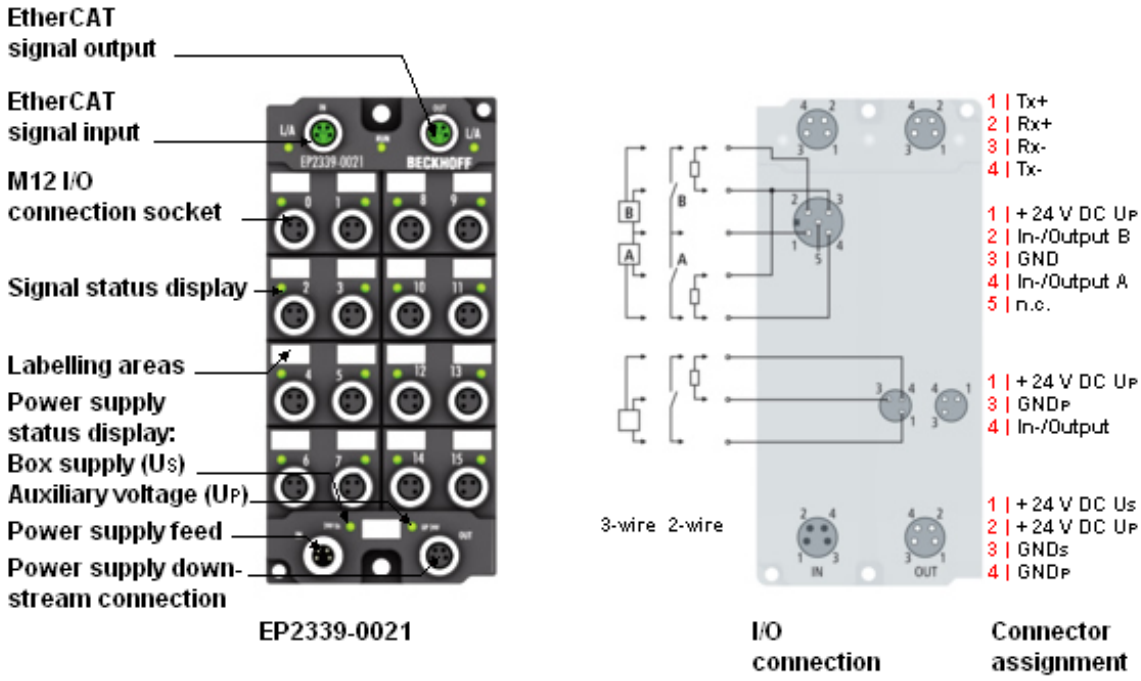


Fig. 31: EP2339-0021

16 digital in or outputs, 24 V_{DC}

The EP2339-0021 EtherCAT Box has 16 digital channels, each of which can optionally be operated as an input or as an output. A configuration if a channel should be used as input or as an output is not necessary; the input circuit is internally connected to the output driver, so a set output is displayed automatically to the input process image.

The outputs handle load currents of up to 0.5 A, are short-circuit proof and protected against inverse polarity.

The filter constant of the inputs is 3 ms.

The state of each signal is indicated by means of light emitting diodes. The signals are connected via M8 connectors.

Note	**The connected sensors are powered via Up, not from Us** The EtherCAT Box EP2339-0021 supplies digital sensors in contrast to many other modules from the auxiliary voltage Up, not from the Control voltage Us! This happens because the connectors can be used alternatively as input or as output. Anyway an overload of the sensor supply (current > 0,5 A) is here also displayed by red shining of the LED Us.

Attention	**For switch off in the event of a fault, do no external sensor power supply** If the design of your installation is such that the power supply voltage Up is switched off in the event of a fault, you must not power the connected sensors externally, but only through the EP2339-0021! Otherwise, when the Up energy is switched off, the EP2339-0021 can continue to draw energy from the external sensor power supply, and the outputs will not be switched off!

Quick links

Installation [▶ 86]

2.10.2 EP2339-0022 - Introduction

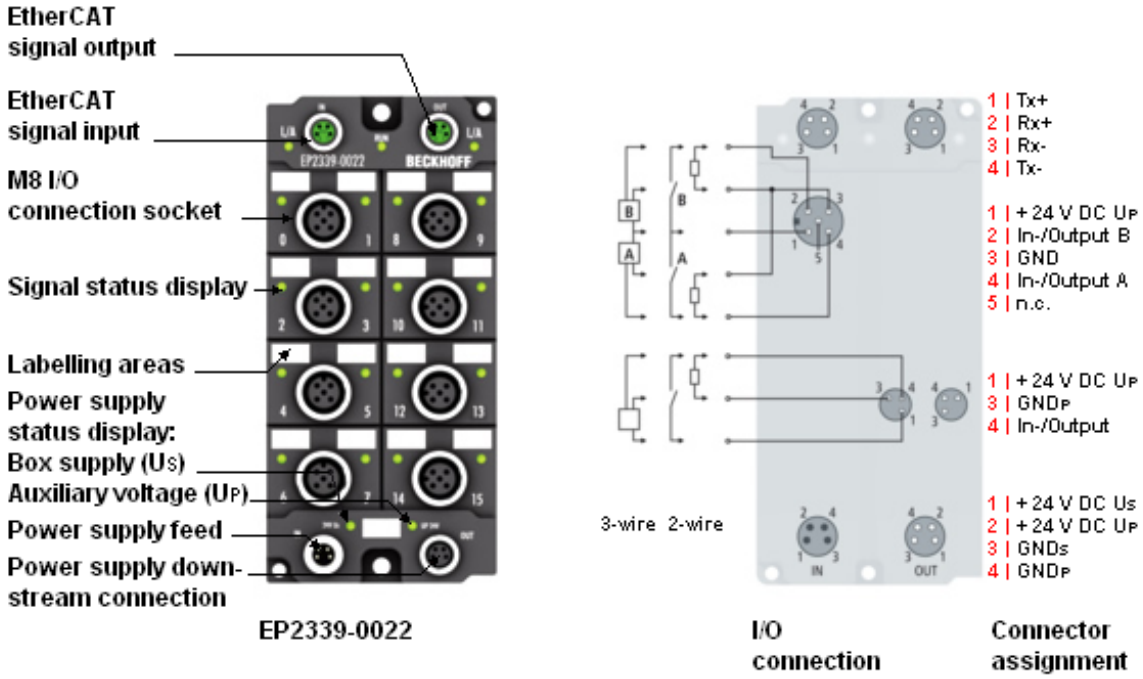


Fig. 32: EP2339-0022

16 digital in or outputs, 24 V_{DC}

The EP2339-0022 EtherCAT Box has 16 digital channels, each of which can optionally be operated as an input or as an output. A configuration if a channel should be used as input or as an output is not necessary; the input circuit is internally connected to the output driver, so a set output is displayed automatically to the input process image.

The outputs handle load currents of up to 0.5 A, are short-circuit proof and protected against inverse polarity.

The filter constant of the inputs is 3 ms.

The state of each signal is indicated by means of light emitting diodes. The signals are connected via M12 connectors.

Note	**The connected sensors are powered via Up, not from Us** The EtherCAT Box EP2339-0022 supplies digital sensors in contrast to many other modules from the auxiliary voltage Up, not from the Control voltage Us! This happens because the connectors can be used alternatively as input or as output. Anyway an overload of the sensor supply (current > 0.5 A) is here also displayed by red shining of the LED Us.

Attention	**For switch off in the event of a fault, do no external sensor power supply** If the design of your installation is such that the power supply voltage Up is switched off in the event of a fault, you must not power the connected sensors externally, but only through the EP2339-0022! Otherwise, when the Up energy is switched off, the EP2339-0022 can continue to draw energy from the external sensor power supply, and the outputs will not be switched off!

Quick links

Installation [▶ 86]

2.10.3 EP2339 - Technical Data

Technical data	EP2339-0021	EP2339-0022
Fieldbus	EtherCAT	
Fieldbus connection	2 x M8 socket (green)	
Number of outputs	16 to 0	
Output connections [▶ 106]	M8	M12
Load type	ohmic, inductive, lamp load	
Rated output voltage	24 V_{DC} (-15%/+20%)	
Output current	max. 0.5 A each channel	
Short circuit current	max. 1.5 A	
Module electronic supply	derived from control voltage Us	
Module electronic current consumption	typically 120 mA	
Output driver supply	derived from load voltage Up	
Output driver current consumption	typically 20 mA	
Number of inputs	0 to 16	
Input connections [▶ 106]	M8	M12
Nominal input voltage	24 V_{DC} (-15%/+20%)	
Input filter	3.0 ms	
"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)	
Sensor supply	derived from auxiliary voltage Up, 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, 16 output bits	
Electrical isolation	Control voltage/fieldbus: yes	
Permissible ambient temperature during operation	-25°C ... +60°C	
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	

2.10.4 EP2339-0021 - Process image

Inputs

You will find the 16 digital inputs to the module (here using the EP2339-0021 as an example) under **Channel 1 to Channel 16**.

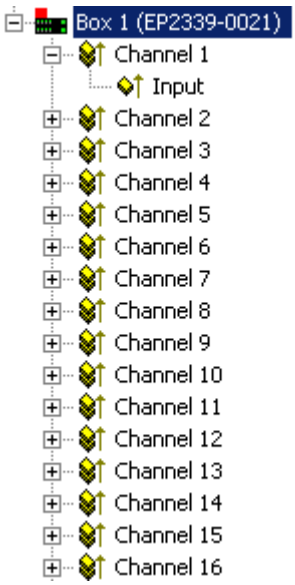


Fig. 33: EP2339-0021, Process image, Inputs

Outputs

You will find the 16 digital outputs to the module (here using the EP2339-0021 as an example) under **Channel 1 to Channel 16**.

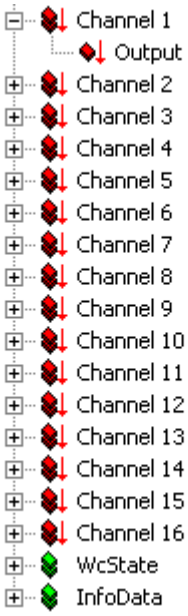


Fig. 34: EP2339-0021, Process image, Outputs

2.11 EP2349-002x

2.11.1 EP2349-002x - Introduction

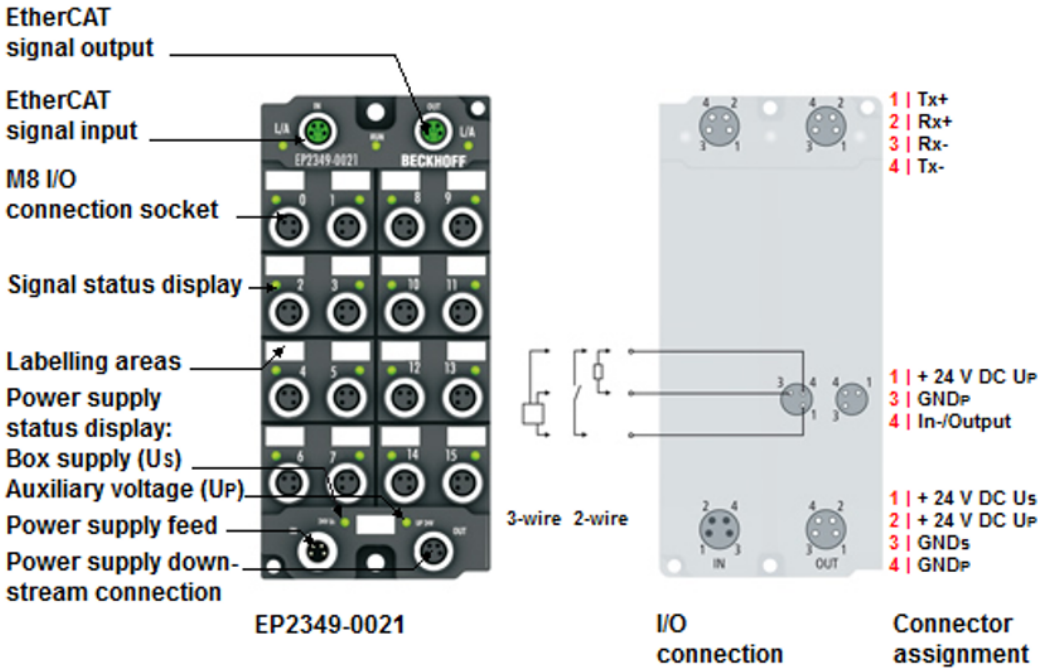


Fig. 35: EP2349-0021

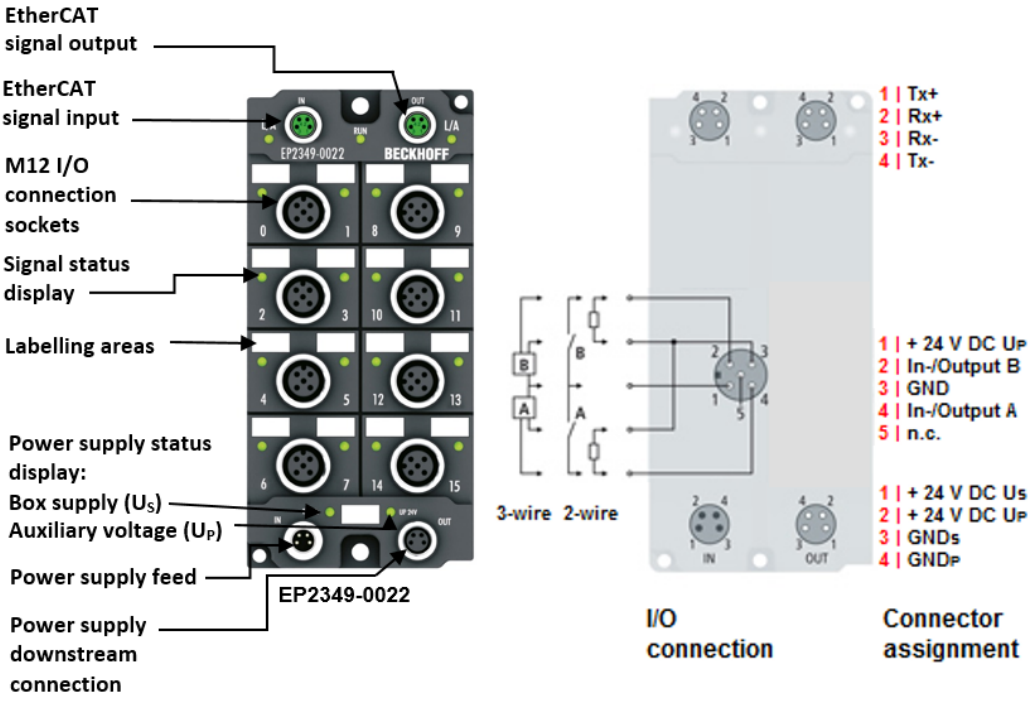


Fig. 36: EP2349-0022

16 digital in or outputs 24 V_{DC}, freely configurable, filter 10 µs

The EP2349 EtherCAT Box has 16 freely configurable digital inputs or outputs in one device. A filter constant of 10 µs is available for the inputs. The outputs are short-circuit-proof and protected against inverse polarity. They handle load currents of up to 0.5 A each, although the total current is limited to 4 A. The state of each signal is indicated by light emitting diodes. The signals are connected optionally via M8 (EP2349-0021) or M12 (EP2349-0022) screw type connectors. The sensors are powered by the load voltage UP.

Note	**The connected sensors are powered via Up, not from Us** The EtherCAT Box EP2349-002x supplies digital sensors in contrast to many other modules from the auxiliary voltage Up, not from the Control voltage Us! This happens because the connectors can be used alternatively as input or as output. Anyway an overload of the sensor supply (current > 0.5 A) is here also displayed by red shining of the LED Us.

Attention	**For switch off in the event of a fault, do no external sensor power supply** If the design of your installation is such that the power supply voltage Up is switched off in the event of a fault, you must not power the connected sensors externally, but only through the EP2349-002x! Otherwise, when the Up energy is switched off, the EP2349-002x can continue to draw energy from the external sensor power supply, and the outputs will not be switched off!

Quick links

Installation [▶ 86]

2.11.2 EP2349-002x – Technical data

Technical data	EP2349-0021	EP2349-0022
Fieldbus	EtherCAT	
Fieldbus connection	2 x M8 socket (green)	
Number of outputs	16 to 0	
Output connections [▶ 103]	M8	M12
Load type	ohmic, inductive, lamp load	
Rated output voltage	24 V_{DC} (-15%/+20%)	
Output current	max. 0.5 A each channel, individually short-circuit-proof, total current max. 4 A	
Short circuit current	max. 1.5 A	
Module electronic supply	derived from control voltage Us	
Module electronic current consumption	typically 130 mA	
Output driver supply	derived from load voltage Up	
Output driver current consumption	typically 20 mA	
Number of inputs	0 to 16	
Input connections [▶ 105]	M8	M12
Nominal input voltage	24 V_{DC} (-15%/+20%)	
Input filter	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 6 mA (EN 61131-2, Type 3)	
Sensor supply	derived from auxiliary voltage Up, 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, 16 output bits	
Electrical isolation	Control voltage/fieldbus: yes	
Weight	approx.. 250 g	
Permissible ambient temperature during operation	0°C ... +55°C	
Permissible ambient temperature during storage	-25°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	

2.11.3 EP2349-002x – Process image

Inputs

You will find the 16 digital inputs to the module (here using the EP2349-0021 as an example) under **Channel 1 to Channel 16**.

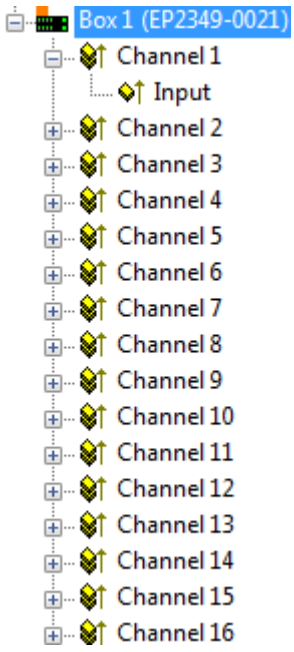


Fig. 37: EP2349-0021, Process image, Inputs

Outputs

You will find the 16 digital outputs to the module (here using the EP2349-0021 as an example) under **Channel 17 to Channel 32**.

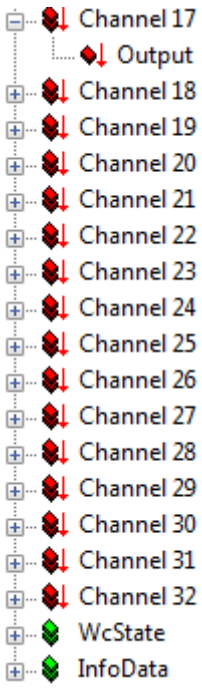


Fig. 38: EP2349-0021, Process image, Outputs

2.12 EP2624-0002

2.12.1 EP2624-0002 - Introduction

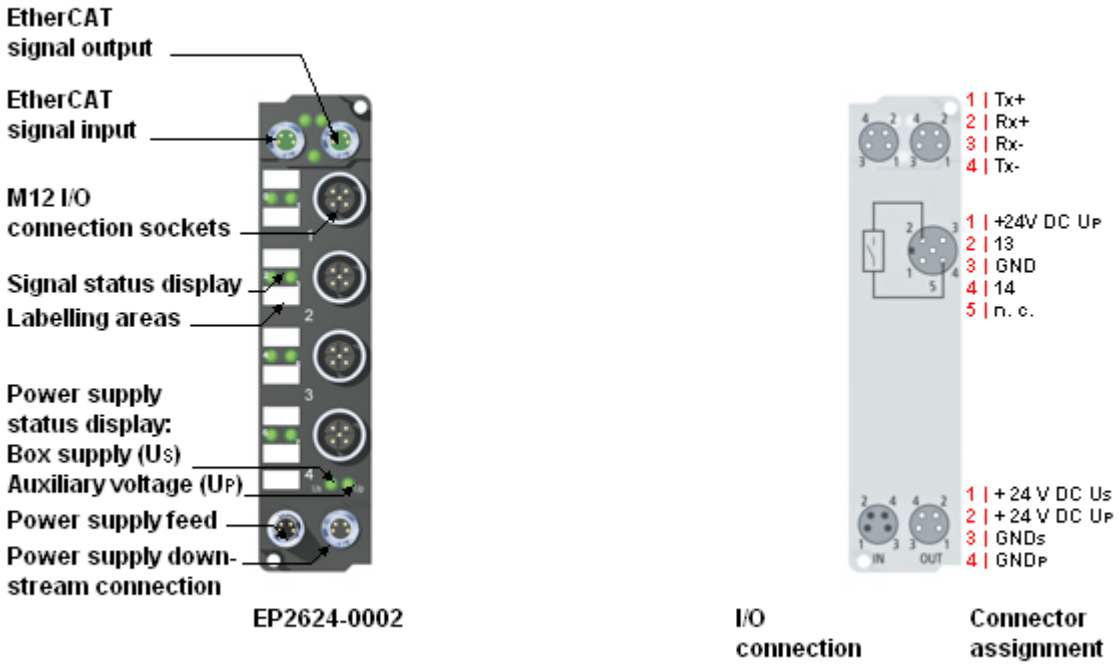


Fig. 39: EP2624-0002

Relay module with four single contacts, 25 V_{AC} / 30 V_{DC}

The EtherCAT Box EP2624-0002 has four relays with potential free contacts. The relays switch voltages up to 25 V_{AC} or 30 V_{DC}.

The EtherCAT Box displays the signal status of each the relays by light emitting diodes. The power supply is looped through.

Quick links

Installation [▶ 86]

UL-Requirements [▶ 99]

ATEX Notes [▶ 100]

2.12.2 EP2624-0002 - Technical data

Technical data	EP2624-0002
Fieldbus	EtherCAT
Fieldbus connection	2 x M8 socket (green)
Number of outputs	8
Output connections	M12
Load type	ohmic, inductive, lamp load
Rated output voltage	25 V_{AC} / 30 V_{DC}
Ohmic switching current	0,5 A_{AC} / 2 A_{DC}
Minimum permitted load	10 µA at 10 mV_{DC}
Operating cycles mechanical	min. 1 x 10^8
Operating cycles electrical	min. 2 x 10^5 (1 A / 30 V_{DC})
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	4 output bits
Electrical isolation	Control voltage/fieldbus: yes
Permissible ambient temperature during operation	-25°C ... +60°C 0°C ... +55°C (according to cULus, see UL Requirements [▶ 99]) 0°C ... +55°C (according to ATEX, see special conditions [▶ 100])
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, cULus , ATEX

2.12.3 EP2624-0002 - Process image

Channel 1 to Channel 4

You will find the 4 digital outputs from the module under **Channel 1 to Channel 4**.

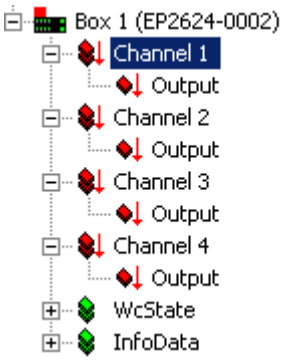


Fig. 40: EP2624-0002, Process image

2.13 EP2809-002x

2.13.1 EP2809-0021 - Introduction

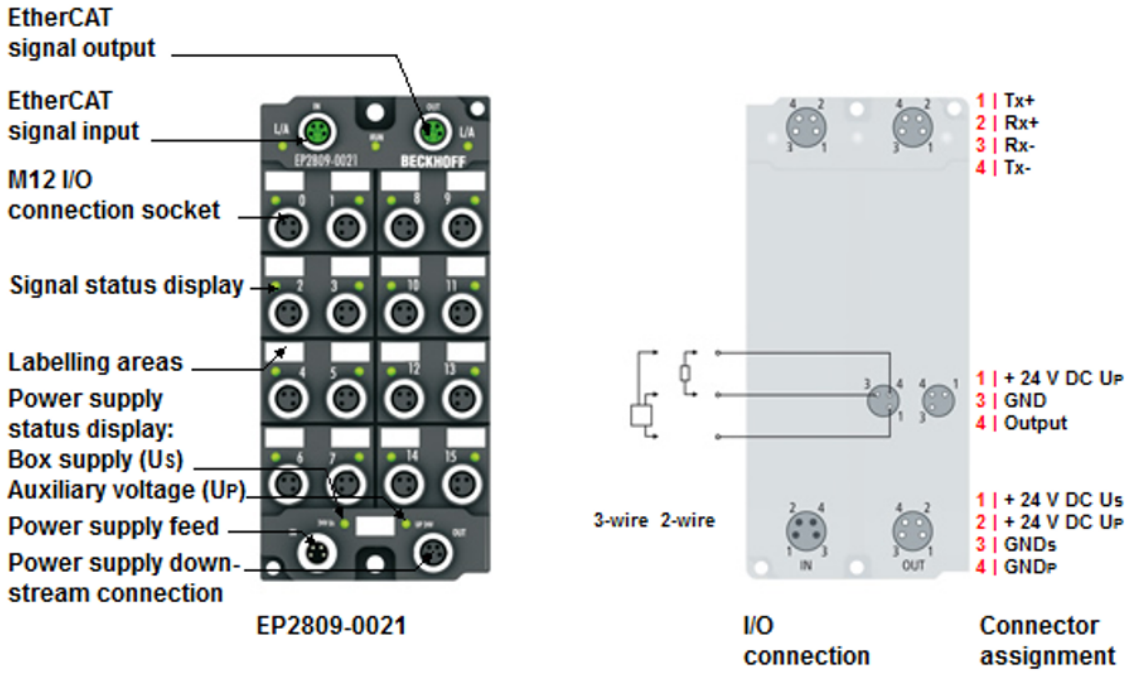


Fig. 41: EP2809-0021

16 digital outputs 24 V_{DC}, I_{max} 0.5 A (Σ 4 A)

The EP2809-0021 EtherCAT Box with digital outputs connects the binary control signals from the controller on to the actuators at the process level.

The 16 outputs handle load currents of up to 0.5 A each, although the total current is limited to 4 A. This makes these modules particularly suitable for applications in which not all of the outputs are active at the same time, or in which not all of the actuators draw 0.5 A current.

The signal state is indicated by means of light emitting diodes. The signals are connected via M8 connectors. All outputs are short-circuit-proof and protected against inverse connection.

Quick links

Installation [▶ 86]

2.13.2 EP2809-0022 - Introduction

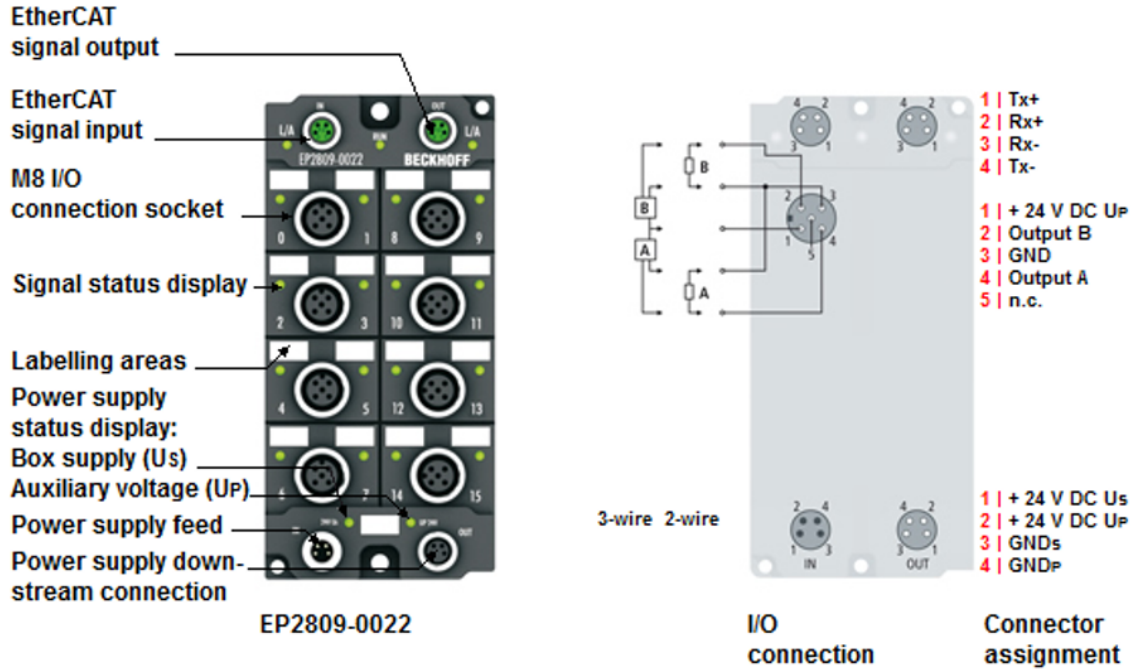


Fig. 42: EP2809-0022

16 digital outputs 24 V_{DC}, I_{max} 0.5 A (Σ 4 A)

The EP2809-0022 EtherCAT Box with digital outputs connects the binary control signals from the controller on to the actuators at the process level.

The 16 outputs handle load currents of up to 0.5 A each, although the total current is limited to 4 A. This makes these modules particularly suitable for applications in which not all of the outputs are active at the same time, or in which not all of the actuators draw 0.5 A current.

The signal state is indicated by means of light emitting diodes. The signals are connected via M12 connectors. All outputs are short-circuit-proof and protected against inverse connection.

Quick links

Installation [▶ 86]

UL-Requirements [▶ 99]

2.13.3 EP2809 - Technical data

Technical data	EP2809-0021	EP2809-0022
Fieldbus	EtherCAT	
Fieldbus connection	2 x M8 socket (green)	
Number of outputs	16	
Output connections [▶ 103]	M8	M12
Load type	ohmic, inductive, lamp load	
Rated output voltage	24 V_{DC} (-15%/+20%)	
Output current	max. 0.5 A each channel, total current of all outputs max. 4 A	
Short circuit current	max. 4.0 A	
Module electronic supply	derived from control voltage Us	
Module electronic current consumption	typically 120 mA	
Output driver supply	derived from load voltage Up	
Output driver current consumption	typically 20 mA	
Power supply connection	Feed: 1 x M8 plug, 4-pin Onward connection: 1 x M8 socket, 4-pin	
Process image	16 output bits	
Electrical isolation	Control voltage/fieldbus: yes	
Permissible ambient temperature during operation	-25°C ... +60°C	-25°C ... +60°C 0°C ... +55°C (according to cULus, see UL Requirements [▶ 99])
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	CE, cULus

2.13.4 EP2809-0021 - Process image

Channel 1 to Channel 16

You will find the 16 digital outputs to the module (here using the EP2809-0021 as an example) under **Channel 1 to Channel 16**.

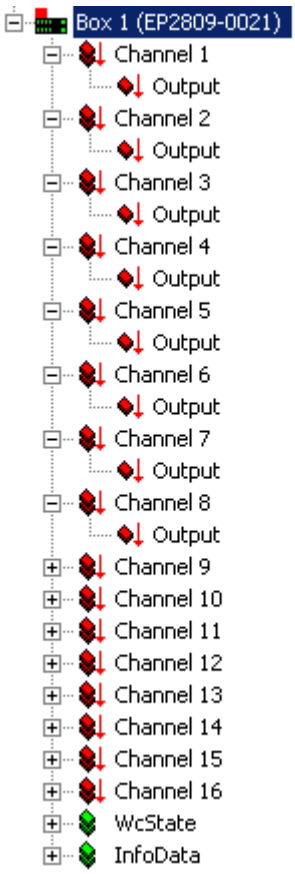


Fig. 43: EP2809-0021, Process image

2.14 EP2816-0004

2.14.1 EP2816-0004 - Introduction

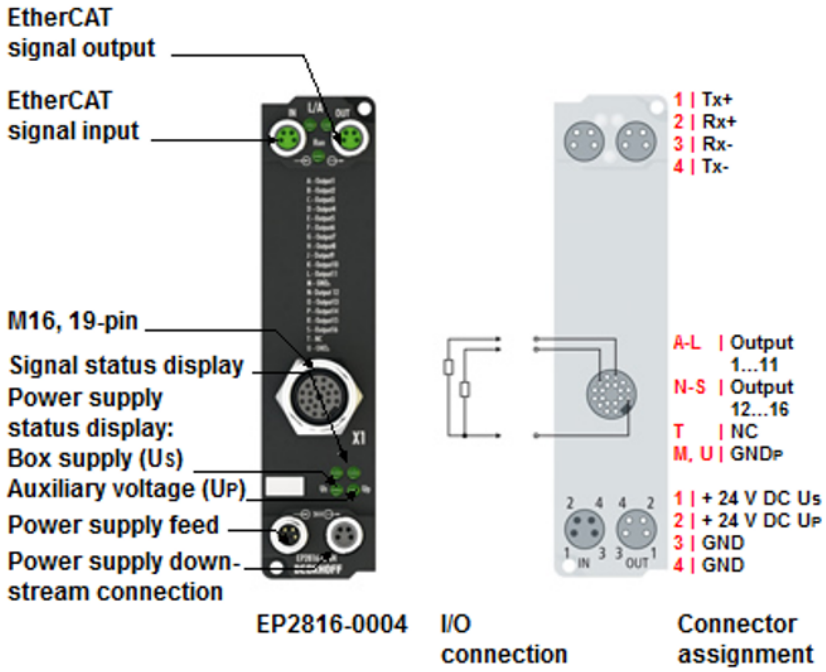


Fig. 44: EP2816-0004

16 digital outputs 24 V_{DC}, I_{MAX} 0.5 A ($\sum$ 4 A)

The EP2816 EtherCAT Box with digital outputs connects the binary control signals from the controller on to the actuators at the process level. The sixteen outputs handle load currents of up to 0.5 A each, although the total current is limited to 4 A. This makes these modules particularly suitable for applications in which not all of the outputs are active at the same time, or in which not all of the actuators draw 0.5 A current. An output short-circuit is recognized and passed on to the controller.

The signal state is indicated in groups by means of light emitting diodes. The signal connection is realized by a 19-pin M16 socket and is thus ideally suited for multi-pin connector valve terminals. All outputs are short-circuit-proof, protected against inverse connection and can be diagnosed.

Quick links

Installation [▶ 86]

Configuration [▶ 127]

UL Requirements [▶ 99] for UL approved modules

2.14.2 EP2816-0004 - Technical data

Technical data	EP2816-0004
Fieldbus	EtherCAT
Fieldbus connection	2 x M8 socket (green)
Number of outputs	16
Output connections	M16, 19-pin
Load type	ohmic, inductive, lamp load
Rated output voltage	24 V_{DC} (-15%/+20%)
Output current	max. 0.5 A each channel, individually short-circuit proof, total current of all outputs max. 4 A
Short circuit current	max. 1.5 A
Module electronic supply	derived from control voltage Us
Module electronic current consumption	typically 120 mA
Output driver supply	derived from load voltage Up
Output driver current consumption	max. 30 mA for all channels
Power supply connection	Feed: 1 x M8 plug, 4-pin Onward connection: 1 x M8 socket, 4-pin
Process image	16 output bits, 16 input bits (diagnostic)
Electrical isolation	Control voltage/fieldbus: yes
Permissible ambient temperature during operation	-25°C ... +60°C 0°C ... +55°C (according to cULus, see UL Requirements [▶ 99])
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, cULus

2.14.3 EP2816-0004 - Status LEDs

Fig. 45: EP2816-0004 - Status-LEDs

LED display

LED	Display	Meaning
STATUS 1-8	Green illuminated	at least one of the outputs for channel 1-8 is set
	Red illuminated	at least one of the outputs for channel 1-8 has a short-circuit
STATUS 9-16	Green illuminated	at least one of the outputs for channel 9-16 is set
	Red illuminated	at least one of the outputs for channel 9-16 has a short-circuit
Us	off	The power supply voltage, Us, is not present
	Green illuminated	The power supply voltage, Us, is present
Up	off	The power supply voltage, Up, is not present
	Green illuminated	The power supply voltage, Up, is present

2.14.4 EP2816-0004 - Process image

DIG Diag Inputs Channel 1

You will find the diagnostic inputs for the modules first 8 digital outputs under **DIGDiag Inputs Channel 1**.

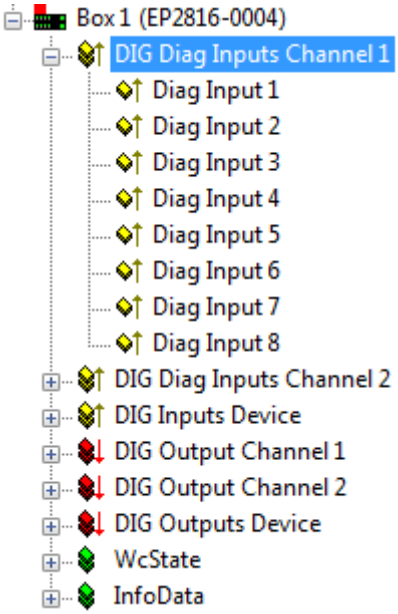


Fig. 46: EP2816-0004, DIG Diag Inputs Channel 1

Diag Input n

Displays an error at output n.

DIG Diag Inputs Channel 2

You will find the diagnostic inputs for the modules second 8 digital outputs under **DIGDiag Inputs Channel 2**

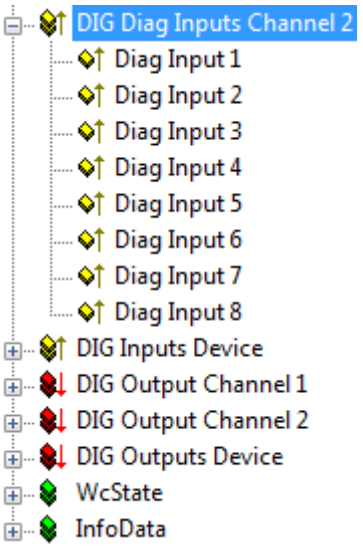


Fig. 47: EP2816-0004, DIG Diag Inputs Channel 2

Diag Input n

Displays an error at output n.

DIG Inputs Device

You will find the modules status inputs under **DIG Inputs Device**.

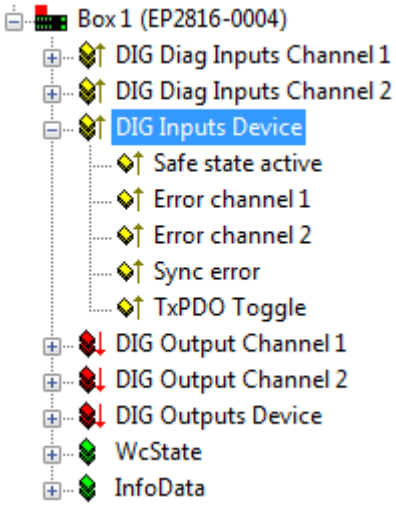


Fig. 48: EP2816-0004, DIG Inputs Device

Safe state active

Displays that the save state is active. The display works only if the network transmits process data, that means only in the network states Safe-Operational (Safe-OP) und Operational (OP), but not in the network state INIT.

Error channel X

Displays an error at channel X.

Sync Error

See EtherCAT System Documentation. The EtherCAT System Documentation is available for download at the Beckhoff Homepage.

TxPDO Toggle

See EtherCAT System Documentation.

DIG Outputs Channel 1

You will find the first 8 digital outputs of the module under **DIGOutputs Channel 1**.

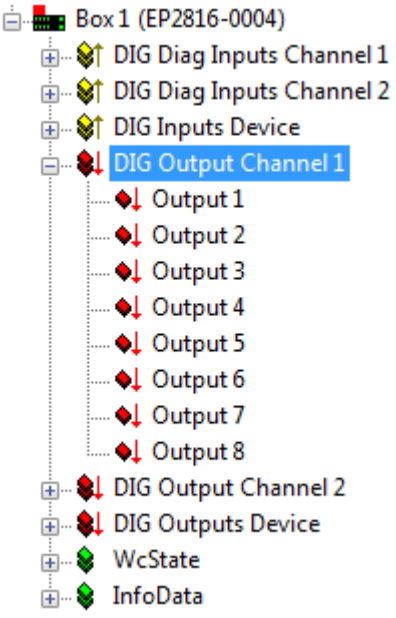


Fig. 49: EP2816-0004, DIG Diag Outputs Channel 1

DIG Outputs Channel 2

You will find the second 8 digital outputs of the module under **DIGOutputs Channel 2**.

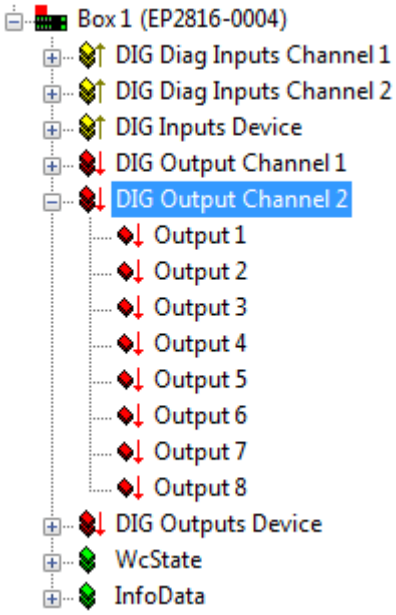


Fig. 50: EP2816-0004, DIG Diag Outputs Channel 2

DIG Outputs Device

You will find the modules control outputs under **DIGOutputs**

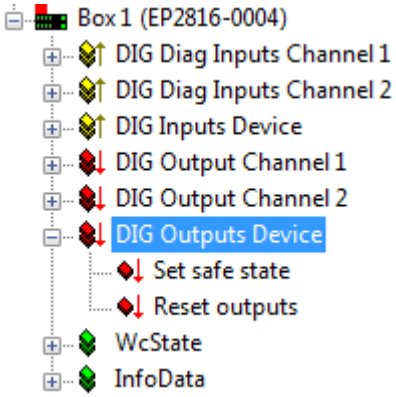


Fig. 51: EP2816-0004 DIG Outputs Device

Set safe state

Sets the module to safe state.

Reset outputs

Resets bits „Error channel X“ of the module. The outputs are activated again.

2.15 EP2816-0008

2.15.1 EP2816-0008 - Introduction

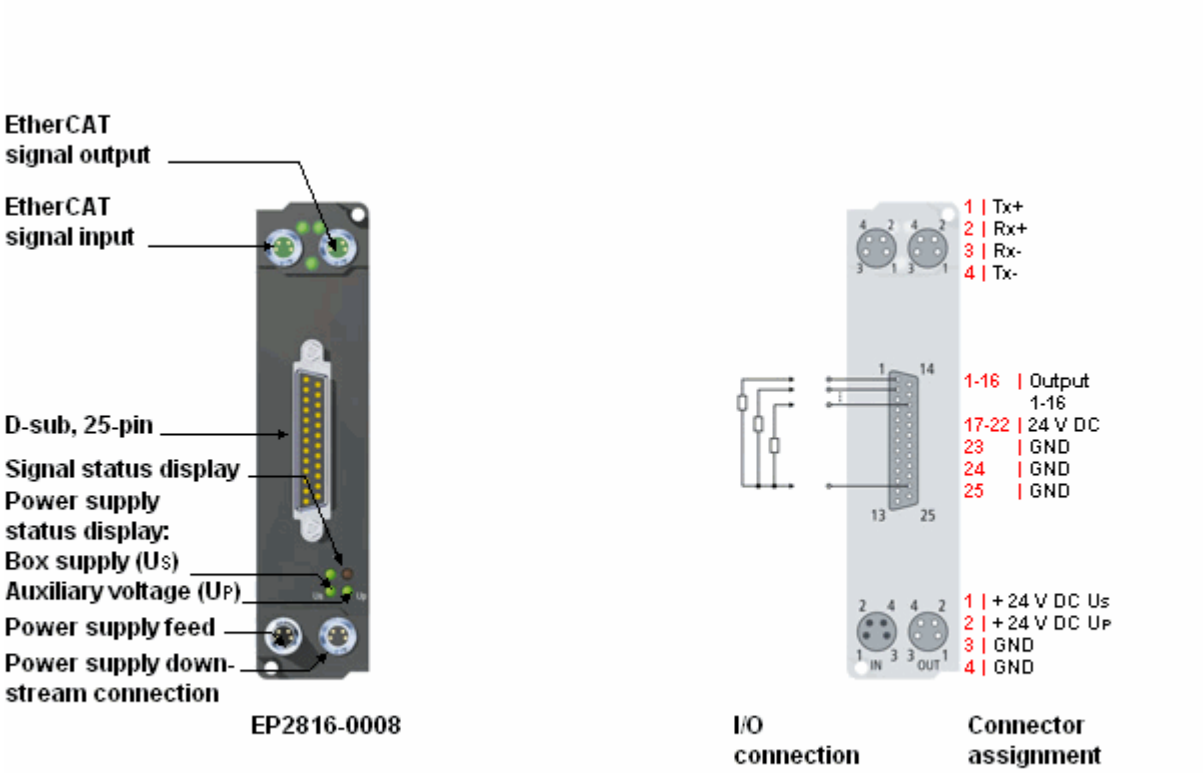


Fig. 52: EP2816-0008

16 digital outputs 24 V_{DC}, I_{max} 0.5 A (Σ 4 A)

The EP2816-0008 EtherCAT Box with digital outputs connects binary control signals from the controller to the actuators at the process level.

The 16 outputs handle load currents of up to 0.5 A each, although the total current is limited to 4 A. This makes these modules particularly suitable for applications in which not all of the outputs are active at the same time, or in which not all of the actuators draw 0.5 A signal current.

All the outputs can withstand short circuits, are protected against reverse connection, and have diagnostic facilities. A shorted output is detected, and the information passed up to the control level.

The signal connection is made through a 25-pin sub-D socket.

The signal state is indicated for signal groups through light emitting diodes [▶ 70].

Quick links

Installation [▶ 86]

Configuration [▶ 127]

UL Requirements [▶ 99] for UL approved modules

2.15.2 EP2816-0008 - Technical Data

Technical data	EP2816-0008
Fieldbus	EtherCAT
Fieldbus connection	2 x M8 socket (green)
Number of outputs	16
Output connections [▶ 107]	25 pin SUB-D socket
Load type	ohmic, inductive, lamp load
Rated output voltage	24 V_{DC} (-15%/+20%)
Output current	max. 0.5 A each channel, individually short-circuit proof, total current of all outputs max. 4 A
Short circuit current	max. 1.5 A
Module electronic supply	derived from control voltage Us
Module electronic current consumption	typically 120 mA
Output driver supply	derived from load voltage Up
Output driver current consumption	max. 30 mA for all channels
Power supply connection	Feed: 1 x M8 plug, 4-pin Onward connection: 1 x M8 socket, 4-pin
Process image	16 output bits, 16 input bits (diagnostic)
Electrical isolation	Control voltage/fieldbus: yes
Permissible ambient temperature during operation	-25°C ... +60°C 0°C ... +55°C (according to cULus, see UL Requirements)
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, cULus

2.15.3 EP2816-0008 - Status LEDs

Fig. 53: EP2816-0008 - Status-LEDs

LED display

LED	Display	Meaning
STATUS 1-8	Green illuminated	at least one of the outputs for channel 1-8 is set
	Red illuminated	at least one of the outputs for channel 1-8 has a short-circuit
STATUS 9-16	Green illuminated	at least one of the outputs for channel 9-16 is set
	Red illuminated	at least one of the outputs for channel 9-16 has a short-circuit
Us	off	The power supply voltage, Us, is not present
	Green illuminated	The power supply voltage, Us, is present
Up	off	The power supply voltage, Up, is not present
	Green illuminated	The power supply voltage, Up, is present

2.15.4 EP2816-0008 - Process image

DIG Diag Inputs Channel 1

You will find the diagnostic inputs for the module's first 8 digital outputs under **DIGDiag Inputs Channel 1**.

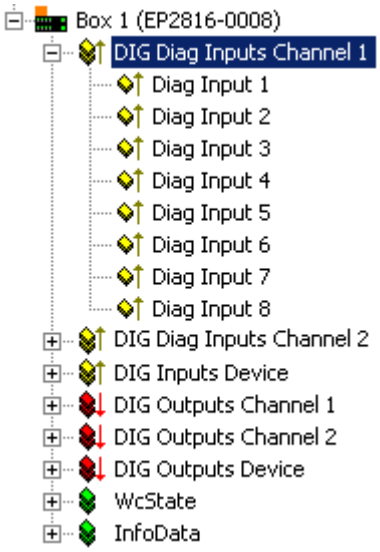


Fig. 54: EP2816-0008, DIG Diag Inputs Channel 1

Diag Input n

Displays an error at output n.

DIG Diag Inputs Channel 2

You will find the diagnostic inputs for the module's second 8 digital outputs under **DIGDiag Inputs Channel 2**

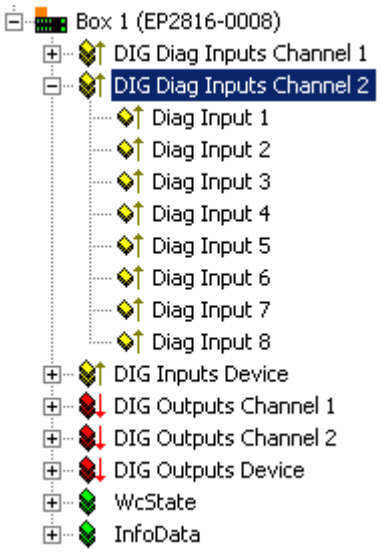


Fig. 55: EP2816-0008, DIG Diag Inputs Channel 2

Diag Input n

Displays an error at output n.

DIG Inputs Device

You will find the module's status inputs under **DIG Inputs Device**.

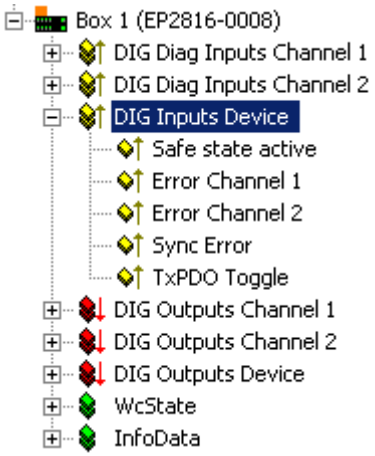


Fig. 56: EP2816-0008, DIG Inputs Device

Safe state active

Displays that the save state is active. The display works only if the network transmits process data, that means only in the network states Safe-Operational (Safe-OP) und Operational (OP), but not in the network state INIT.

Error channel X

Displays an error at channel X.

Sync Error

See EtherCAT System Documentation. The EtherCAT System Documentation is available for download at the Beckhoff Homepage.

TxPDO Toggle

See EtherCAT System Documentation.

DIG Outputs Channel 1

You will find the first 8 digital outputs of the module under **DIGOutputs Channel 1**.

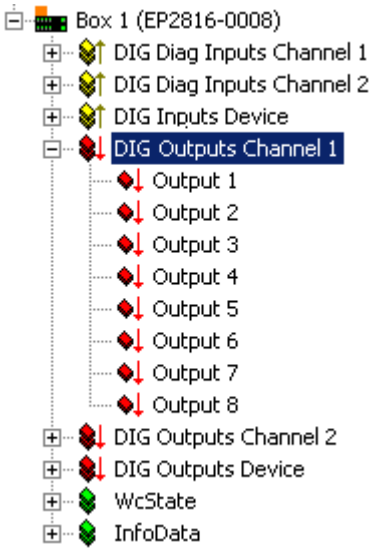


Fig. 57: EP2816-0008, DIG Outputs Channel 1

DIG Outputs Channel 2

You will find the second 8 digital outputs of the module under **DIGOutputs Channel 2**.

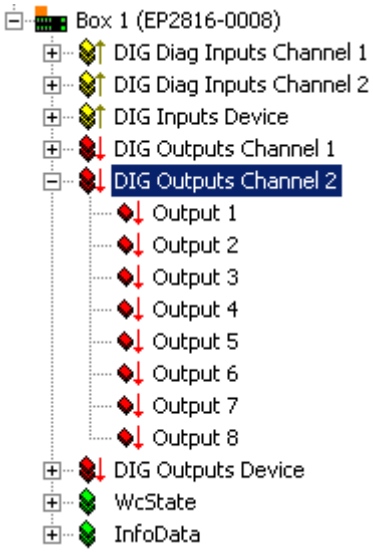


Fig. 58: EP2816-0008, DIG Outputs Channel 2

DIG Outputs Device

You will find the module's control outputs under **DIGOutputs**

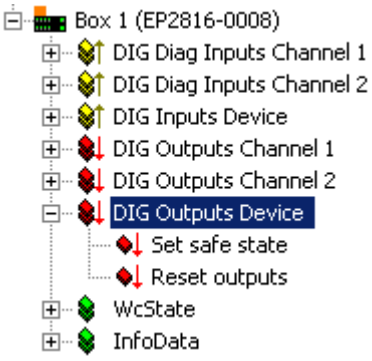


Fig. 59: EP2816-0008, DIG Outputs Device

Set safe state

Sets the module to safe state.

Reset outputs

Resets bits „Error channel X“ of the module. The outputs are activated again.

2.16 EP2816-0010

2.16.1 EP2816-0010 - Introduction

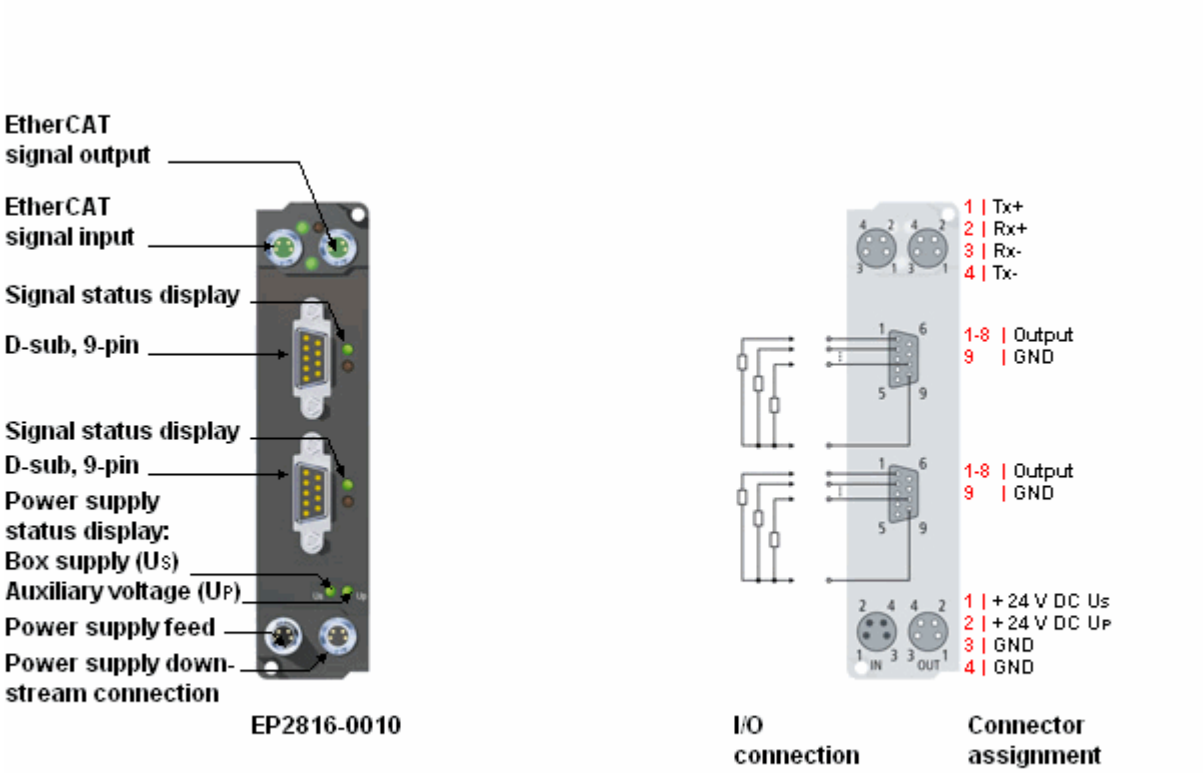


Fig. 60: EP2816-0010

16 digital outputs 24 V_{DC}, I_{max} 0.5 A (Σ 4 A)

The EP2816-0010 EtherCAT Box with digital outputs connects binary control signals from the controller to the actuators at the process level.

The 16 outputs handle load currents of up to 0.5 A each, although the total current is limited to 4 A. This makes these modules particularly suitable for applications in which not all of the outputs are active at the same time, or in which not all of the actuators draw 0.5 A signal current.

All the outputs can withstand short circuits, are protected against reverse connection, and have diagnostic facilities. A shorted output is detected, and the information passed up to the control level.

The signal connection is made through two 9-pin sub-D sockets

The signal state is indicated for signal groups by means of light emitting diodes.

Quick links

Installation [▶ 86]

Configuration [▶ 127]

UL Requirements [▶ 99] for UL approved modules

2.16.2 EP2816-0010 - Technical Data

Technical data	EP2816-0010
Fieldbus	EtherCAT
Fieldbus connection	2 x M8 socket (green)
Number of outputs	16
Output connections [▶ 109]	Two 9 pin SUB-D sockets
Load type	ohmic, inductive, lamp load
Rated output voltage	24 V_{DC} (-15%/+20%)
Output current	max. 0.5 A each channel, individually short-circuit proof, total current of all outputs max. 4 A
Short circuit current	Maximum 1.5 A
Module electronic supply	derived from control voltage Us
Module electronic current consumption	typically 120 mA
Output driver supply	derived from load voltage Up
Output driver current consumption	max. 30 mA for all channels
Power supply connection	Feed: 1 x M8 plug, 4-pin Onward connection: 1 x M8 socket, 4-pin
Process image	16 output bits, 16 input bits (diagnostic)
Electrical isolation	Control voltage/fieldbus: yes
Permissible ambient temperature during operation	-25°C ... +60°C 0°C ... +55°C (according to cULus, see UL Requirements)
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, cULus

2.16.3 EP2816-0010 - Status LEDs

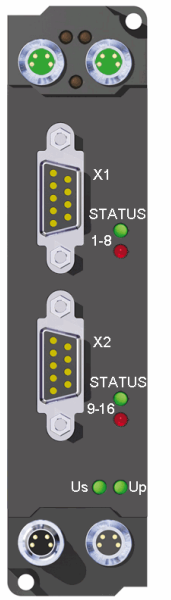


Fig. 61: EP2816-0010 - Status LEDs

LED display

LED	Color	Display	Meaning
X1 Status 1-8	green	on	at least one of the outputs for channel 1-8 is set
	red	on	at least one of the outputs for channel 1-8 has a short-circuit
X2 Status 9-16	green	on	at least one of the outputs for channel 9-16 is set
	red	on	at least one of the outputs for channel 9-16 has a short-circuit
Us	green	off	The power supply voltage, Us, is not present
		on	The power supply voltage, Us, is present
Up	green	off	The power supply voltage, Up, is not present
		on	The power supply voltage, Up, is present

2.16.4 EP2816-0010 - Process image

DIG Diag Inputs Channel 1

You will find the diagnostic inputs for the module's first 8 digital outputs under **DIGDiag Inputs Channel 1**.

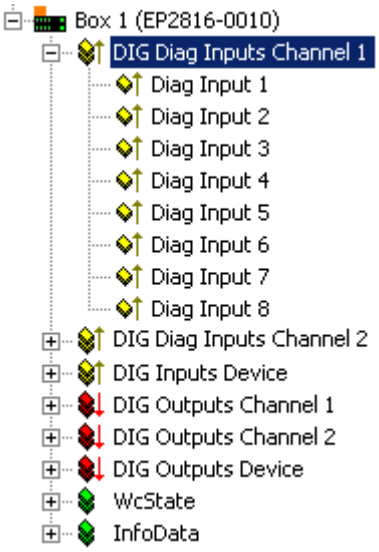


Fig. 62: EP2816-0010, DIG Diag Inputs Channel 1

Diag Input n

Displays an error at output n.

DIG Diag Inputs Channel 2

You will find the diagnostic inputs for the module's second 8 digital outputs under **DIGDiag Inputs Channel 2**.

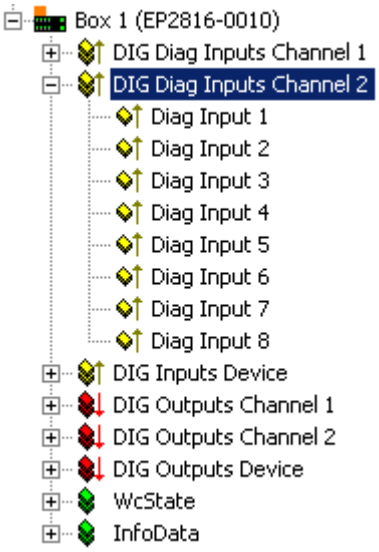


Fig. 63: EP2816-0010, DIG Diag Inputs Channel 2

Diag Input n

Displays an error at output n.

DIG Inputs Device

You will find the module's status inputs under **DIG Inputs Device**.

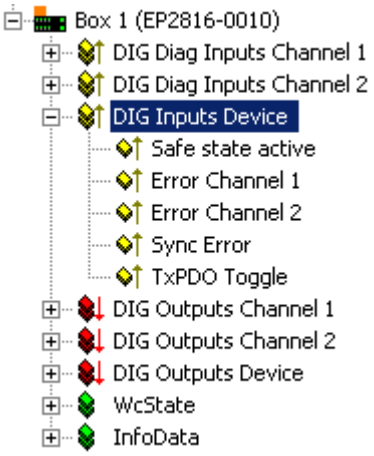


Fig. 64: EP2816-0010, DIG Inputs Device

Safe state active

Displays that the save state is active. The display works only if the network transmits process data, that means only in the network states Safe-Operational (Safe-OP) und Operational (OP), but not in the network state INIT.

Error channel X

Displays an error at channel X.

Sync Error

See EtherCAT System Documentation. The EtherCAT System Documentation is available for download at the Beckhoff Homepage.

TxPDO Toggle

See EtherCAT System Documentation.

DIG Outputs Channel 1

You will find the first 8 digital outputs of the module under **DIGOutputs Channel 1**.

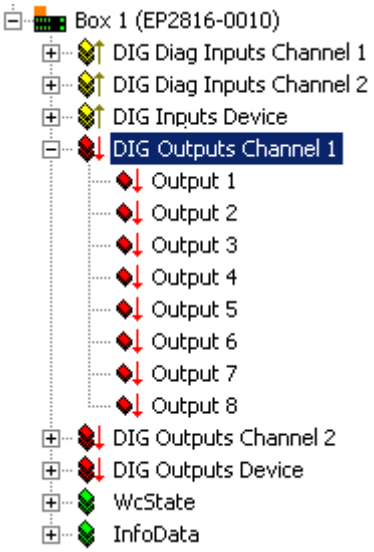


Fig. 65: EP2816-0010, DIG Outputs Channel 1

DIG Outputs Channel 2

You will find the second 8 digital outputs of the module under **DIGOutputs Channel 2**.

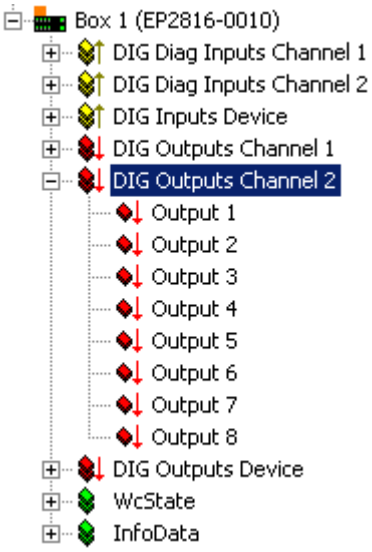


Fig. 66: EP2816-0010, DIG Outputs Channel 2

DIG Outputs Device

You will find the module's control outputs under **DIGOutputs**.

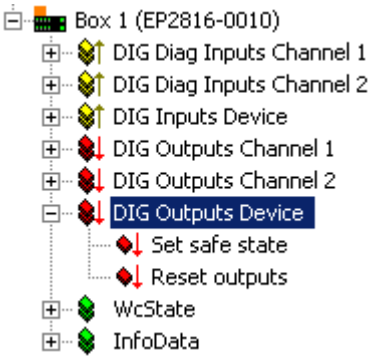


Fig. 67: EP2816-0010, DIG Outputs Device

Set safe state

Sets the module to safe state.

Reset outputs

Resets bits „Error channel X“ of the module. The outputs are activated again.

2.17 EP2817-0008

2.17.1 EP2817-0008 - Introduction

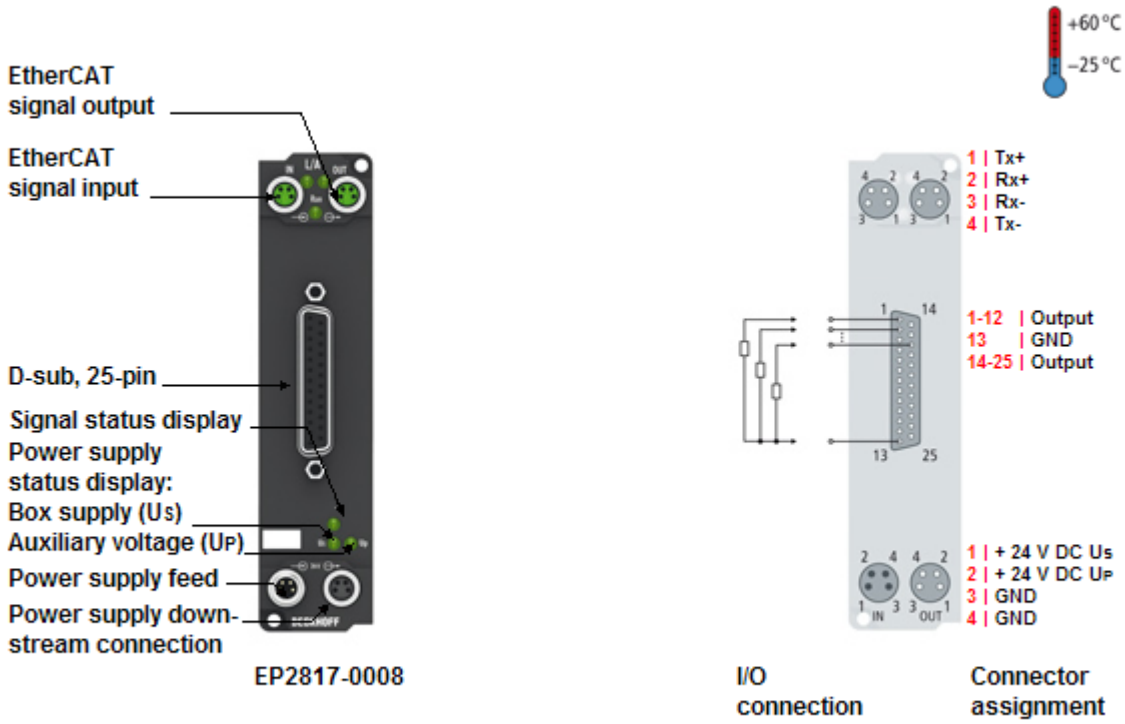


Fig. 68: EP2817-0008

24 digital outputs 24 V_{DC}, I_{max} 0.5 A

The EP2817-0008 EtherCAT Box with digital outputs connects the binary control signals from the controller on to the actuators at the process level.

The 24 outputs handle load currents of up to 0.5 A each.

All outputs are short-circuit-proof, protected against inverse connection and can be diagnosed. An output short-circuit is recognized and passed on to the controller

The signal connection is realized by a 25-pin D-sub socket.

The signal state is indicated for signal groups by means of light emitting diodes [▶ 82].

Quick-Links

Installation [▶ 86]

Configuration [▶ 127]

UL requirements [▶ 99] for UL approved modules

2.17.2 EP2817-0008 - Technical data

Technical data	EP2817-0008
Fieldbus	EtherCAT
Fieldbus connection	2 x M8 socket (green)
Number of outputs	24
Output connection [▶ 107]	25 pin SUB-D socket
Load type	ohmic, inductive, lamp load
Rated output voltage	24 V_{DC} (-15%/+20%)
Output current	max. 0.5 A each channel, individually short-circuit proof, total current max. 4 A
Short circuit current	maximum 1.0 A
Diagnosis	low voltage detection < 18 V_{DC} for Us und Up
Module electronic supply	derived from control voltage Us
Module electronic current consumption	typically 120 mA
Output driver supply	derived from load voltage Up
Output driver current consumption	max. 30 mA for all channels
Power supply connection	Feed: 1 x M8 plug, 4-pin Onward connection: 1 x M8 socket, 4-pin
Process image	24 output bits, 24 input bits (diagnostic)
Electrical isolation	Control voltage/fieldbus: yes
Permissible ambient temperature during operation	-25°C ... +60°C 0°C ... +55°C (according to cULus, see UL Requirements [▶ 99])
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, cULus

2.17.3 EP2817-0008 - Status LEDs

Fig. 69: EP2817-0008 - status-LEDs

LED display

LED	Display	Meaning
STATUS 1 - 12	green illuminated	at least one of the outputs for channel 1-12 is set
	red illuminated	at least one of the outputs for channel 1-12 has a fault
STATUS 13 - 24	green illuminated	at least one of the outputs for channel 13-24 is set
	red illuminated	at least one of the outputs for channel 13-24 has a fault
Us	off	Power supply voltage, Us, is not present
	green illuminated	Power supply voltage, Us, is present
Up	off	Power supply voltage, Up, is not present
	green illuminated	Power supply voltage, Up, is present

2.17.4 EP2817-0008 - Process image

DIG Diag Inputs Channel 1

Under **DIGDiag Inputs Channel 1- 3** you find the diagnostic inputs Eingänge for 8 digital outputs (DIG Outputs Channel 1 - 3) of the module.

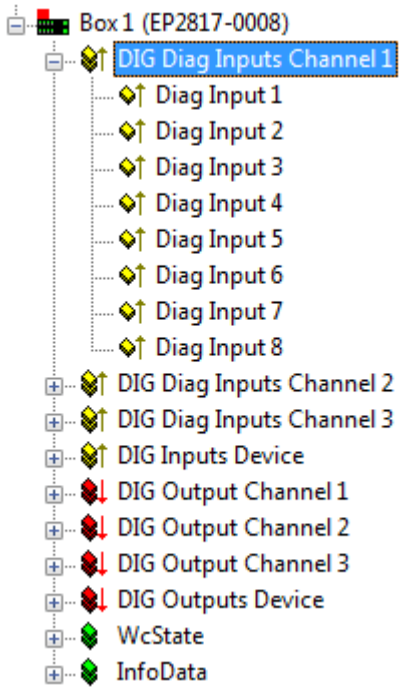


Fig. 70: EP2817-0008, DIG Diag Inputs Channel 1

Diag Input n

Displays an error at output n, this means an output that should has been switched to ON is OFF, or an output that should has been switched to OFF is ON

DIG Inputs Device

Under **DIGInputs Device** you find the status inputs of the module.

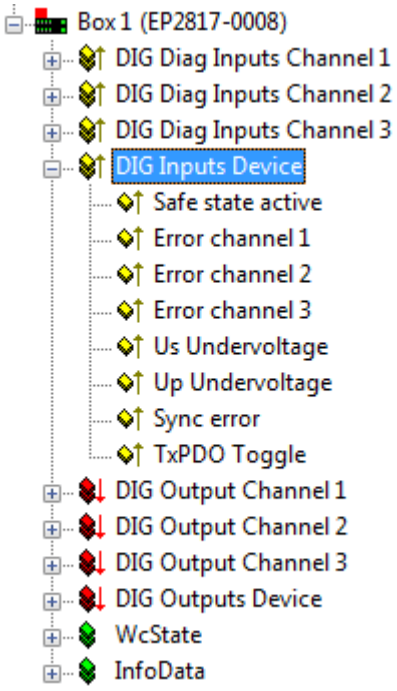


Fig. 71: EP2817-0008, DIG Inputs Device

Safe state active

Displays that safe state is reached. This works only if the network transmits process data, e.g. at network state Pre-Operational (PRE-OP) and Operational (OP), but not at network state INIT.

Error channel n

Displays an error at channel n

Us Undervoltage

Displays that the voltage Us < ca. 18V

Up Undervoltage

Displays that the voltage Up < ca. 18V

Sync Error

See EtherCAT system documentation. Die EtherCAT system documentation is available from the Beckhoff Homepage under downloads.

TxPDO Toggle

See EtherCAT system documentation.

DIG Outputs Channel n

Under **DIGOutputs Channel 1 - 3** you find 8 digital outputs of the module.

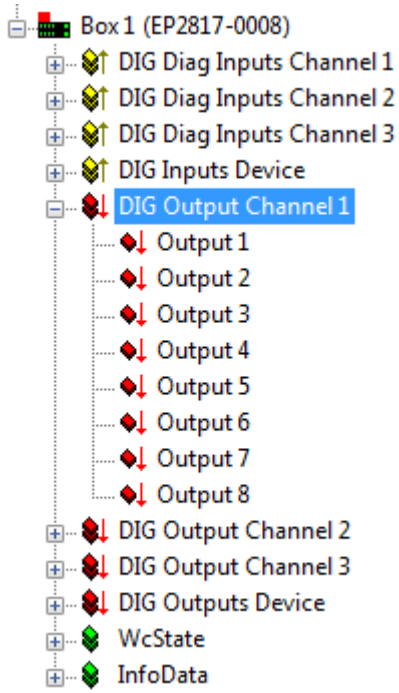


Fig. 72: EP2817-0008, DIG Outputs Channel n

Die assignment is done in pairs each on the right and left side of the D-SUB connector, to connect double switching valves systematically:

Type	Output 2	Output 4	Output 6	Output 8	Output 10	Output 12	Output 14	Output 16	Output 18	Output 20	Output 22	Output 24	
Pin	14	15	16	17	18	19	20	21	22	23	24	25	
Type	Output 1	Output 3	Output 5	Output 7	Output 9	Output 11	Output 13	Output 15	Output 17	Output 19	Output 21	Output 23	GND
Pin	1	2	3	4	5	6	7	8	9	10	11	12	13

DIG Outputs Device

Under **DIG Outputs Device** you find the control outputs of the module.

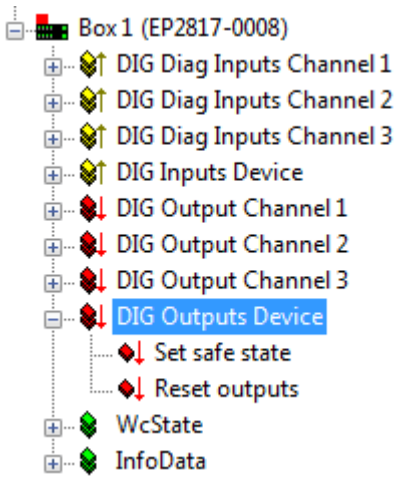


Fig. 73: EP2817-0008, DIG Outputs Device

Set safe state

Sets the module into the safe state.

Reset outputs

Sets the module's error bits „Error channel X“ back. The outputs are activated again.

3 Mounting and cabling

3.1 Mounting

3.1.1 Dimensions

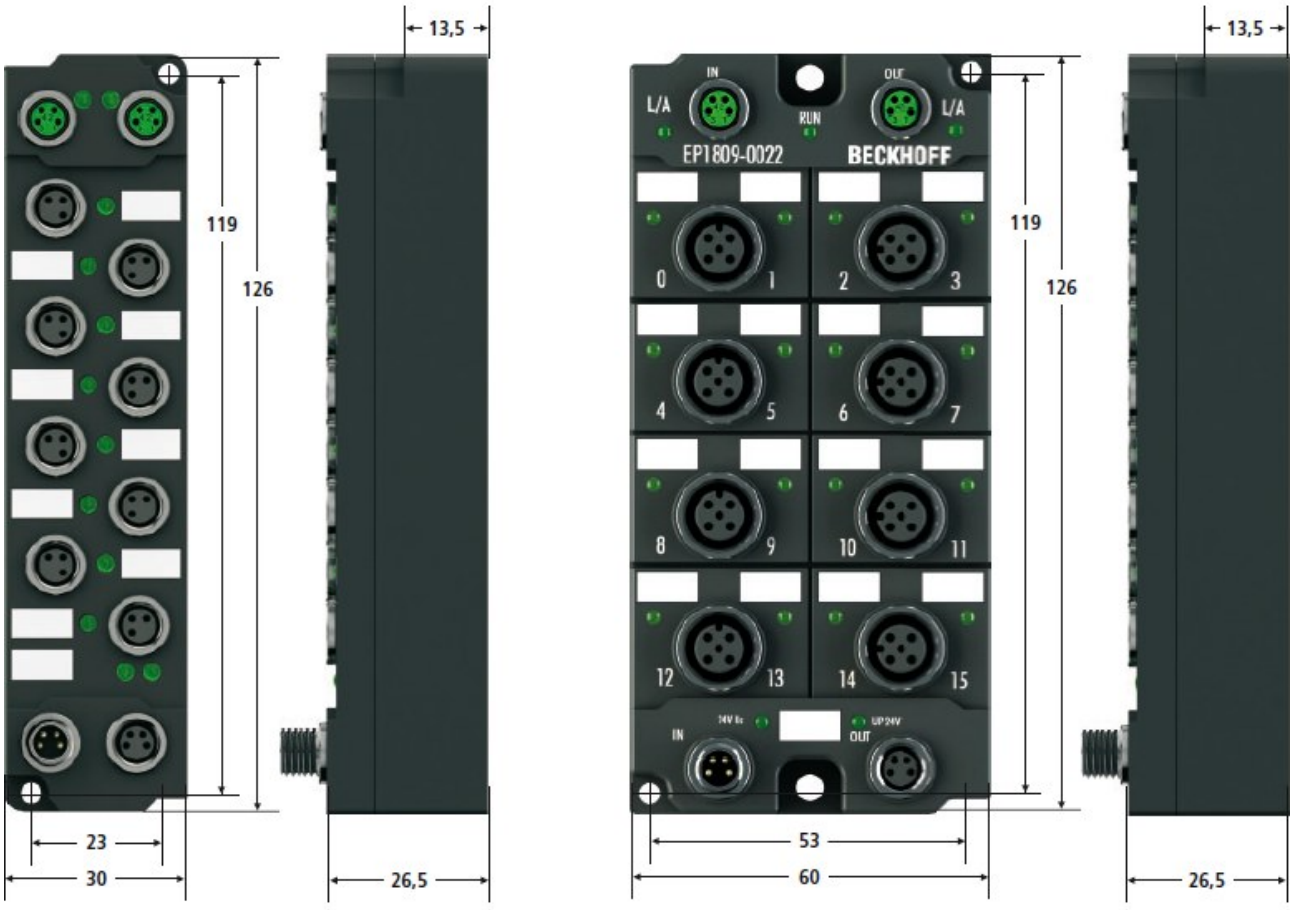


Fig. 74: Dimensions of the EtherCAT Box Modules

All dimensions are given in millimeters.

Housing properties

EtherCAT Box	lean body	wide body
Housing material	PA6 (polyamide)	
Casting compound	Polyurethane	
Mounting	two fastening holes Ø 3 mm for M3	two fastening holes Ø 3 mm for M3 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)	ca. 126 x 30 x 26,5 mm	ca. 126 x 60 x 26,5 mm
Weight	approx. 125 g, depending on module type	approx. 250 g, depending on module type

3.1.2 Fixing

Note	**Note or pointer** 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.

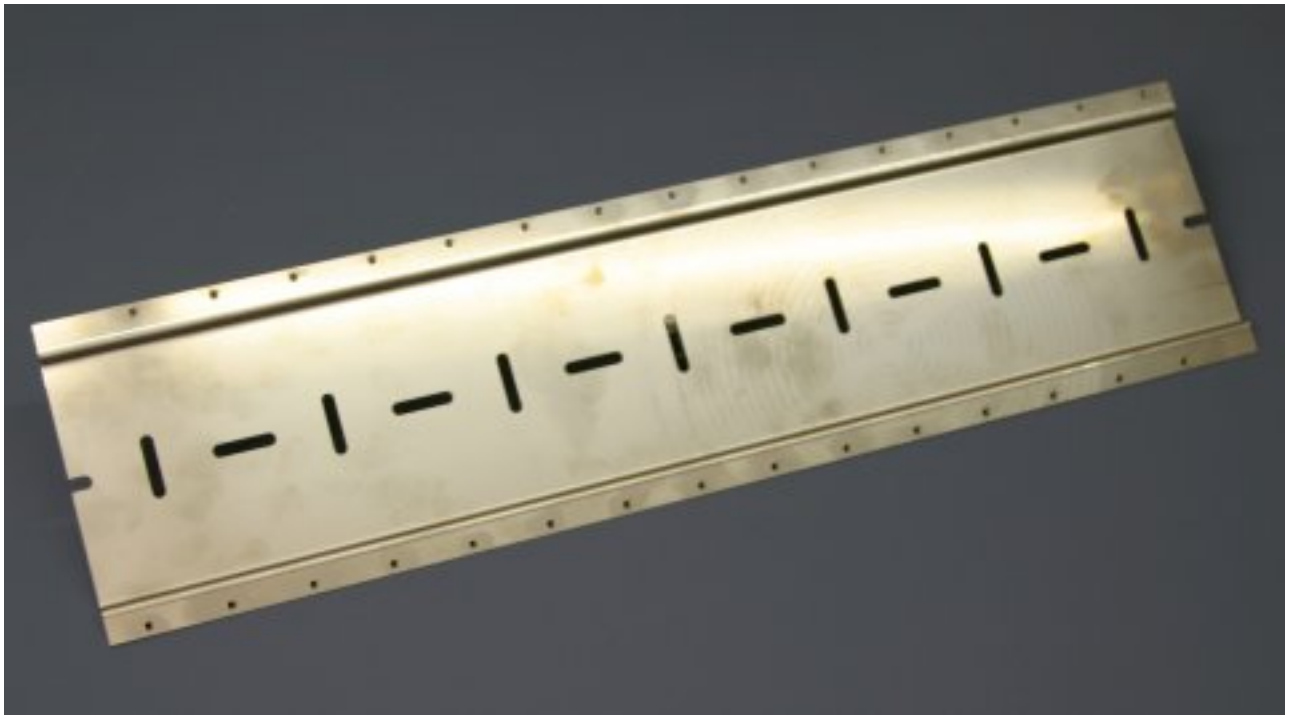


Fig. 75: Mounting Rail ZS5300-000

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.

3.1.3 Nut torque for connectors

M8 connectors

It is recommended to pull the M8 connectors tight with a nut torque of **0.4 Nm**. When using the torque control screwdriver ZB8800 is also a max. torque of **0.5 Nm** permissible.

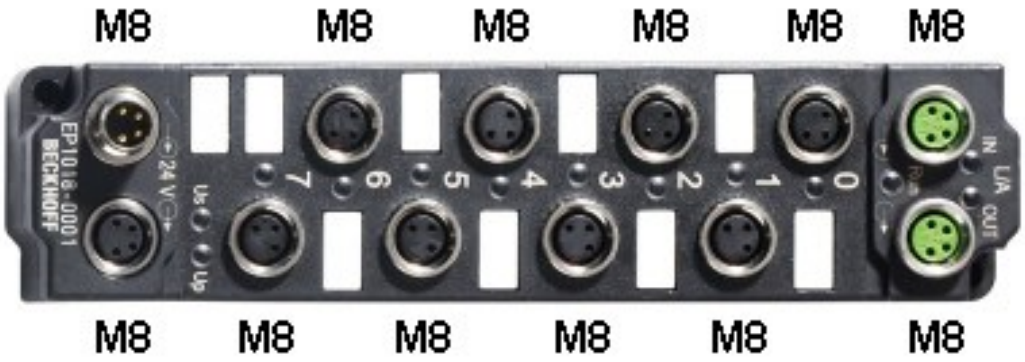


Fig. 76: EtherCAT Box with M8 connectors

M12 connectors

It is recommended to pull the M12 connectors tight with a nut torque of **0.6 Nm**.

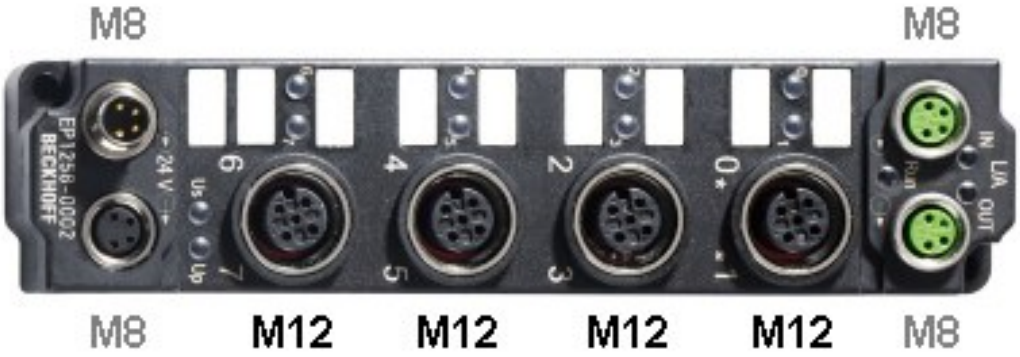


Fig. 77: EtherCAT Box with M8 and M12 connectors

7/8" plug connectors

We recommend fastening the 7/8" plug connectors with a torque of **1.5 Nm**.

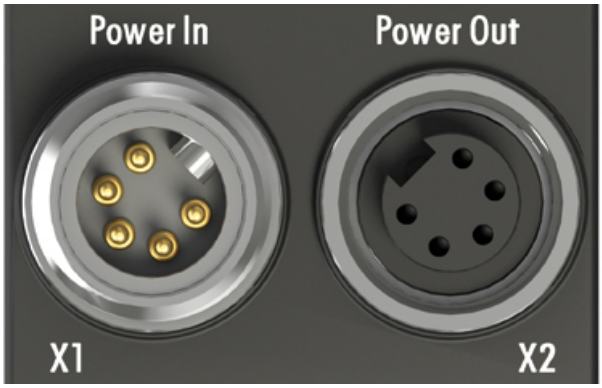


Fig. 78: 7/8" plug connectors

Torque socket wrenches

Fig. 79: ZB8801 torque socket wrench

Note	**Ensure the right torque** Use the torque socket wrenches available by Beckhoff to pull the connectors tight (ZB8800, ZB8801-0000)!

3.1.4 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

3.2 EtherCAT

3.2.1 EtherCAT connection

For the incoming and ongoing EtherCAT connection,

- the EtherCAT Box (EPxxxx) has two M8 sockets, marked in **green**
- the Coupler Box (FBB-x110) has two M12 sockets

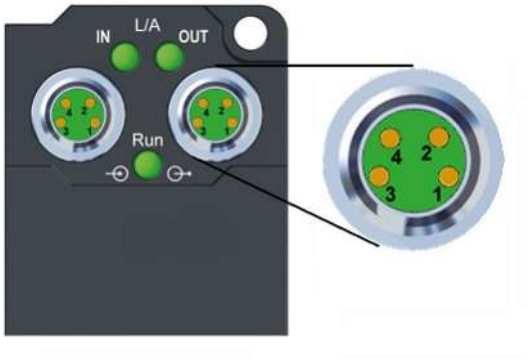


Fig. 80: EtherCAT Box: M8 (30 mm housing)

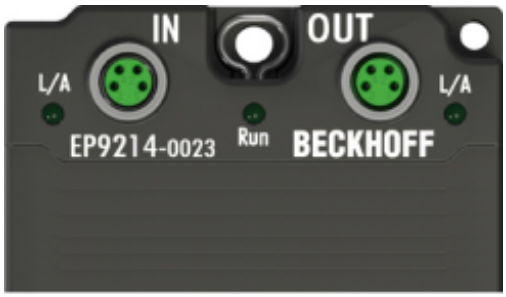


Fig. 81: EtherCAT Box: M8 60 mm housing (EP9214 for example)

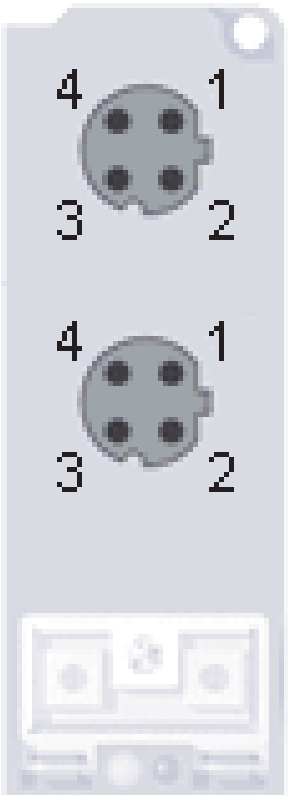


Fig. 82: Coupler Box: M12

Assignment

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

Ethernet/EtherCAT		Plug connector			Cable		Standard
Signal	**Description**	**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 +	Transmit Data+	Pin 1	Pin 1	Pin 1	yellow[2]	orange/white[3]	white/orange
Tx -	Transmit Data-	Pin 4	Pin 3	Pin 2	orange[2]	orange[3]	orange
Rx +	Receive Data+	Pin 2	Pin 2	Pin 3	white[2]	blue/white[3]	white/green
Rx -	Receive Data-	Pin 3	Pin 4	Pin 6	blue[2]	blue[3]	green
Shield	Shield	Housing		Shroud	Screen	Screen	Screen

[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

Note

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 this means the pre assembled cables with M8 connectors were changed to the colors of EN61918 (yellow, orange, white, blue).So different color coding exists. But the electrical properties are absolutely identical.

EtherCAT connectors

The following connectors can be supplied for use in Beckhoff EtherCAT systems.

Designation	Plug connector	Comment
ZS1090-0003	RJ45	four-pin, IP20, for field assembly
ZS1090-0004	M12	four-pin, IP67, for field assembly
ZS1090-0005	RJ45	eight-pin, IP20, for field assembly, suitable for GigaBit Ethernet
ZS1090-0006	M8 male	four-pin, IP67, for field assembly, for ZB903x cable
ZS1090-0007	M8 female	four-pin, IP67, for field assembly, for ZB903x cable
ZS1090-1006	M8 male	four-pin, IP67, for field assembly up to OD = 6.5 mm
ZS1090-1007	M8 female	four-pin, IP67, for field assembly up to OD = 6.5 mm

3.2.2 EtherCAT - Fieldbus LEDs

Fig. 83: EtherCAT-LEDs

LED display

LED	Display	Meaning
IN L/A	off	no connection to the preceding EtherCAT module
	Lit	LINK: connection to the preceding EtherCAT module
	flashing	ACT: Communication with the preceding EtherCAT module
OUT L/A	off	no connection to the following EtherCAT module
	Lit	LINK: connection to the following EtherCAT module
	flashing	ACT: Communication with the following EtherCAT module
Run	off	Status of the EtherCAT module is Init
	flashes quickly	Status of the EtherCAT module is pre-operational
	flashes slowly	Status of the EtherCAT module is safe-operational
	Lit	Status of the EtherCAT module is operational

Note

EtherCAT statuses

The various statuses in which an EtherCAT module may be found are described in the Basic System Documentation for EtherCAT, which is available for download from our website (www.beckhoff.com) under Downloads.

3.3 Power supply

3.3.1 Power Connection

The feeding and forwarding of supply voltages is done via two M8 connectors at the bottom end of the modules:

- IN: left M8 connector for feeding the supply voltages
- OUT: right M8 connector for forwarding the supply voltages

Fig. 84: EtherCAT Box, Connectors for power supply

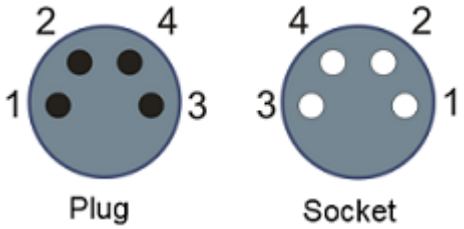


Fig. 85: Pin assignment M8, Power In and Power Out

Table 1: PIN assignment

Pin	Voltage	
1	Control voltage Us, +24 V_{DC}	
2	Auxiliary voltage Up, +24 V_{DC}	
3	GNDs*	*) may be connected internally to each other depending on the module: see specific module descriptions
4	GNDp*	

The pins M8 connectors carry a maximum current of 4 A.

Two LEDs display the status of the supply voltages.

Attention	**Don't confuse the power connectors with the EtherCAT connectors!** Never connect the power cables (M8, 24 V_{DC}) with the green marked EtherCAT sockets of the EtherCAT Box Modules! This can damage the modules!

Control voltage Us: 24 V_{DC}

Power is supplied to the fieldbus, the processor logic, the inputs and the sensors from the 24 V_{DC} control voltage Us. The control voltage is electrically isolated from the fieldbus circuitry.

Auxiliary voltage Up 24 V_{DC}

The Auxiliary voltage Up supplies the digital outputs; it can be brought in separately. If the load voltage is switched off, the fieldbus functions and the power supply and functionality of the inputs are retained.

Redirection of the supply voltages

The IN and OUT power connections are bridged in the module (not IP204x-Bxxx and IE204x). The supply voltages Us and Up can thus easily be transferred from EtherCAT Box to EtherCAT Box.

 **Attention**	**Pay attention to the maximum permissible current!** Pay attention also for the redirection of the supply voltages Us and Up, the maximum permissible current for M8 connectors of 4 A must not be exceeded!

Supply via EP92x4-0023 PowerBox modules

If the machine requires higher current or if the EtherCAT Box Modules are installed far away from the control cabinet with included power supply, the usage of four cannel power distribution modules EP9214 or EP9224 (with integrated data logging, see www.beckhoff.com/EP9224) is recommended.

With these modules intelligent power distribution concepts with up to 2 x 16 A and a maximum of 2.5 mm² cable cross-section can be realized.

Fig. 86: EP92x4-0023, Connectors for Power In and Power Out

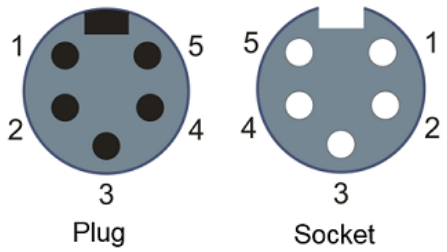


Fig. 87: Pin assignment 7/8”, Power In and Power Out

Electrical isolation

Digital modules

In the digital input/output modules, the grounds of the control voltage (GNDs) and the auxiliary voltage (GNDp) are connected to each other!

Check this at the documentation of each used EtherCAT Box.

Analog modules

In the analog input/output modules the grounds of the control voltage (GNDs) and the auxiliary voltage (GNDp) are separated from each other in order to ensure electrical isolation of the analog signals from the control voltage.

In some of the analog modules the sensors or actuators are supplied by Up - this means, for instance, that in the case of 0...10 V inputs, any reference voltage (0...30 V) may be connected to Up; this is then available to the sensors (e.g. smoothed 10 V for measuring potentiometers).

Details of the power supply may be taken from the specific module descriptions.

Attention	**Electrical isolation may be cancelled!** If digital and analog fieldbus boxes are connected directly via four-core power leads, the analog signals in the fieldbus boxes may be no longer electrically isolated from the control voltage!

3.3.2 Status LEDs for power supply

Fig. 88: Status LEDs for power supply

LED display

LED	Display	Meaning
Us (Control voltage)	off	The power supply voltage Us is not present
	green illuminated	The power supply voltage Us is present
	red illuminated	Because of overload (current > 0.5 A) the sensor supply generated from power supply voltage Us was switched off for all sensors fed from this.
Up (Auxiliary voltage)	off	The power supply voltage Up is not present
	green illuminated	The power supply voltage Up is present

3.3.3 Power cable conductor losses M8

The ZK2020-xxxx-yyyy power cables should not exceed the total length of 15 m at 4 A (with continuation). When planning the cabling, note that at 24 V nominal voltage, the functionality of the module can no longer be assured if the voltage drop reaches 6 V. Variations in the output voltage from the power supply unit must also be taken into account.

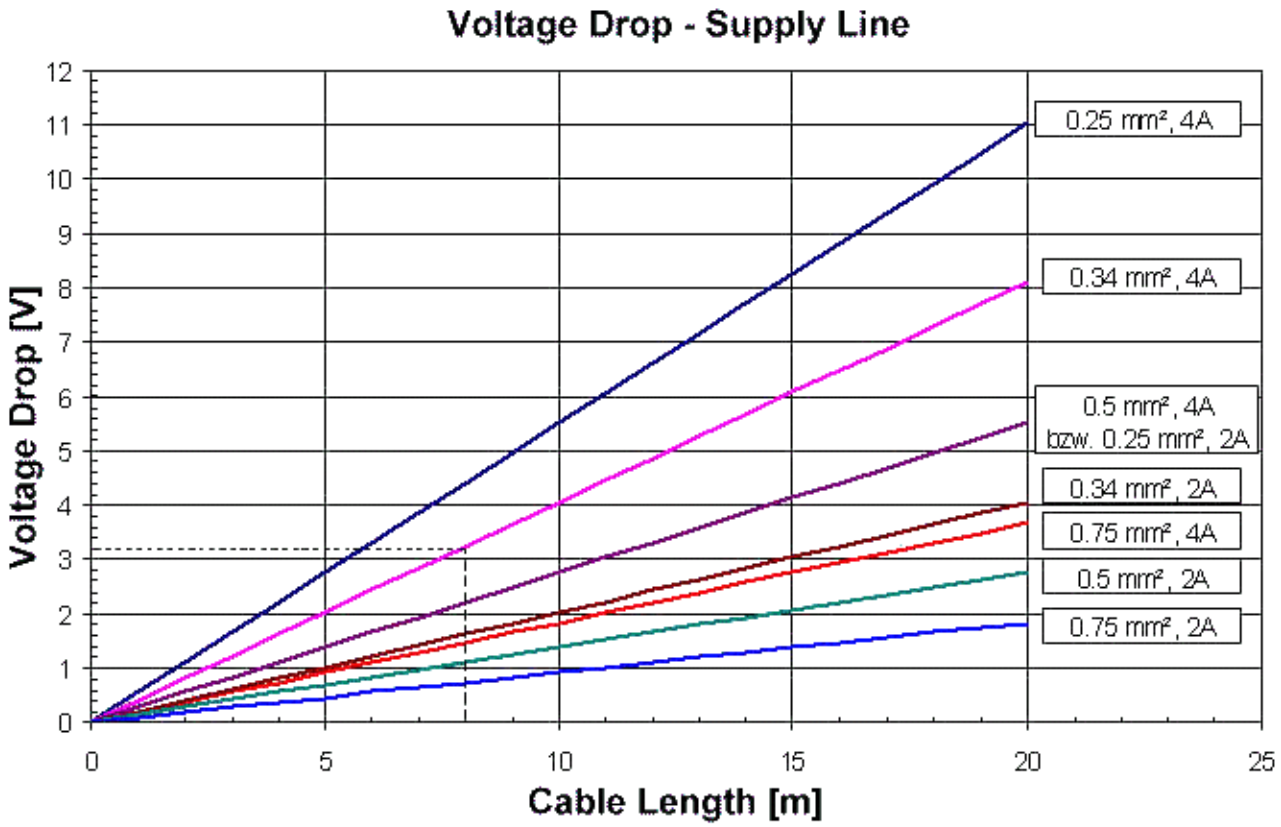


Fig. 89: Power cable conductor losses

Example

8 m power cable with 0.34 mm² cross-section has a voltage drop of 3.2 V at 4 A.

Note	**EP92x4 Power Distribution Modules** With EP9214 and EP9224 Power Distribution Modules intelligent concepts for voltage supply are available. Further information may be found under www.beckhoff.com/EP9224.

3.3.4 Conductor losses 7/8"

In the case of the power cables ZK2030-xxxx-yyy, a total length of 15 m should not be exceeded at 16 A. When wiring, note that with a rated voltage of 24 V the function of the modules can no longer be guaranteed from a voltage drop of 6 V. Variations in the output voltage from the power supply unit must also be taken into account.

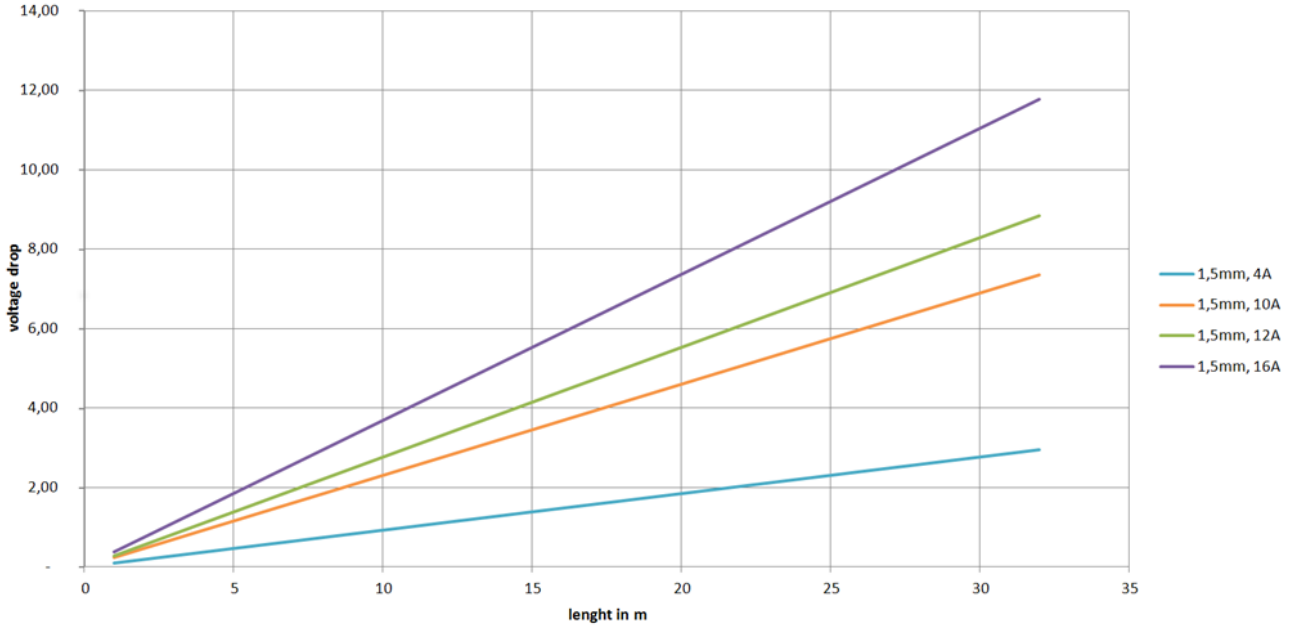


Fig. 90: ZK2030-xxxx-yyy - Conductor losses

Alternatively, larger cable cross-section can be used, e.g. 2.5 mm^2.

3.4 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. 91: UL label

3.5 ATEX notes

3.5.1 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 in the BG2000-0000 protection enclosure [▶ 101] 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! • Observethe permissible ambient temperature range of 0 - 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

Beispiel mit Ser. Nr.: 29 10 02 01:

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

3.5.2 BG2000-0000 - EtherCAT Box protection enclosure

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

The BG2000-0000 protection enclosure has to be mounted over a single EtherCAT Box to fulfill the special conditions according to ATEX [▶ 100].

Installation

Put the cables for EtherCAT, power supply and sensors/actuators through the hole of the BG2000-0000 protection enclosure.

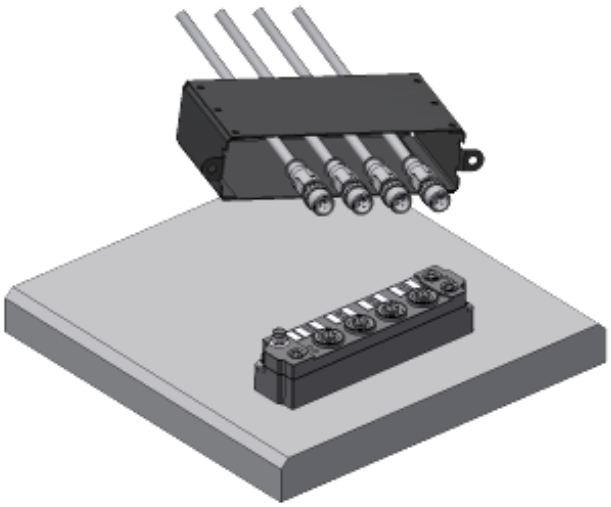


Fig. 92: BG2000-0000, putting the cables

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

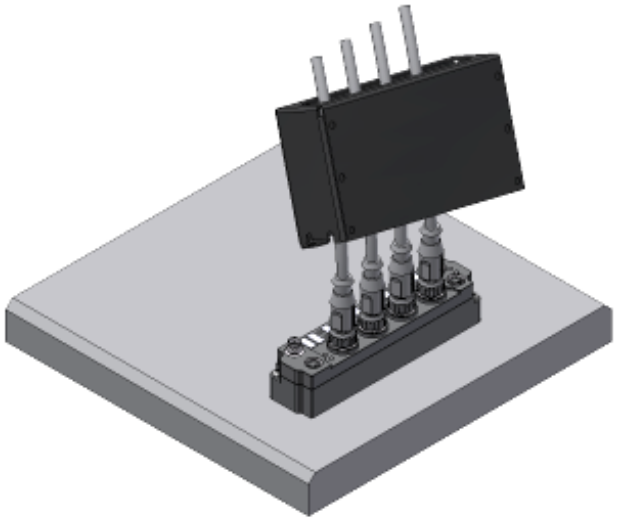


Fig. 93: BG2000-0000, fixing the cables

Mount the BG2000-0000 protection enclosure over the EtherCAT Box.

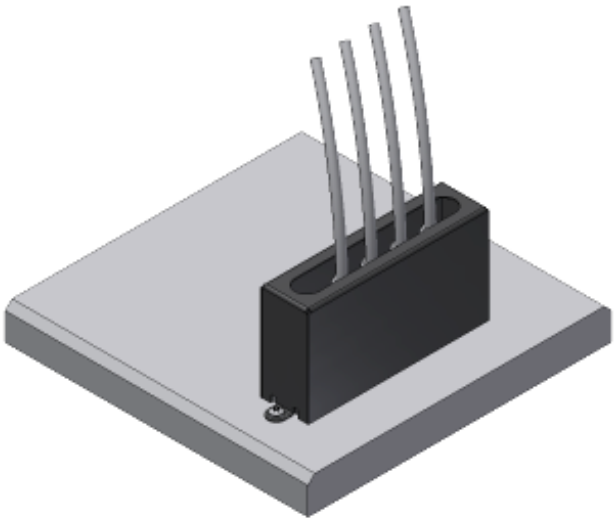


Fig. 94: BG2000-0000, mounting the protection enclosure

3.5.3 ATEX Documentation

Note	**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!

3.6 Signal connection

3.6.1 Digital outputs M8 and M12

The digital output modules connect the binary control signals from the automation unit on to the actuators at the process level.

The signals are connected via screw-in M8 connectors (EP2xxx-0001) or screw-in M12 connectors (EP2xxx-0002).

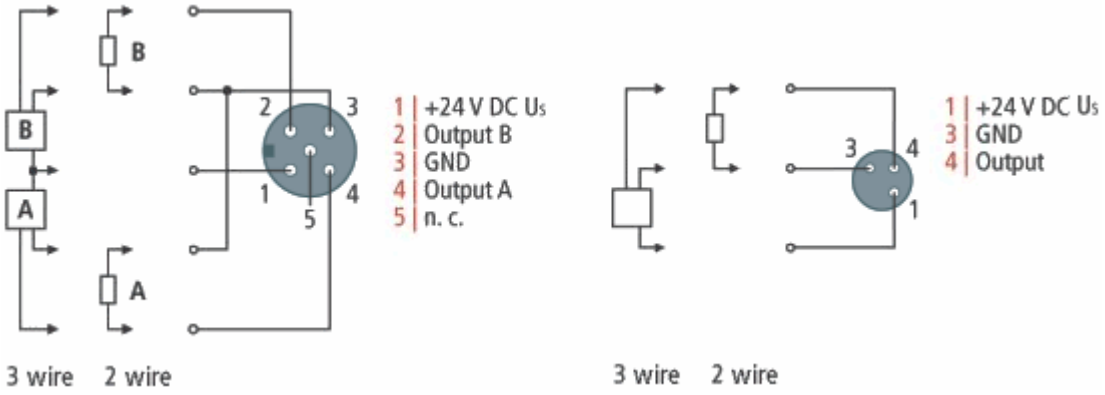


Fig. 95: Digital outputs, M8 and M12

The outputs are short-circuit safe and protected against inverse connection.

The outputs indicate their status through light emitting diodes.

3.6.2 Digital outputs M12 for EP2028-0032

The digital outputs / actuators are connected via M12 sockets.

Pin 2 and 4 of channel 0 and 1, channel 2 and 3, channel 4 and 5 as well as channel 6 and 7 are connected.

Therefore also actuators witch needs 2 outputs can be connected via one M12 cable.

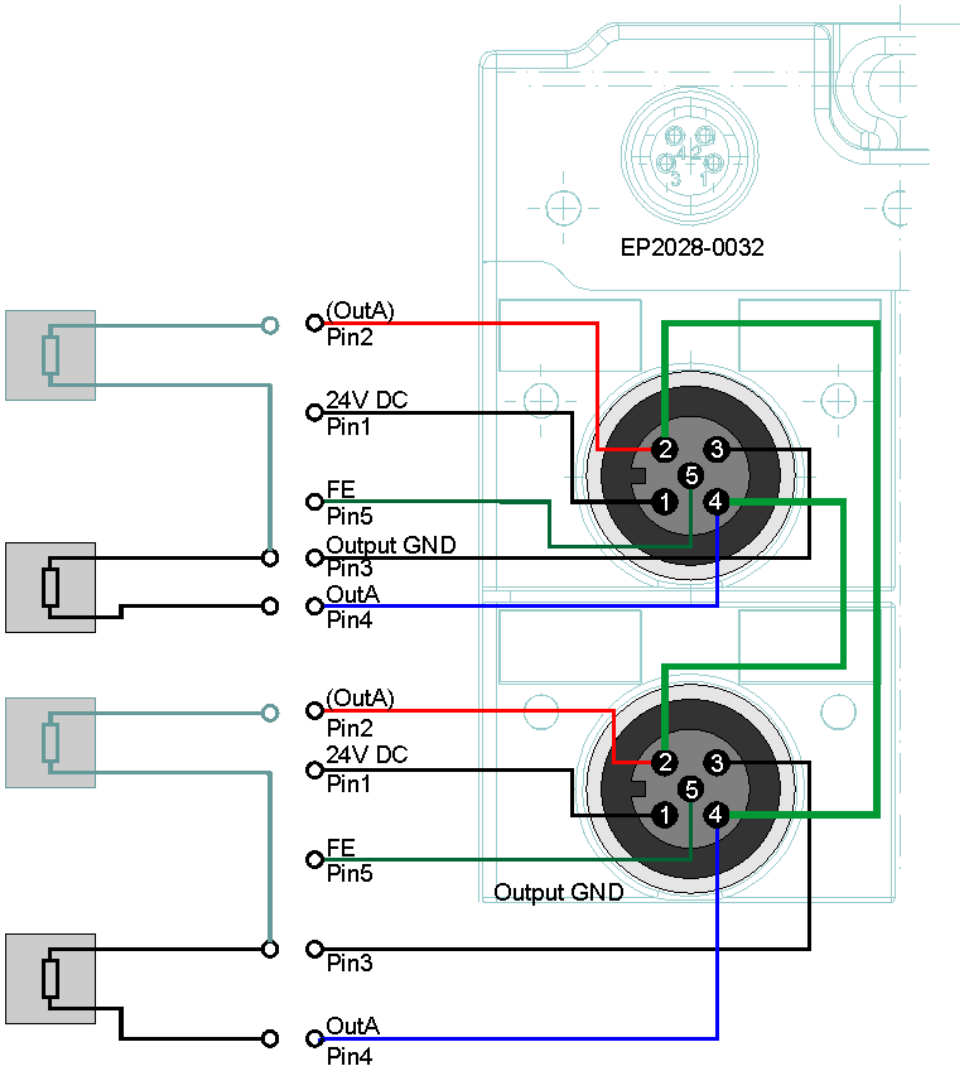


Fig. 96: Digital outputs M12 for EP2028-0032

The state of the signals is indicated by light emitting diodes.

3.6.3 Digital inputs M8 and M12

The digital input modules acquire the binary control signals from the process level and transmit them to the higher-level automation unit.

The signals are optionally connected via screw-in M8 connectors (EP1xxx-0001) or screw-in M12 connectors (EP1xxx-0002).

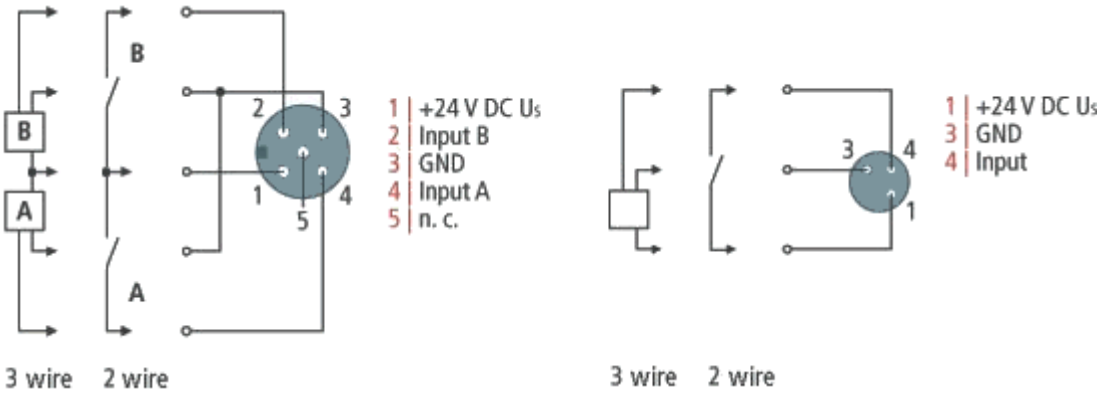


Fig. 97: Digital inputs M8 and M12

The sensors are supplied from the control voltage Us with a maximum current of 0.5 A.

The state of the signals is indicated by light emitting diodes.

3.6.4 Digital In-/Outputs M8 and M12

The EPP2338-x00x have digital channels, each of which can optionally be operated as an input or as an output.

As the channels are operated as digital inputs the modules acquire the binary control signals from the process level and transmit them to the higher-level automation unit. The sensors are supplied from the load supply voltage U_P.

As the channels are operated as digital outputs the modules connect the binary control signals from the automation unit on to the actuators at the process level. The outputs are short-circuit safe and protected against inverse connection. The signals are connected via screw-in M8 connectors (EPP2xxx-xxx1) or screw-in M12 connectors (EPP2xxx-xxx2).

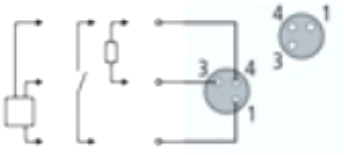


Fig. 98: Digital In-/Output M8

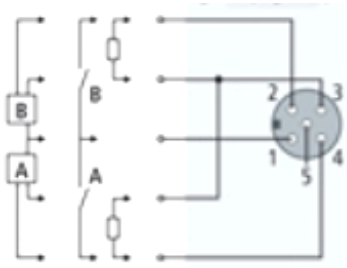


Fig. 99: Digital In-/Output M12

The outputs indicate their status through light emitting diodes.

3.6.5 Digital outputs Sub-D 25, 16 channels

The EP2816 digital output module transmits the binary control signals from the automation unit on to the actuators at the process level.

The 16 outputs deliver load currents of up to 0.5 A, although the total current from all the outputs must not exceed 4 A.

The signal connection is made through a 25-pin sub-D socket.

The outputs are short-circuit proof and protected against inverse connection.

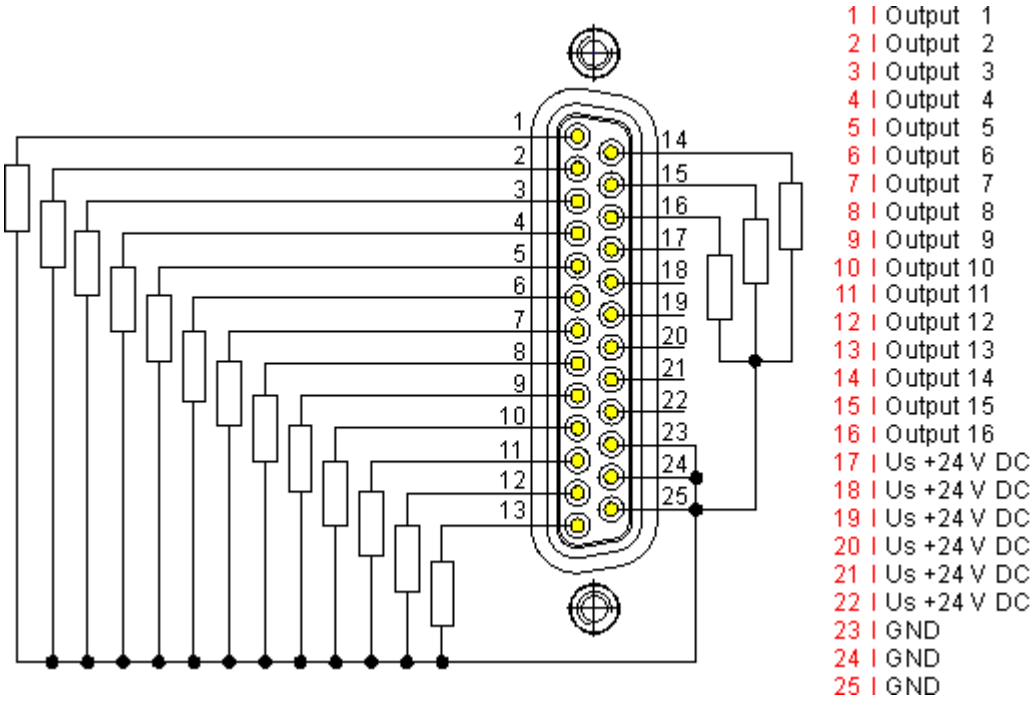


Fig. 100: Digital outputs Sub-D 25, 16 channels

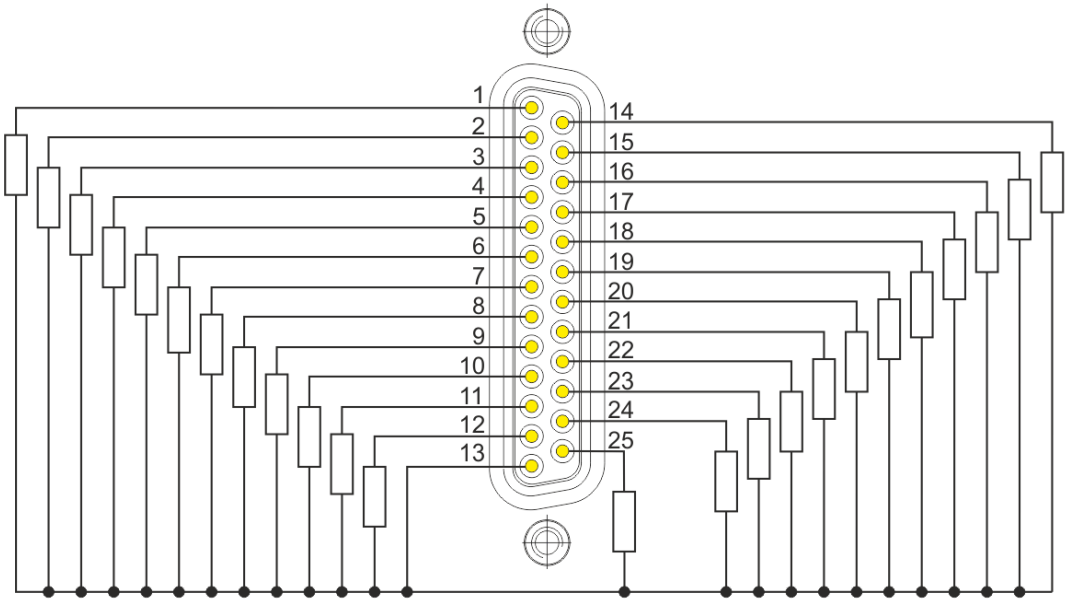
3.6.6 Digital outputs Sub-D 25, 24 channels

The EP2817-0008 digital output modules transmit the binary control signals from the automation unit on to the actuators at the process level.

The 24 outputs deliver load currents of up to 0.5 A, although the total current from all the outputs must not exceed 4 A.

The signal connection is made through a 25-pin sub-D socket.

The outputs are short-circuit proof and protected against inverse connection.



1 I Output 1
2 I Output 3
3 I Output 5
4 I Output 7
5 I Output 9
6 I Output 11
7 I Output 13
8 I Output 15
9 I Output 17
10 I Output 19
11 I Output 21
12 I Output 23
13 I GND
14 I Output 2
15 I Output 4
16 I Output 6
17 I Output 8
18 I Output 10
19 I Output 12
20 I Output 14
21 I Output 16
22 I Output 18
23 I Output 20
24 I Output 22
25 I Output 24

Fig. 101: Digital outputs Sub-D 25, 24 channels

3.6.7 Digital outputs Sub-D 9, 8 channels

The IE2808 digital output module transmits the binary control signals from the automation unit on to the actuators at the process level.

The 16 outputs deliver load currents of up to 0.5 A, although the total current from all the outputs must not exceed 4 A.

The signal connection is made through two 9-pin sub-D sockets

The outputs are short-circuit proof and protected against inverse connection.

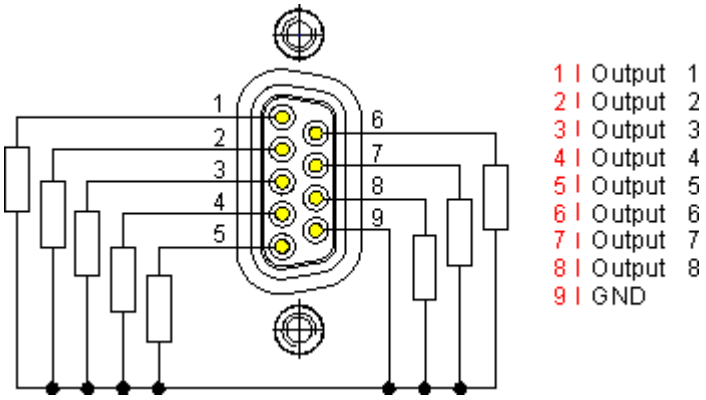


Fig. 102: Digital outputs Sub-D 9, 8 channels

3.6.8 Digital inputs and outputs Sub-D 25

The EP2316-008 digital combination module

- connects the binary control signals from the automation unit on to the actuators at the process level.
- acquires the binary control signals from the process level and transmits them to the higher-level automation unit.

The 8 outputs deliver load currents of up to 0.5 A, although the total current from all the outputs must not exceed 4 A. The outputs are short-circuit proof and protected against inverse connection.

The sensors are supplied from the control voltage Us.

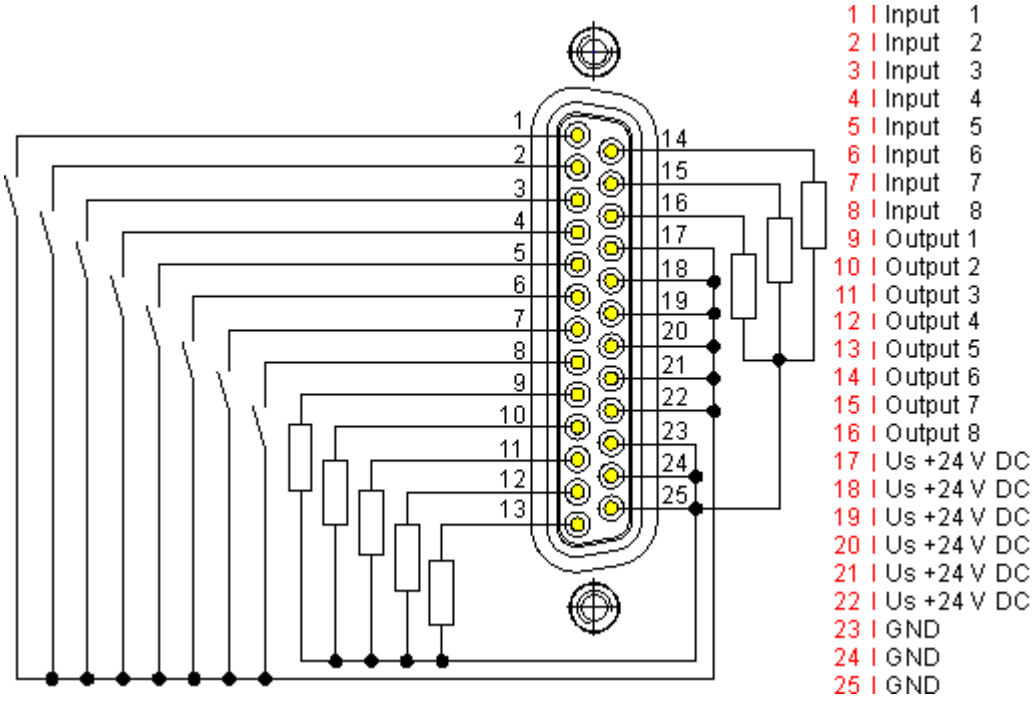


Fig. 103: Digital inputs and outputs Sub-D 25

3.6.9 Digital inputs and outputs ZS2001, 8 channels

The digital outputs connect the binary control signals from the automation unit on to the actuators at the process level. The 8 outputs handle load currents of up to 0.5 A, and indicate their status through light emitting diodes. The signals are optionally connected via several KM connectors. The outputs are short-circuit safe and protected against inverse connection.

The digital inputs acquire the binary control signals from the process level and transmit them to the higher-level automation unit. The signal state is indicated by means of light emitting diodes. The signals are optionally connected via several KM-connectors.

The sensors are supplied from the control voltage U_S. The load voltage, U_P, is required for the output drivers. If U_P and U_S are used for passing the power on, the maximum current must not exceed 4 A.

Inputs

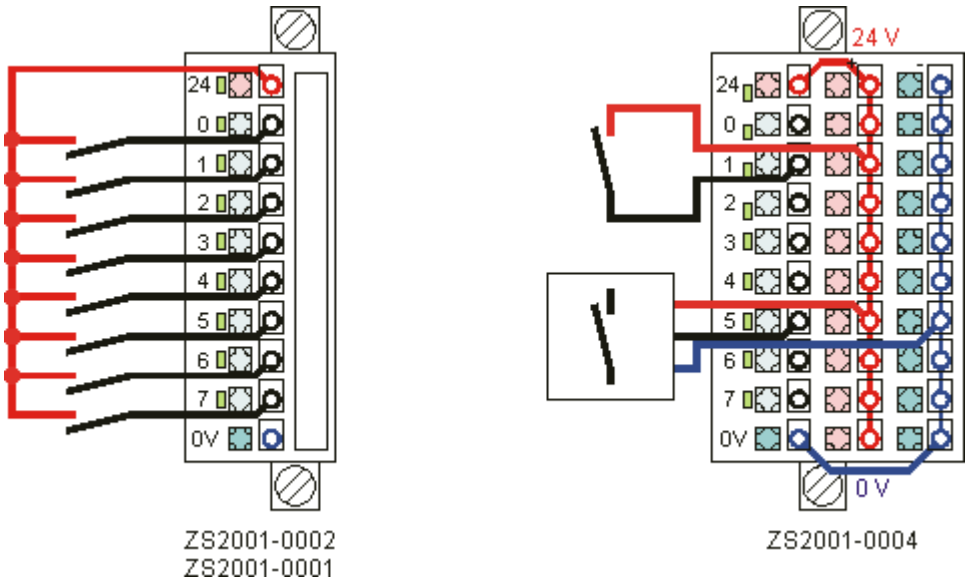


Fig. 104: Digital inputs ZS2001, 8 channels

The picture shows connection of 8 sensors in single-wire and of respectively one sensor in two- and three-wire connection.
Please pay attention for connector ZS2001-0004: two bridges (24 V und 0 V) are necessary to feed the terminal points for two- and three-wire connection.

Outputs

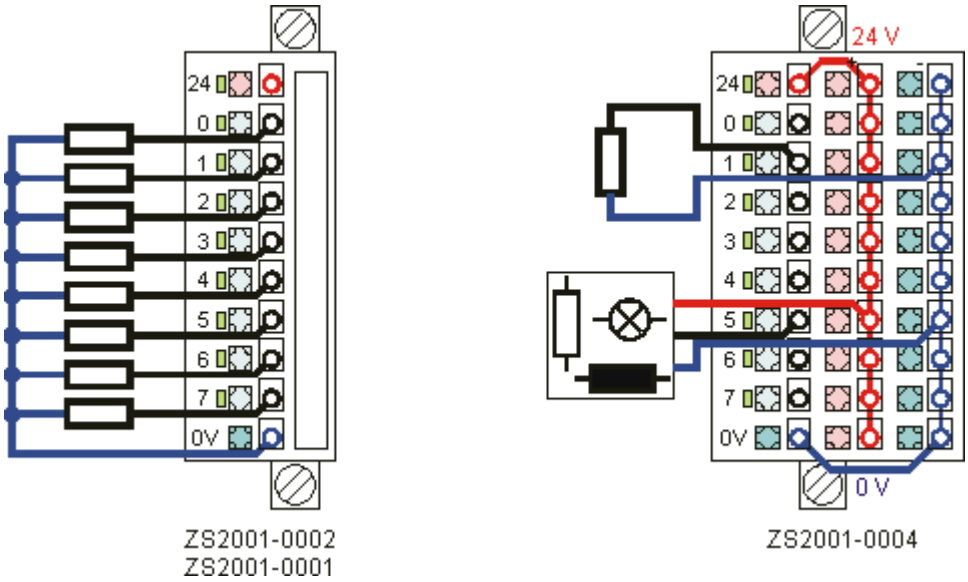


Fig. 105: Digital outputs ZS2001, 8 channels

The picture shows connection of 8 actuators in single-wire and of respectively one actuator in two- and three-wire connection.
Please pay attention for connector ZS2001-0004: two bridges (24 V und 0 V) are necessary to feed the terminal points for two- and three-wire connection.

3.6.9.1 Ordering information for KM plug-in connector

Fig. 106: KM plug-in connector for single-wire connection (ZS2001-0001, ZS2001-0002)

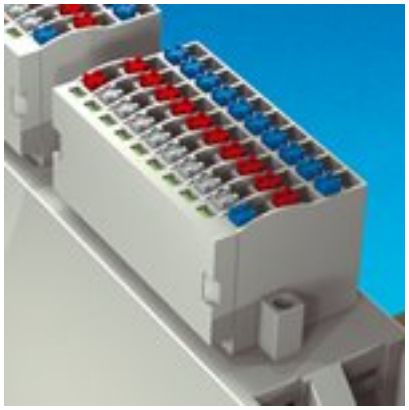


Fig. 107: KM plug-in connector for tree-wire connection (ZS2001-0004)

Ordering name	Signal LEDs	Wiring technique		
		single-wire	two-wire	three-wire
ZS2001-0001	no	yes	no	no
ZS2001-0002	yes	yes	no	no
ZS2001-0004	yes	yes	yes	yes

3.6.9.2 Technical Data

Technical Data	ZS2001-0001	ZS2001-0002	ZS2001-0004
Number of terminal points	10	10	30
Signal LEDs	no	yes	yes
Nominal voltage	50 V_{DC}	24 V_{DC}	24 V_{DC}
Nominal current	2 A		
Wire size with	0,5 mm^2 ... 1,5 mm^2		
Wire stripping length	8 mm		
Dimensions (w x h x d)	app. 42mm x 10,3mm x 26,9mm	app. 42mm x 12,7mm x 26,9mm	app. 42mm x 20,8mm x 26,9mm
Weight	app. 10 g	app. 10 g	app. 20 g
Permissible ambient temperature range during operation	0°C ... + 55°C		
Permissible ambient temperature range during storage	-25°C ... + 85°C		
Permissible relative humidity	95%, no condensation		
Vibration / shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27		
EMC resistance burst / ESD	conforms to EN 61000-6-2 / EN 61000-6-4		
Protection class	IP20		
Installation position	variable		
Approval	CE		

3.7 Cabling

A list of EtherCAT cables, power cables, sensor cables, Ethernet/EtherCAT connectors and field-configurable connectors can be found under the following link: http://download.beckhoff.com/download/document/catalog/main_catalog/german/Beckhoff_EtherCAT-Box-Zubehoer.pdf

The corresponding data sheets can be found under the following link:

https://beckhoff.de/default.asp?ethercat-box/ethercat_box_cables.htm?id=690338951657421

EtherCAT cables

Fig. 108: ZK1090-3131-0xxx

For connecting EtherCAT devices, only use shielded Ethernet cables with a minimum specification of **category 5 (CAT5) according to EN 50173 or ISO/IEC 11801**.

Note	**Wiring recommendations** Detailed recommendations for EtherCAT cabling can be found in the documentation "Design recommendations for EtherCAT/Ethernet infrastructure", which is available for download from www.beckhoff.de.

EtherCAT uses four cable wires for signal transmission.
Due to automatic cable detection (auto-crossing) symmetric (1:1) or cross-over cables can be used between EtherCAT devices from Beckhoff.

Power cable

Fig. 109: ZK2020-3132-0xxx

Sensor cables

Fig. 110: Selection of Beckhoff sensor cables

4 Commissioning/Configuration

4.1 Inserting into the EtherCAT network

Note	**Installation of the latest XML device description** Please ensure that you have installed the latest XML device description in TwinCAT. This can be downloaded from the Beckhoff website (http://www.beckhoff.de/english/download/elconfg.htm?id=1983920606140) and installed according to the installation instructions.

At the Beckhoff TwinCAT System Manager the configuration tree can be build in two different ways:

- by scanning [▶ 116] for existing hardware (called "online") and
- by manual inserting/appending [▶ 116] of fieldbus devices, couplers and slaves.

Automatic scanning in of the box

- The EtherCAT system must be in a safe, de-energized state before the EtherCAT modules are connected to the EtherCAT network!
- Switch on the operating voltage, open the TwinCAT System Manager [▶ 119] (Config mode), and scan in the devices (see Fig. 1). Acknowledge all dialogs with "*OK*", so that the configuration is in "FreeRun" mode.

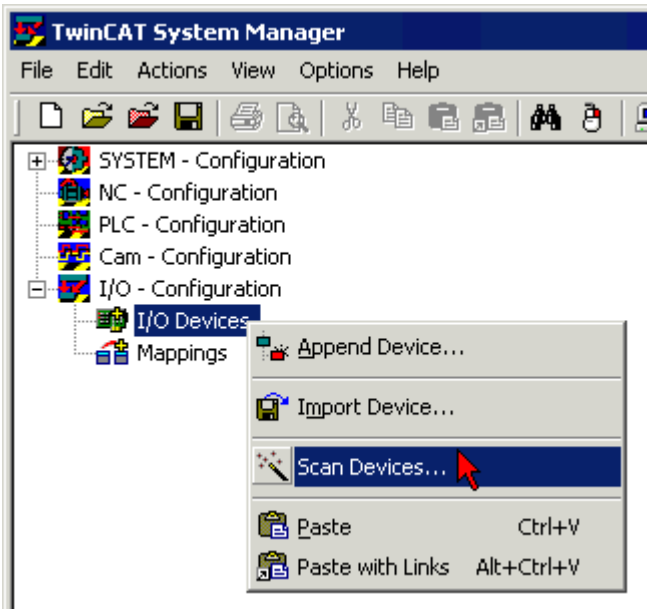


Fig. 111: Scanning in the configuration (I/O Devices -> right-click -> Scan Devices...)

Appending a module manually

- The EtherCAT system must be in a safe, de-energized state before the EtherCAT modules are connected to the EtherCAT network!
- Switch on the operating voltage, open the TwinCAT System Manager [▶ 119] (Config mode)
- Append a new I/O device. In the dialog that appears select the device *EtherCAT (Direct Mode),* and confirm with *OK*.

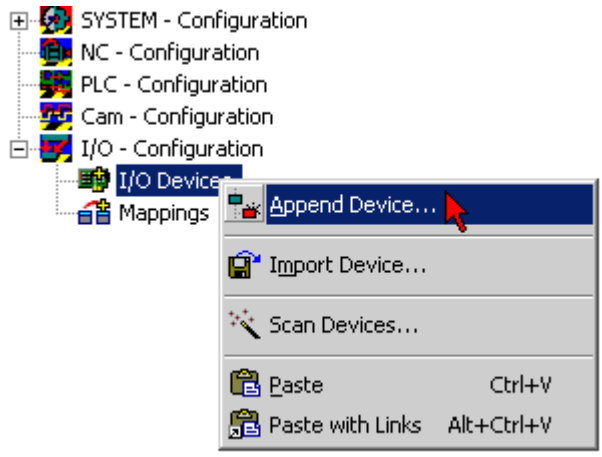


Fig. 112: Appending a new I/O device (I/O Devices -> right-click -> Append Device...)

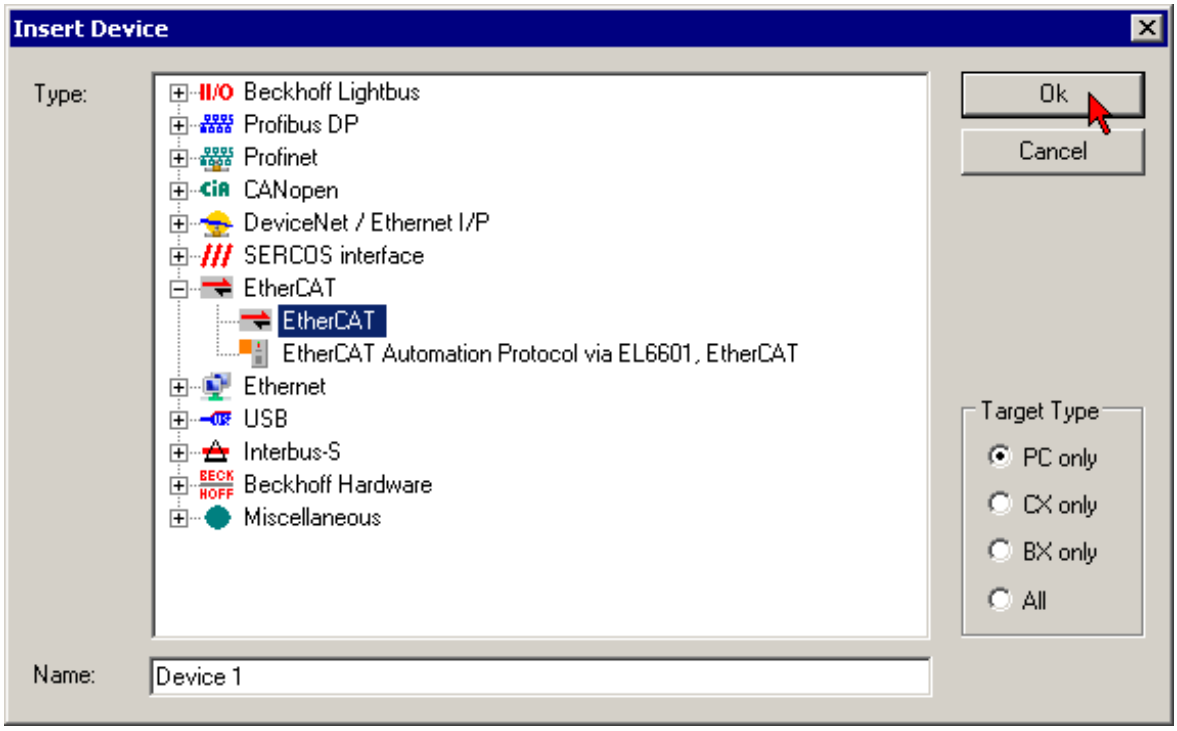


Fig. 113: Selecting the device EtherCAT

- Append a new box.

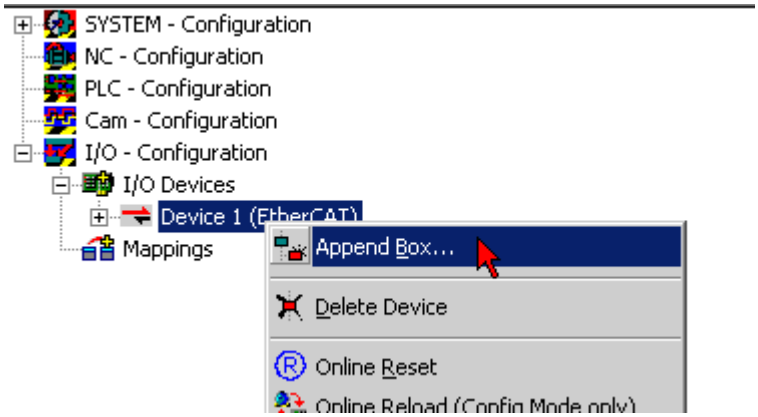


Fig. 114: Appending a new box (Device -> right-click -> Append Box...)

- In the dialog that appears select the desired box (e.g. EP2816-0008), and confirm with *OK*.

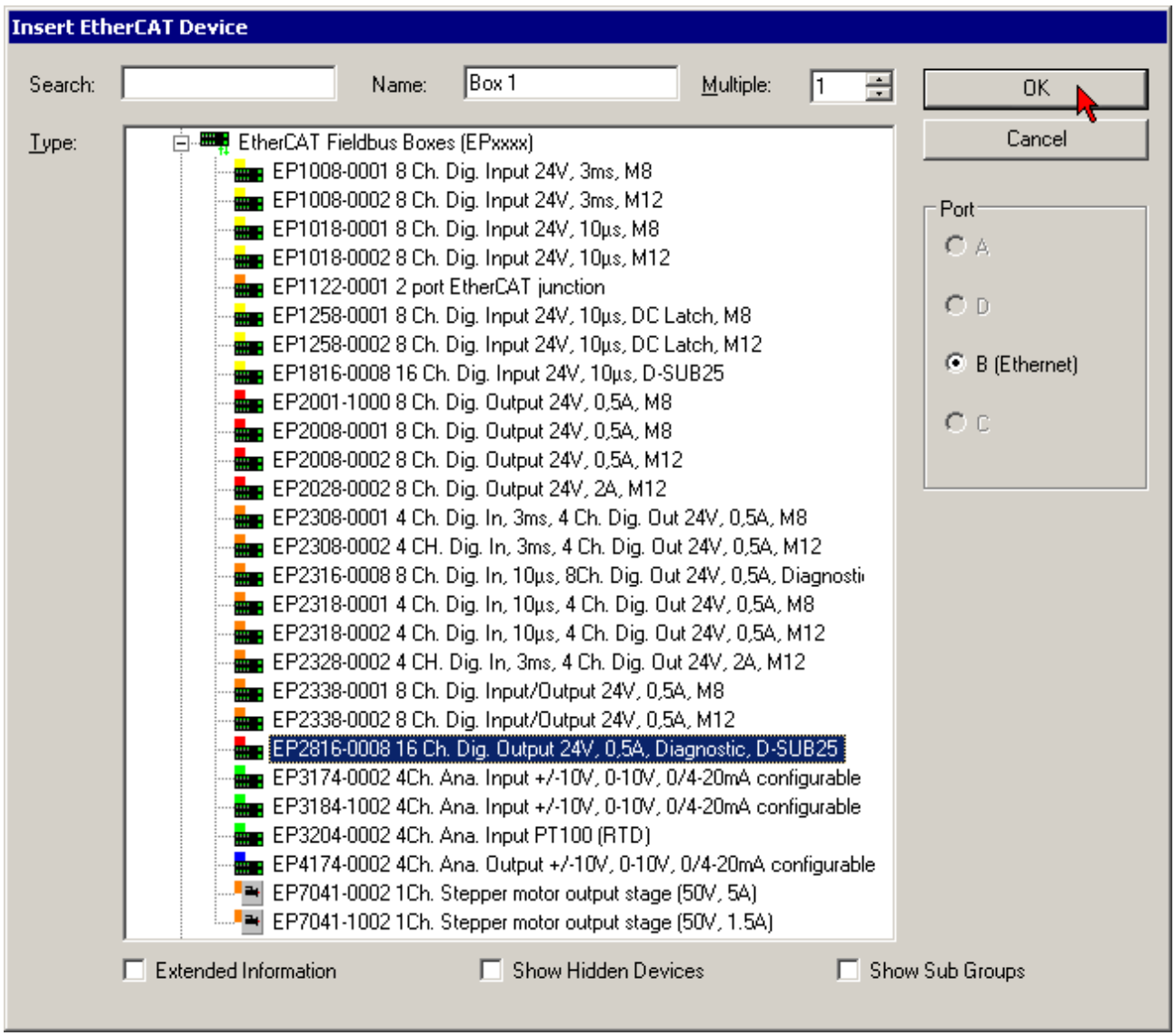


Fig. 115: Selecting a Box (e.g. EP2816-0008)

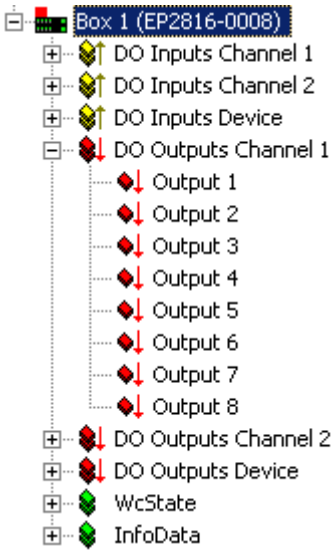


Fig. 116: Appended Box in the TwinCAT tree

4.2 Configuration via TwinCAT

In the left-hand window of the TwinCAT System Manager, click on the branch of the EtherCAT Box you wish to configure (EP2816-0008 in this example).

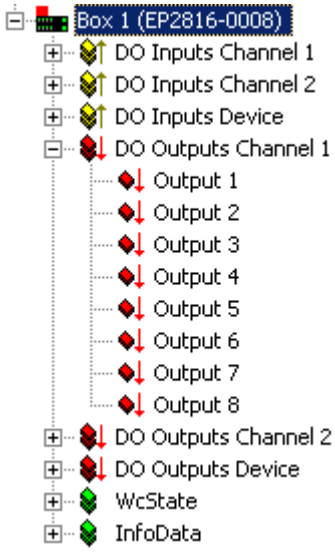


Fig. 117: Branch of the EtherCAT box to be configured

In the right-hand window of the TwinCAT System manager, various tabs are now available for configuring the EtherCAT Box.

General tab

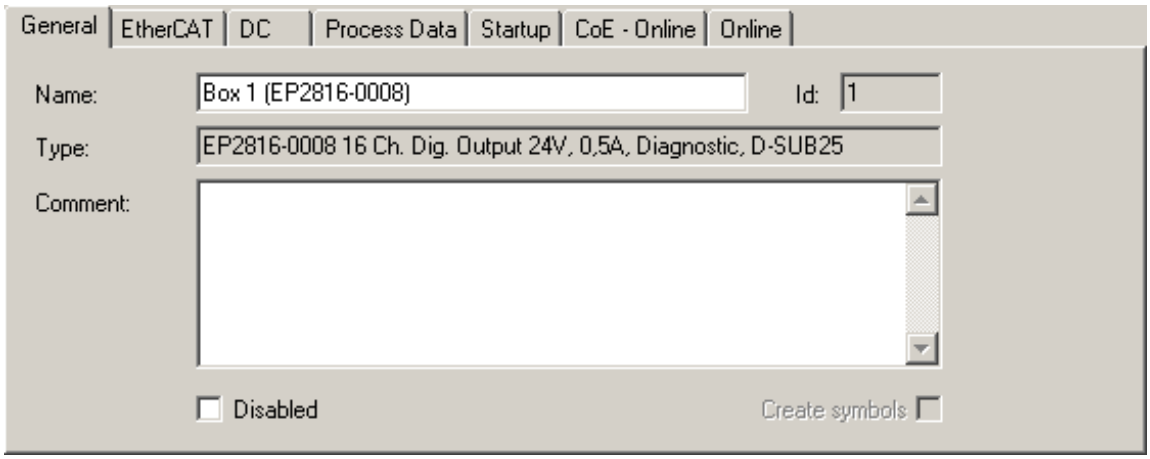


Fig. 118: General tab

Name	Name of the EtherCAT device
Id	Number of the EtherCAT device
Type	EtherCAT device type
Comment	Here you can add a comment (e.g. regarding the system).
Disabled	Here you can deactivate the EtherCAT device.
Create symbols	Access to this EtherCAT slave via ADS is only available if this control box is activated.

EtherCAT tab

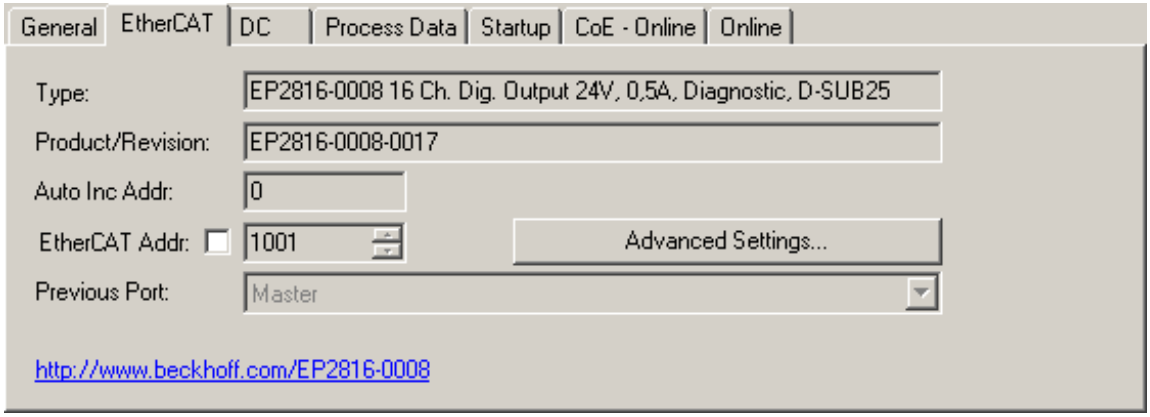


Fig. 119: EtherCAT tab

Type	EtherCAT device type
Product/Revision	Product and revision number of the EtherCAT device
Auto Inc Addr.	Auto increment address of the EtherCAT device. The auto increment address can be used for addressing each EtherCAT device in the communication ring through its physical position. Auto increment addressing is used during the start-up phase when the EtherCAT master allocates addresses to the EtherCAT devices. With auto increment addressing the first EtherCAT slave in the ring has the address 0000_{hex}. For each further slave the address is decremented by 1 ($FFFF_{hex}$, $FFFE_{hex}$ etc.).
EtherCAT Addr.	Fixed address of an EtherCAT slave. This address is allocated by the EtherCAT master during the start-up phase. Tick the control box to the left of the input field in order to modify the default value.
Previous Port	Name and port of the EtherCAT device to which this device is connected. If it is possible to connect this device with another one without changing the order of the EtherCAT devices in the communication ring, then this combination field is activated and the EtherCAT device to which this device is to be connected can be selected.
Advanced Settings	This button opens the dialogs for advanced settings.

The link at the bottom of the tab points to the product page for this EtherCAT device on the web.

Process Data tab

Indicates the configuration of the process data. The input and output data of the EtherCAT slave are represented as CANopen process data objects (PDO). The user can select a PDO via PDO assignment and modify the content of the individual PDO via this dialog, if the EtherCAT slave supports this function.

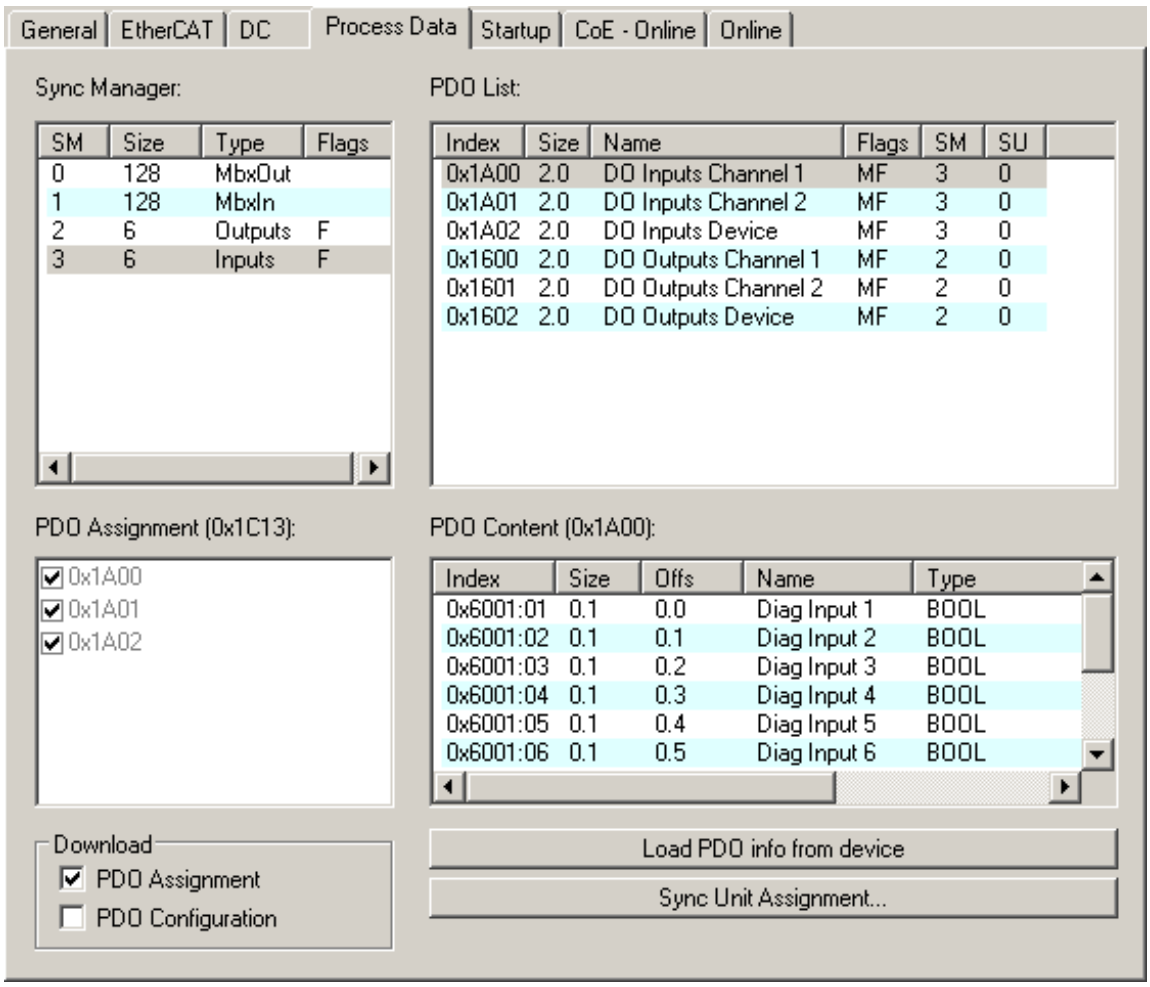


Fig. 120: Process Data tab

Sync Manager

Lists the configuration of the Sync Manager (SM).
If the EtherCAT device has a mailbox, SM0 is used for the mailbox output (MbxOut) and SM1 for the mailbox input (MbxIn).
SM2 is used for the output process data (outputs) and SM3 (inputs) for the input process data.

If an input is selected, the corresponding PDO assignment is displayed in the *PDO Assignment* list below.

PDO Assignment

PDO assignment of the selected Sync Manager. All PDOs defined for this Sync Manager type are listed here:

- If the output Sync Manager (outputs) is selected in the Sync Manager list, all RxPDOs are displayed.
- If the input Sync Manager (inputs) is selected in the Sync Manager list, all TxPDOs are displayed.

The selected entries are the PDOs involved in the process data transfer. In the tree diagram of the System Manager these PDOs are displayed as variables of the EtherCAT device. The name of the variable is identical to the *Name* parameter of the PDO, as displayed in the PDO list. If an entry in the PDO assignment list is deactivated (not selected and greyed out), this indicates that the input is excluded from the PDO assignment. In order to be able do select a greyed out PDO, the currently selected PDO has to be deselected first.

Note	**Activation of PDO assignment** • the EtherCAT slave has to run through the PS status transition cycle (from pre-operational to safe-operational) once (see Online tab [▶ 125]), • and the System Manager has to reload the EtherCAT slaves ( button)

PDO list

List of all PDOs supported by this EtherCAT device. The content of the selected PDOs is displayed in the *PDO Content* list. The PDO configuration can be modified by double-clicking on an entry.

Column	Description	
Index	PDO index.	
Size	Size of the PDO in bytes.	
Name	Name of the PDO. If this PDO is assigned to a Sync Manager, it appears as a variable of the slave with this parameter as the name.	
Flags	F	Fixed content: The content of this PDO is fixed and cannot be changed by the System Manager.
	M	Mandatory PDO. This PDO is mandatory and must therefore be assigned to a Sync Manager! Consequently, this PDO cannot be deleted from the *PDO Assignment* list
SM	Sync Manager to which this PDO is assigned. If this entry is empty, this PDO does not take part in the process data traffic.	
SU	Sync unit to which this PDO is assigned.	

PDO Content

Indicates the content of the PDO. If flag F (fixed content) of the PDO is not set the content can be modified.

Download

If the device is intelligent and has a mailbox, the configuration of the PDO and the PDO assignments can be downloaded to the device. This is an optional feature that is not supported by all EtherCAT slaves.

PDO Assignment

If this check box is selected, the PDO assignment that is configured in the PDO Assignment list is downloaded to the device on startup. The required commands to be sent to the device can be viewed in the Startup [▶ 122] tab.

PDO Configuration

If this check box is selected, the configuration of the respective PDOs (as shown in the PDO list and the PDO Content display) is downloaded to the EtherCAT slave.

Startup tab

The *Startup* tab is displayed if the EtherCAT slave has a mailbox and supports the *CANopen over EtherCAT* (CoE) or *Servo drive over EtherCAT* protocol. This tab indicates which download requests are sent to the mailbox during startup. It is also possible to add new mailbox requests to the list display. The download requests are sent to the slave in the same order as they are shown in the list.

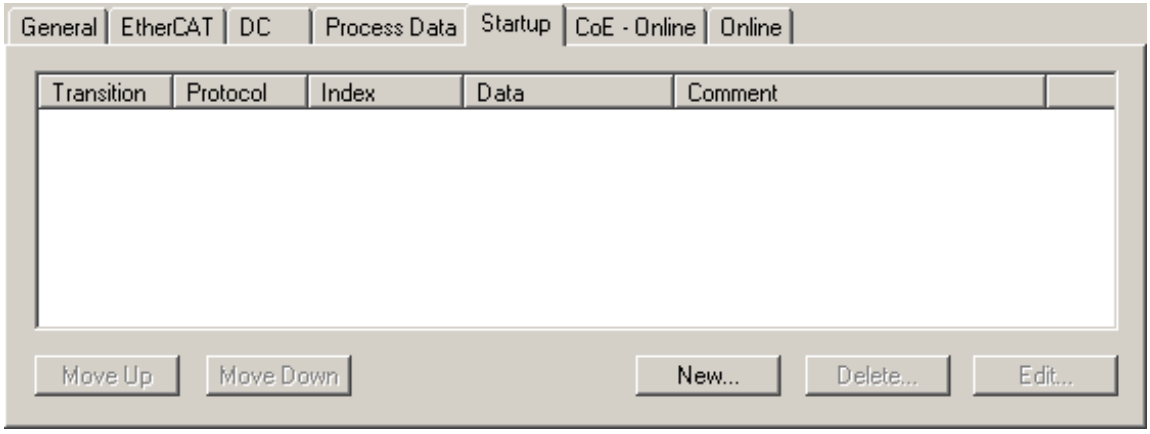


Fig. 121: Startup tab

Column	Description
Transition	Transition to which the request is sent. This can either be • the transition from pre-operational to safe-operational (PS), or • the transition from safe-operational to operational (SO). If the transition is enclosed in "<>" (e.g. <PS>), the mailbox request is fixed and cannot be modified or deleted by the user.
Protocol	Type of mailbox protocol
Index	Index of the object
Data	Date on which this object is to be downloaded.
Comment	Description of the request to be sent to the mailbox

Move Up	This button moves the selected request up by one position in the list.
Move Down	This button moves the selected request down by one position in the list.
New	This button adds a new mailbox download request to be sent during startup.
Delete	This button deletes the selected entry.
Edit	This button edits an existing request.

CoE - Online tab

The additional *CoE - Online* tab is displayed if the EtherCAT slave supports the *CANopen over EtherCAT* (CoE) protocol. This dialog lists the content of the object list of the slave (SDO upload) and enables the user to modify the content of an object from this list. Details for the objects of the individual EtherCAT devices can be found in the device-specific object descriptions.

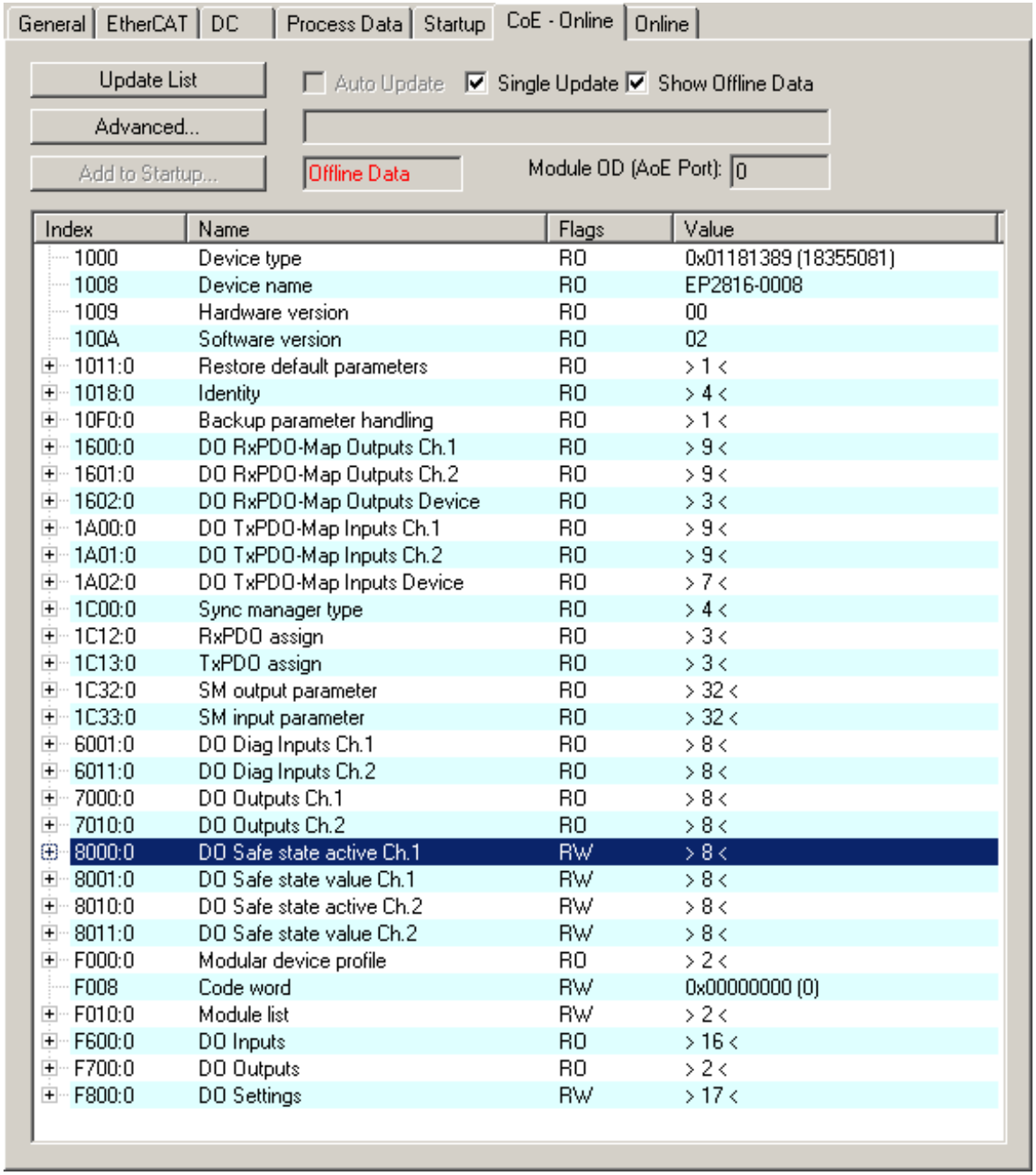


Fig. 122: CoE - Online tab

Table 2: Object list display

Column	Description	
Index	Index and sub-index of the object	
Name	Name of the object	
Flags	RW	The object can be read, and data can be written to the object (read/write)
	RO	The object can be read, but no data can be written to the object (read only)
	P	An additional P identifies the object as a process data object.
Value	Value of the object	

Update List The *Update list* button updates all objects in the displayed list

Auto Update If this check box is selected, the content of the objects is updated automatically.

Advanced The *Advanced* button opens the *Advanced Settings* dialog. Here you can specify which objects are displayed in the list.

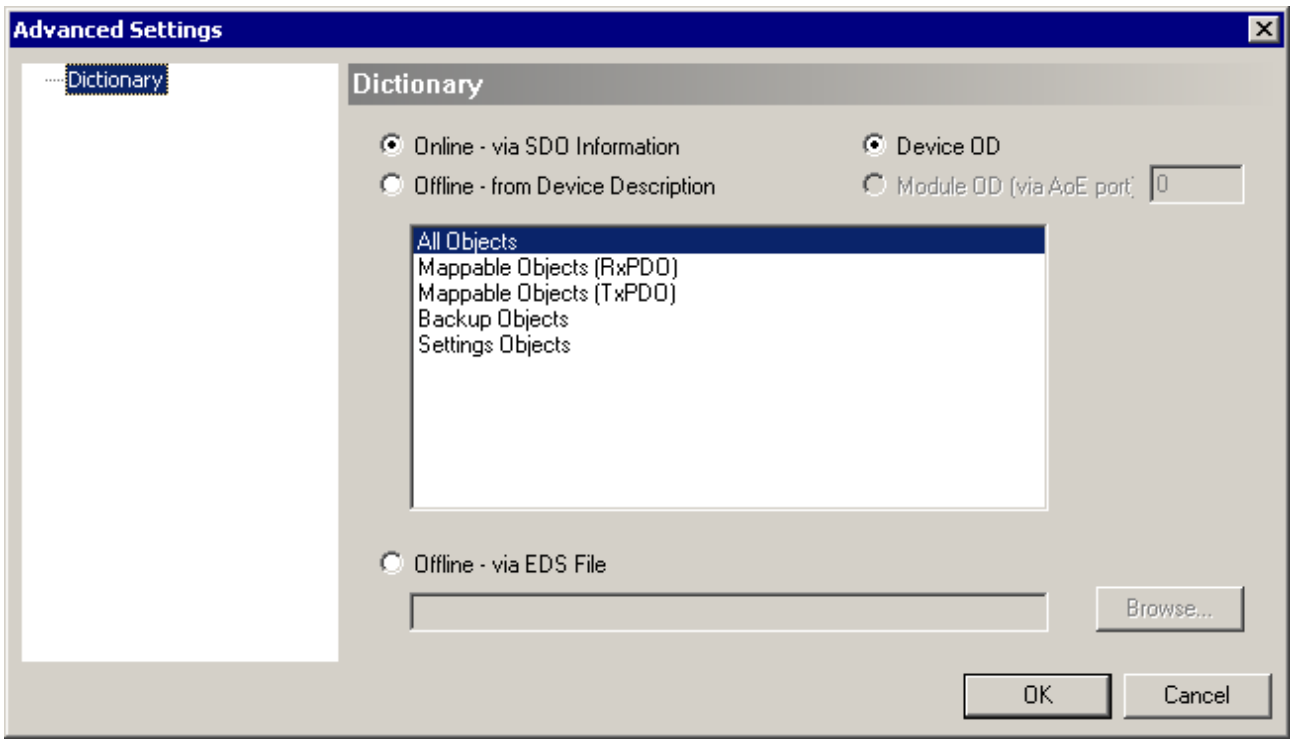


Fig. 123: Advanced Settings

Online - via SDO Information
If this option button is selected, the list of the objects included in the object list of the slave is uploaded from the slave via SDO information. The list below can be used to specify which object types are to be uploaded.

Offline - via EDS File
If this option button is selected, the list of the objects included in the object list is read from an EDS file provided by the user.

Online tab

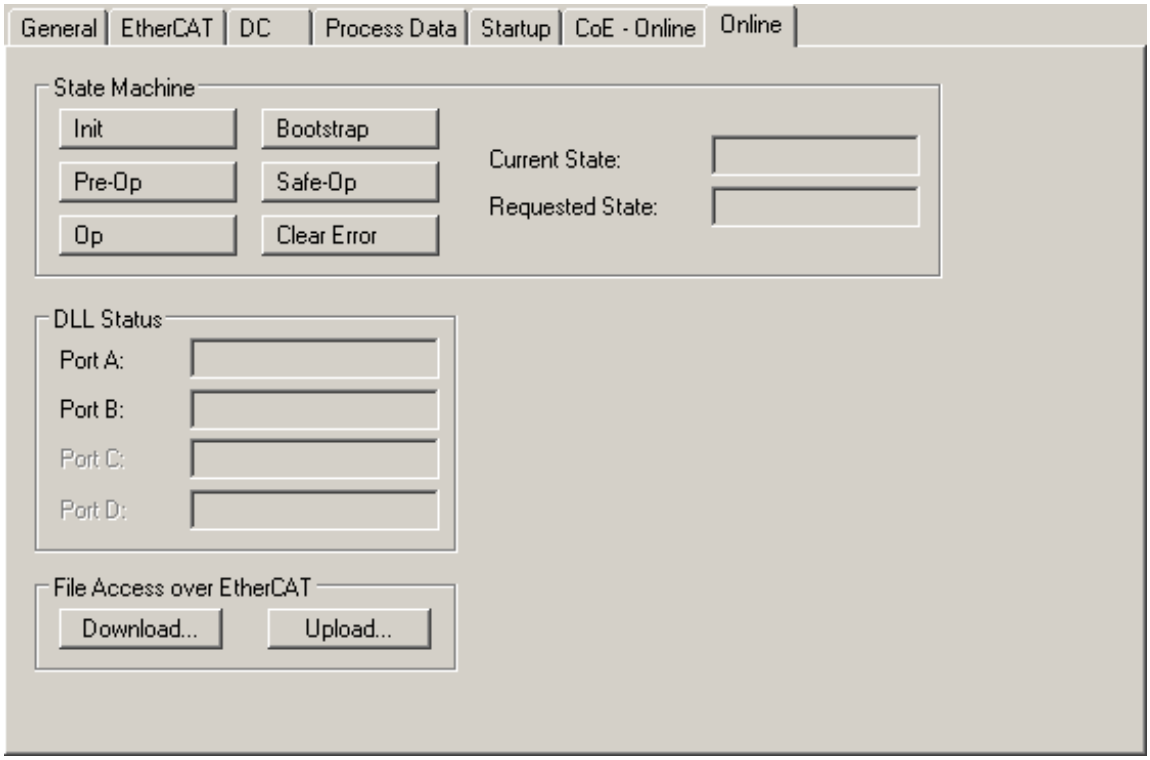


Fig. 124: Online tab

State Machine

Init	This button attempts to set the EtherCAT device to the *Init* state.
Pre-Op	This button attempts to set the EtherCAT device to the *pre-operational* state.
Op	This button attempts to set the EtherCAT device to the *operational* state.
Bootstrap	This button attempts to set the EtherCAT device to the *Bootstrap* state.
Safe-Op	This button attempts to set the EtherCAT device to the *safe-operational* state.
Clear Error	This button attempts to delete the fault display. If an EtherCAT slave fails during change of state it sets an error flag. Example: An EtherCAT slave is in PREOP state (pre-operational). The master now requests the SAFEOP state (safe-operational). If the slave fails during change of state it sets the error flag. The current state is now displayed as ERR PREOP. When the *Clear Error* button is pressed the error flag is cleared, and the current state is displayed as PREOP again.
Current State	Indicates the current state of the EtherCAT device.
Requested State	Indicates the state requested for the EtherCAT device.

DLL Status

Indicates the DLL status (data link layer status) of the individual ports of the EtherCAT slave. The DLL status can have four different states:

Status	Description
No Carrier / Open	No carrier signal is available at the port, but the port is open.
No Carrier / Closed	No carrier signal is available at the port, and the port is closed.
Carrier / Open	A carrier signal is available at the port, and the port is open.
Carrier / Closed	A carrier signal is available at the port, but the port is closed.

Table 3: File Access over EtherCAT

Download	With this button a file can be written to the EtherCAT device.
Upload	With this button a file can be read from the EtherCAT device.

4.3 EP2316-0008, EPP2316-0008 - Configuration

A number of parameterizations can be carried out for the EP2316-0003, EPP2316-0008, EP2316-0008, EP2816-0008 and EP2816-0010 modules on the *C0E - Online* tab in the TwinCAT System Manager.

The description of the parameterizations is done with the help of EP2316-0008 but is suitable for all this modules.

Definitions for the behavior of the outputs in case of network failure

With bit 8000:0n (Safe State Active) you can specify that channel n should adopt a specified value (Safe State Value) if the network communication is interrupted or not.

With bit 8001:0n (Safe State Value) you define this specific value for channel n.

Note	**Safe State Value at network start up** The network transfers output process data only at the network states Save-Operational (SAFE-OP) and Operational (OP). Also at the network states INIT, Pre-Operational (PRE-OP) and BOOT passed through during network start up no output process data is transmitted. If Safe State is activated for an output, this output adopts the specified value also during network start up.

8000:0 - DIG Safe state active Ch.1

Note	**Observe the maximum short-circuit current!** When dimensioning the power supply unit and choosing the fuses, observe that the short-circuit current is approximately 1.7 A.

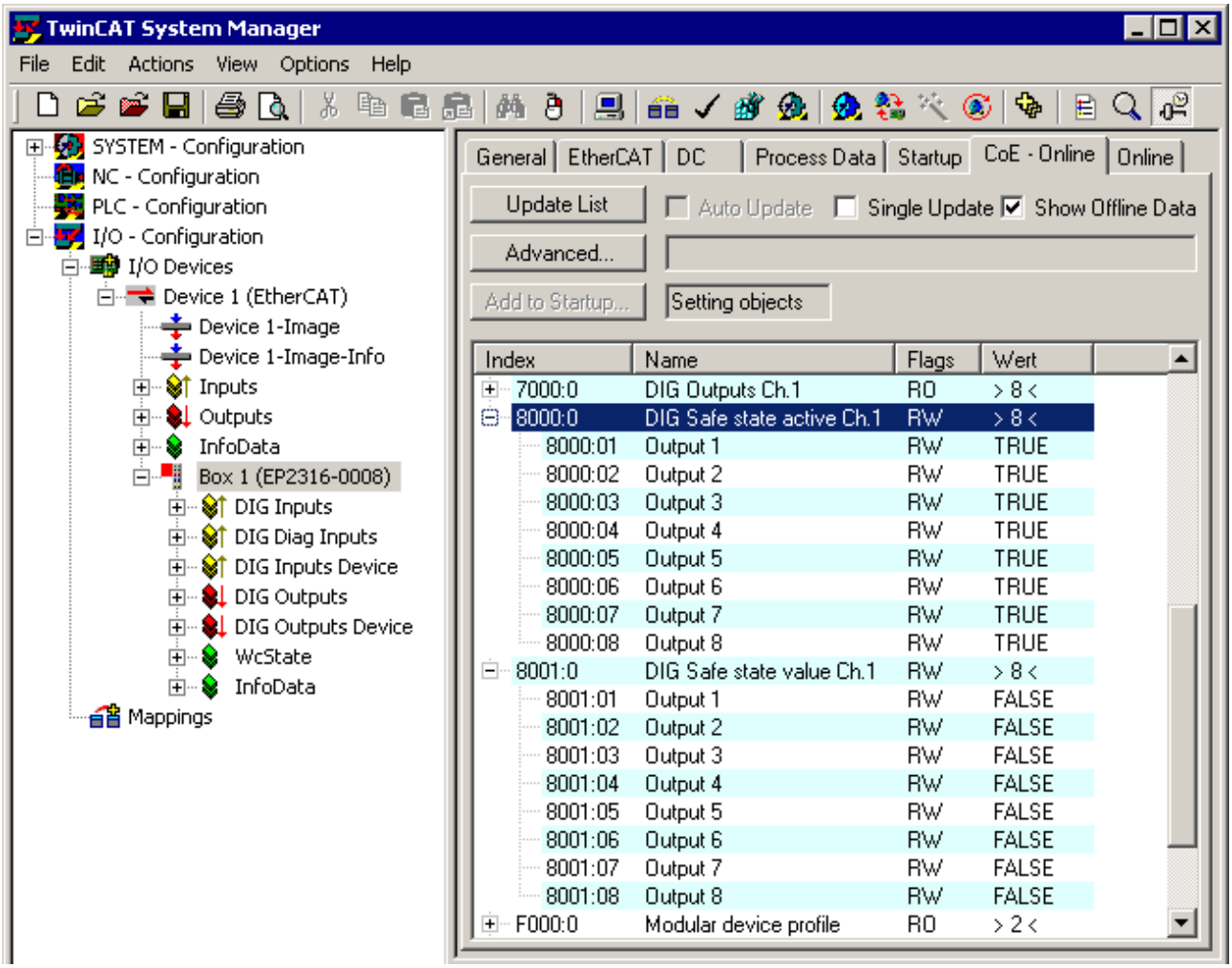


Fig. 125: EP2316-0008 - 8000:0 - DIG Safe state active Ch.1

8000:01 to 8000:08 - DIG Safe state active Ch.1, Output 1 to Output 8 (default: TRUE)

Specifies whether or not the outputs should adopt a safe state in the case of network failure.

Value	Meaning
FALSE	Safe state disabled
TRUE	Safe state enabled

8001:01 to 8001:08 - DIG Safe state value Ch.1, Output 1 to Output 8 (default: FALSE)

Specifies what the safe state is.

Value	Meaning
FALSE	Output switched off
TRUE	Output switched on

Definitions for the behavior of the outputs in the presence of a short-circuit

F800:0 - DO Settings (Safe State Value)

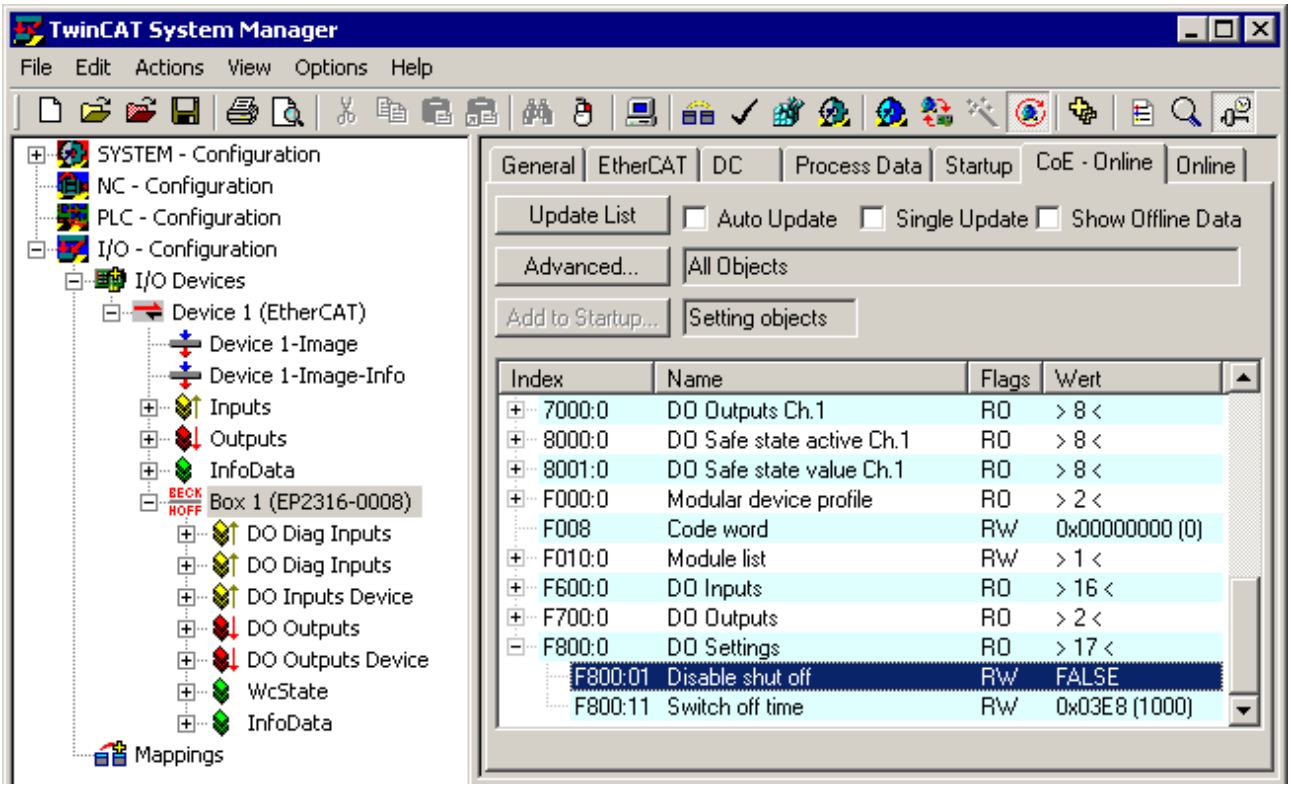


Fig. 126: EP2316-0008 - F800:0 - DO Settings (Safe State Value)

Table 4: F800:01 - Disable shut off (default: FALSE)

Value	Meaning
FALSE	If a short-circuit occurs at one output, all outputs of the module will be switched off. This disabling can be removed through the process data value *Reset Outputs*.
TRUE	If a short-circuit occurs at one output, only this output of the module will be switched off. After the short circuit has been eliminated, this output is automatically enabled again. see "Extracted nested table 3"

F800:11 - Switch off time (default: 0x03E8, 1000_{dec})

Here you can enter a time in milliseconds. During this time, the module checks whether the short circuit has been repaired by switching itself on again. Default = 1000 ms (depending on the type of module and the internal cycle time). Errors are displayed after this time.

4.4 EP2316-0008 / EPP2316-0008 - Object description and parameterization

Note	**Parameterization** Terminals'/Boxes' parameterization will be conducted by the CoE tab (double-click on the referring object) or the Process data tab (PDO assignment)

Note	**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.

Introduction

The CoE overview contains objects for different intended applications:

- Objects required for parameterization [▶ 130] during commissioning
- Objects intended for regular operation [▶ 131], e.g. through ADS access
- Objects for indicating internal settings [▶ 131] (may be fixed)
- Further profile-specific objects [▶ 136] indicating inputs, outputs and status information

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

Objects for parameterization during commissioning

Index 1011 Restore default parameters

Index	Name	Meaning	Data type	Flags	Default
1011:0	Restore default parameters	Restore the default settings in the EtherCAT/EtherCAT P slave	UINT8	RO	0x01 (1_{dec})
1011:01	SubIndex 001	If this object is set to **"0x64616F6C"** ("Set Value Dialog") all terminal-specific objects are reset to their delivery state.	UINT32	RW	0x00000000 (0_{dec})

Index 8000 DIG Safe state active

The outputs the bit *DIG Safe state active* is set for, are switched to the value that is specified in *Safe state value*, in case of status Operational (OP) is left.
Status Operational (OP) is left if communication to the master is interrupted, for example at power breakdown at the master or cable breakage.

Index	Name	Meaning	Data type	Flags	Default
8000:0	DIG Safe state active		UINT8	RO	0x08 (8_{dec})
8000:01	Output 1	0_{bin}: DIG Safe state for output 1 is disabled 1_{bin}: DIG Safe state for output 1 is enabled	boolean	RW	1_{bin}
8000:02	Output 2	0_{bin}: DIG Safe state for output 2 is disabled 1_{bin}: DIG Safe state for output 2 is enabled	boolean	RW	1_{bin}
8000:03	Output 3	0_{bin}: DIG Safe state for output 3 is disabled 1_{bin}: DIG Safe state for output 3 is enabled	boolean	RW	1_{bin}
8000:04	Output 4	0_{bin}: DIG Safe state for output 4 is disabled 1_{bin}: DIG Safe state for output 4 is enabled	boolean	RW	1_{bin}
8000:05	Output 5	0_{bin}: DIG Safe state for output 5 is disabled 1_{bin}: DIG Safe state for output 5 is enabled	boolean	RW	1_{bin}
8000:06	Output 6	0_{bin}: DIG Safe state for output 6 is disabled 1_{bin}: DIG Safe state for output 6 is enabled	boolean	RW	1_{bin}
8000:07	Output 7	0_{bin}: DIG Safe state for output 7 is disabled 1_{bin}: DIG Safe state for output 7 is enabled	boolean	RW	1_{bin}
8000:08	Output 8	0_{bin}: DIG Safe state for output 8 is disabled 1_{bin}: DIG Safe state for output 8 is enabled	boolean	RW	1_{bin}

Index 8001 DIG Safe state value

Here the values are specified, the outputs are switched to if the status Operational (OP) is left.

Index	Name	Meaning	Data type	Flags	Default
8001:0	DIG Safe state value		UINT8	RO	0x08 (8_{dec})
8001:01	Output 1	0_{bin}: DIG Safe state for output 1 = 0 1_{bin}: DIG Safe state for output 1 = 1	boolean	RW	0_{bin}
8001:02	Output 2	0_{bin}: DIG Safe state for output 2 = 0 1_{bin}: DIG Safe state for output 2 = 1	boolean	RW	0_{bin}
8001:03	Output 3	0_{bin}: DIG Safe state for output 3 = 0 1_{bin}: DIG Safe state for output 3 = 1	boolean	RW	0_{bin}
8001:04	Output 4	0_{bin}: DIG Safe state for output 4 = 0 1_{bin}: DIG Safe state for output 4 = 1	boolean	RW	0_{bin}
8001:05	Output 5	0_{bin}: DIG Safe state for output 5 = 0 1_{bin}: DIG Safe state for output 5 = 1	boolean	RW	0_{bin}
8001:06	Output 6	0_{bin}: DIG Safe state for output 6 = 0 1_{bin}: DIG Safe state for output 6 = 1	boolean	RW	0_{bin}
8001:07	Output 7	0_{bin}: DIG Safe state for output 7 = 0 1_{bin}: DIG Safe state for output 7 = 1	boolean	RW	0_{bin}
8001:08	Output 8	0_{bin}: DIG Safe state for output 8 = 0 1_{bin}: DIG Safe state for output 8 = 1	boolean	RW	0_{bin}

Objects for normal operation

The EP2xxx/EPP2xxx do not have objects like this.

Further objects

Standard objects (0x1000-0x1FFF)

The standard objects of all EtherCAT/EtherCAT P slaves have the same meaning.

Index 1000 Device type

Index	Name	Meaning	Data type	Flags	Default
1000:0	Device type	Device Type of the EtherCAT/EtherCAT P slave: The Lo-Word contains the supported CoE Profile (5001). The Hi-Word contains the Module Profile corresponding 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/EtherCAT P slave	STRING	RO	EP2316-0008

Index 1009 Hardware version

Index	Name	Meaning	Data type	Flags	Default
1009:0	Hardware version	Hardware version of the EtherCAT/EtherCAT P slave	STRING	RO	04

Index 100A Software version

Index	Name	Meaning	Data type	Flags	Default
100A:0	Software version	Firmware version of the EtherCAT/EtherCAT P slave	STRING	RO	04

Index 1018 Identity

Index	Name	Meaning	Data type	Flags	Default
1018:0	Identity	contains information to identify the EtherCAT/EtherCAT P slave	UINT8	RO	0x04 (4_{dec})
1018:01	Vendor ID	Vendor ID of the EtherCAT/EtherCAT P slave	UINT32	RO	0x00000002 (2_{dec})
1018:02	Product code	Product code of the EtherCAT/EtherCAT P slave	UINT32	RO	0x090C4052 (151797842_{dec})
1018:03	Revision	Revision number of the EtherCAT/EtherCAT P slave, the Lo-Word (Bit 0-15) indicates the special functions terminal number; the Hi-Word (Bit 16-31) refers to the device description.	UINT32	RO	0x00130008 (1245192_{dec})
1018:04	Serial number	Serial number of the EtherCAT/EtherCAT P slave, the Lo-Byte (Bit 0-7) of the Lo-Word contains the year of manufacturing, the Hi-Byte (Bit 8-15) of the Lo-Word contains the week of manufacturing, the Hi-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	contains information for the standardized Upload and Download of the Backup Entries	UINT8	RO	0x01 (1_{dec})
10F0:01	Checksum	Checksum over all backup entries	UINT32	RO	0x00000000 (0_{dec})

Index 1600 DIG RxPDO-Map Outputs

Index	Name	Meaning	Data type	Flags	Default
1600:0	DIG RxPDO-Map Outputs	PDO Mapping RxPDO 1	UINT8	RO	0x09 (9_{dec})
1600:01	SubIndex 001	1. PDO Mapping entry (object 0x7000 (DO Outputs Ch.1), entry 0x01 (Output 1))	UINT32	RO	0x7000:01, 1
1600:02	SubIndex 002	2. PDO Mapping entry (object 0x7000 (DO Outputs Ch.1), entry 0x02 (Output 2))	UINT32	RO	0x7000:02, 1
1600:03	SubIndex 003	3. PDO Mapping entry (object 0x7000 (DO Outputs Ch.1), entry 0x03 (Output 3))	UINT32	RO	0x7000:03, 1
1600:04	SubIndex 004	4. PDO Mapping entry (object 0x7000 (DO Outputs Ch.1), entry 0x04 (Output 4))	UINT32	RO	0x7000:04, 1
1600:05	SubIndex 005	5. PDO Mapping entry (object 0x7000 (DO Outputs Ch.1), entry 0x05 (Output 5))	UINT32	RO	0x7000:05, 1
1600:06	SubIndex 006	6. PDO Mapping entry (object 0x7000 (DO Outputs Ch.1), entry 0x06 (Output 6))	UINT32	RO	0x7000:06, 1
1600:07	SubIndex 007	7. PDO Mapping entry (object 0x7000 (DO Outputs Ch.1), entry 0x07 (Output 7))	UINT32	RO	0x7000:07, 1
1600:08	SubIndex 008	8. PDO Mapping entry (object 0x7000 (DO Outputs Ch.1), entry 0x08 (Output 8))	UINT32	RO	0x7000:08, 1
1600:09	SubIndex 009	9. PDO Mapping entry (8 bits align)	UINT32	RO	0x0000:00, 8

Index 1601 DIG RxPDO-Map Outputs Device

Index	Name	Meaning	Data type	Flags	Default
1601:0	DIG RxPDO-Map Outputs Device	PDO Mapping RxPDO 2	UINT8	RO	0x03 (3_{dec})
1601:01	SubIndex 001	1. PDO Mapping entry (object 0xF700 (DIG Outputs), entry 0x01 (Set safe state))	UINT32	RO	0xF700:01, 1
1601:02	SubIndex 002	2. PDO Mapping entry (object 0xF700 (DIG Outputs), entry 0x02 (Reset outputs))	UINT32	RO	0xF700:02, 1
1601:03	SubIndex 003	3. PDO Mapping entry (14 bits align)	UINT32	RO	0x0000:00, 14

Index 1A00 DIG TxPDO-Map Inputs

Index	Name	Meaning	Data type	Flags	Default
1A00:0	DIG TxPDO-Map Inputs	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 (SM output parameter), entry 0x20 (Sync error))	UINT32	RO	0x1C32:20, 1
1A00:0B	SubIndex 011	11. PDO Mapping entry (2 bits align)	UINT32	RO	0x0000:00, 2

Index 1A01 DIG TxPDO-Map Diag Inputs

Index	Name	Meaning	Data type	Flags	Default
1A01:0	DIG TxPDO-Map Diag Inputs	PDO Mapping TxPDO 2	UINT8	RO	0x09 (9_{dec})
1A01:01	SubIndex 001	1. PDO Mapping entry (object 0xF600 (DO Inputs), entry 0x01 (Safe state active))	UINT32	RO	0x6001:01, 1
1A01:02	SubIndex 002	2. PDO Mapping entry (object 0xF600 (DO Inputs), entry 0x02 (Error channel 1))	UINT32	RO	0x6001:02, 1
1A01:03	SubIndex 003	3. PDO Mapping entry (11 bits align)	UINT32	RO	0x6001:03, 1
1A01:04	SubIndex 004	4. PDO Mapping entry (object 0x1C32 (SM output parameter), entry 0x20 (Sync error))	UINT32	RO	0x6001:04, 1
1A01:05	SubIndex 005	5. PDO Mapping entry (1 bits align)	UINT32	RO	0x6001:05, 1
1A01:06	SubIndex 006	6. PDO Mapping entry (object 0x1800, entry 0x09)	UINT32	RO	0x6001:06, 1
1A01:07	SubIndex 007	7. PDO Mapping entry (object 0x6001 (DO Diag Inputs Ch.1), entry 0x07 (Diag Input 7))	UINT32	RO	0x6001:07, 1
1A01:08	SubIndex 008	8. PDO Mapping entry (object 0x6001 (DO Diag Inputs Ch.1), entry 0x08 (Diag Input 8))	UINT32	RO	0x6001:08, 1
1A01:09	SubIndex 009	9. PDO Mapping entry (8 bits align)	UINT32	RO	0x0000:00, 8

Index 1A02 DIG TxPDO-Map Inputs Device

Index	Name	Meaning	Data type	Flags	Default
1A02:0	DIG TxPDO-Map Inputs Device	PDO Mapping TxPDO 3	UINT8	RO	0x07 (7_{dec})
1A02:01	SubIndex 001	1. PDO Mapping entry (object 0xF600 (DO Inputs), entry 0x01 (Safe state active))	UINT32	RO	0xF600:01, 1
1A02:02	SubIndex 002	2. PDO Mapping entry (object 0xF600 (DO Inputs), entry 0x02 (Error channel 1))	UINT32	RO	0xF600:02, 1
1A02:03	SubIndex 003	3. PDO Mapping entry (11 bits align)	UINT32	RO	0xF600:03, 1
1A02:04	SubIndex 004	4. PDO Mapping entry (object 0x1C32 (SM output parameter), entry 0x20 (Sync error))	UINT32	RO	0x0000:00, 10
1A02:05	SubIndex 005	5. PDO Mapping entry (1 bits align)	UINT32	RO	0x1C32:20, 1
1A02:06	SubIndex 006	6. PDO Mapping entry (object 0x1800, entry 0x09)	UINT32	RO	0x0000:00, 1
1A02:07	SubIndex 007	7. PDO Mapping entry (object 0x1800, entry 0x09)	UINT32	RO	0x1800:09, 1

Index 1C00 Sync manager type

Index	Name	Meaning	Data type	Flags	Default
1C00:0	Sync manager type	Usage of the Sync Manager channels	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	RW	0x02 (2_{dec})
1C12:01	Subindex 001	1. assigned RxPDO (contains the index of the corresponding RxPDO Mapping object)	UINT16	RW	0x1600 (5632_{dec})
1C12:02	Subindex 002	2. assigned RxPDO (contains the index of the corresponding RxPDO Mapping object)	UINT16	RW	0x1601 (5633_{dec})

Index 1C13 TxPDO assign

Index	Name	Meaning	Data type	Flags	Default
1C13:0	TxPDO assign	PDO Assign Inputs	UINT8	RW	0x03 (3_{dec})
1C13:01	Subindex 001	1. assigned TxPDO (contains the index of the corresponding TxPDO Mapping object)	UINT16	RW	0x1A00 (6656_{dec})
1C13:02	Subindex 002	2. assigned TxPDO (contains the index of the corresponding TxPDO Mapping object)	UINT16	RW	0x1A01 (6657_{dec})
1C13:03	Subindex 003	3. assigned TxPDO (contains the index of the corresponding TxPDO Mapping object)	UINT16	RW	0x1A02 (6658_{dec})

Index 1C32 SM output parameter

Index	Name	Meaning	Data type	Flags	Default
1C32:0	SM output parameter	Synchronization parameter of the outputs	UINT8	RO	0x20 (32_{dec})
1C32:01	Sync mode	actual synchronization mode: • 0: Free Run • 1: Synchron with SM 2 Event • 2: DC-Mode - Synchron with SYNC0 Event • 3: DC-Mode - Synchron with SYNC1 Event	UINT16	RW	0x0001 (1_{dec})
1C32:02	Cycle time	Cycle time (in ns): • Free Run: cycle time of the local timer • Synchron with SM 2 Event: Cycle time of the master • DC-Mode: SYNC0/SYNC1 Cycle time	UINT32	RW	0x00030D40 (200000_{dec})
1C32:03	Shift time	Time between SYNC0 Event and Outputs Valid (in ns, only in DC-Mode)	UINT32	RO	0x00020F58 (135000_{dec})
1C32:04	Sync modes supported	Supported synchronization modes: • Bit 0 = 1: Free Run is supported • Bit 1 = 1: Synchron with SM 2 Event is supported • Bit 2-3 = 01: DC-Mode is supported • Bit 4-5 = 10: Output Shift with SYNC1 Event (only DC-Mode) • Bit 14 = 1: dynamic times (could be measured Messen by writing 1C32:08 [▶ 135])	UINT16	RO	0xC007 (49159_{dec})
1C32:05	Minimum cycle time	Minimum cycle time supported (in ns)	UINT32	RO	0x000249F0 (150000_{dec})
1C32:06	Calc and copy time	Minimal time between SYNC0 and SYNC1 Event (in ns, only in DC-Mode)	UINT32	RO	0x00000000 (0_{dec})
1C32:07	Minimum delay time		UINT32	RO	0x00020F58 (135000_{dec})
1C32:08	Command	• 0: Measurement of the times will be stopped • 1: Measurement of the times will be started The Entries 1C32:03 [▶ 135], 1C32:05 [▶ 135], 1C32:06 [▶ 135], 1C32:09 [▶ 135], 1C33:03 [▶ 136], 1C33:06 [▶ 135], 1C33:09 [▶ 136] will be updated with the maximum measured values.	UINT16	RW	0x0000 (0_{dec})
1C32:09	Maximum Delay time	Time between SYNC1 Event and Outputs Valid (in ns, only in DC-Mode)	UINT32	RO	0x00020F58 (135000_{dec})
1C32:0B	SM event missed counter	Number of the missed SM-Events in state OPERATIONAL (only in DC Mode)	UINT16	RO	0x0000 (0_{dec})
1C32:0C	Cycle exceeded counter	Number of the exceeded cycles in state OPERATIONAL	UINT16	RO	0x0000 (0_{dec})
1C32:0D	Shift too short counter	Number of the too short distances between SYNC0 and SYNC1 Event (only in DC Mode)	UINT16	RO	0x0000 (0_{dec})
1C32:20	Sync error	TRUE: In the last cycle the synchronization was not correct (only in DC Mode)	boolean	RO	0x00 (0_{dec})

Index 1C33 SM input parameter

Index	Name	Meaning	Data type	Flags	Default
1C33:0	SM input parameter	Synchronization parameter of the inputs	UINT8	RO	0x20 (32_{dec})
1C33:01	Sync mode	actual synchronization mode: • 0: Free Run • 1: Synchron with SM 3 Event (no Outputs available) • 2: DC - Synchron with SYNC0 Event • 3: DC - Synchron with SYNC1 Event • 34: Synchron with SM 2 Event (Outputs available)	UINT16	RW	0x0022 (34_{dec})
1C33:02	Cycle time	same as 1C32:02 [▶ 135]	UINT32	RW	0x00030D40 (200000_{dec})
1C33:03	Shift time	time between SYNC0-Event and Input Latch (in ns, only in DC-Mode)	UINT32	RO	0x00003200 (12800_{dec})
1C33:04	Sync modes supported	Supported synchronization modes: • Bit 0: Free Run is supported • Bit 1: Synchron with SM 2 Event is supported (Outputs available) • Bit 1: Synchron with SM 3 Event is supported (no Outputs available) • Bit 2-3 = 01: DC-Mode is supported • Bit 4-5 = 01: Input Shift with local event (Outputs available) • Bit 4-5 = 10: Input Shift with SYNC1 Event (no Outputs available) • Bit 14 = 1: dynamic times (could be measured Messen by writing 1C32:08 [▶ 135] or 1C33:08 [▶ 136])	UINT16	RO	0xC007 (49159_{dec})
1C33:05	Minimum cycle time	same as 1C32:05 [▶ 135]	UINT32	RO	0x000249F0 (150000_{dec})
1C33:06	Calc and copy time	time between Input Latch and the availability of the inputs for the master (in ns, only in DC-Mode)	UINT32	RO	0x00000000 (0_{dec})
1C33:07	Minimum delay time		UINT32	RO	0x00003200 (12800_{dec})
1C33:08	Command	same as 1C32:08 [▶ 135]	UINT16	RW	0x0000 (0_{dec})
1C33:09	Maximum Delay time	time between SYNC1-Event and Input Latch (in ns, only in DC-Mode)	UINT32	RO	0x00003200 (12800_{dec})
1C33:0B	SM event missed counter	same as 1C32:11 [▶ 135]	UINT16	RO	0x0000 (0_{dec})
1C33:0C	Cycle exceeded counter	same as 1C32:12 [▶ 135]	UINT16	RO	0x0000 (0_{dec})
1C33:0D	Shift too short counter	same as 1C32:13 [▶ 135]	UINT16	RO	0x0000 (0_{dec})
1C33:20	Sync error	same as 1C32:32 [▶ 135]	boolean	RO	0x00 (0_{dec})

Profile specific objects (0x6000-0xFFFF)

The profile specific objects have the same meaning for all EtherCAT/EtherCAT P slave which support the profile 5001.

Index 6000 DIG Inputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
6000:0	DIG 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 6001 DIG Diag Inputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
6001:0	DIG Diag Inputs Ch.1		UINT8	RO	0x08 (8_{dec})
6001:01	Diag Input 1		boolean	RO	0x00 (0_{dec})
6001:02	Diag Input 2		boolean	RO	0x00 (0_{dec})
6001:03	Diag Input 3		boolean	RO	0x00 (0_{dec})
6001:04	Diag Input 4		boolean	RO	0x00 (0_{dec})
6001:05	Diag Input 5		boolean	RO	0x00 (0_{dec})
6001:06	Diag Input 6		boolean	RO	0x00 (0_{dec})
6001:07	Diag Input 7		boolean	RO	0x00 (0_{dec})
6001:08	Diag Input 8		boolean	RO	0x00 (0_{dec})

Index 7000 DIG Outputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
7000:0	DIG Outputs Ch.1		UINT8	RO	0x08 (8_{dec})
7000:01	Output 1		boolean	RO	0x00 (0_{dec})
7000:02	Output 2		boolean	RO	0x00 (0_{dec})
7000:03	Output 3		boolean	RO	0x00 (0_{dec})
7000:04	Output 4		boolean	RO	0x00 (0_{dec})
7000:05	Output 5		boolean	RO	0x00 (0_{dec})
7000:06	Output 6		boolean	RO	0x00 (0_{dec})
7000:07	Output 7		boolean	RO	0x00 (0_{dec})
7000:08	Output 8		boolean	RO	0x00 (0_{dec})

Index F000 Modular device profile

Index	Name	Meaning	Data type	Flags	Default
F000:0	Modular device profile	general information about the Modular Device Profile	UINT8	RO	0x02 (2_{dec})
F000:01	Module index distance	Index distance between the objects of two channels	UINT16	RO	0x0010 (16_{dec})
F000:02	Maximum number of modules	number of channels	UINT16	RO	0x0001 (1_{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	0x01 (1_{dec})
F010:01	SubIndex 001		UINT32	RW	0x00000118 (280_{dec})

Index F600 DIG Inputs

Index	Name	Meaning	Data type	Flags	Default
F600:0	DIG Inputs		UINT8	RO	0x10 (16_{dec})
F600:01	Safe state active		boolean	RO	0x00 (0_{dec})
F600:02	Error channel 1		boolean	RO	0x00 (0_{dec})
F600:03	Error channel 2		boolean	RO	0x00 (0_{dec})
F600:0E	Sync error		boolean	RO	0x00 (0_{dec})
F600:10	TxPDO Toggle		boolean	RO	0x00 (0_{dec})

Index F700 DIG Outputs

Index	Name	Meaning	Data type	Flags	Default
F700:0	DIG Outputs		UINT8	RO	0x02 (2_{dec})
F700:01	Set safe state		boolean	RO	0x00 (0_{dec})
F700:02	Reset outputs		boolean	RO	0x00 (0_{dec})

Index F800 DIG Settings

Index	Name	Meaning	Data type	Flags	Default
F800:0	DIG Settings		UINT8	RO	0x11 (17_{dec})
F800:01	Disable shut off		boolean	RW	0x00 (0_{dec})
F800:11	Switch off time		UINT16	RW	0x03E8 (1000_{dec})

Also see about this

- Configuration via TwinCAT [▶ 123]
- Configuration via TwinCAT [▶ 120]

4.5 EP2816-0008 - Object description and parameterization

Note	**Parameterization** Terminals' parameterization will be conducted by the CoE tab (double-click on the referring object) or the Process data tab (PDO assignment)

Note	**EtherCAT XML Device Description** The description correspond 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.

Introduction

The CoE overview contains objects for different intended applications:

- Objects required for parameterization [▶ 139] during commissioning
- Objects intended for regular operation [▶ 140], e.g. through ADS access
- Objects for indicating internal settings [▶ 140] (may be fixed)
- Further profile-specific objects [▶ 146] indicating inputs, outputs and status information

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

Objects for parameterization during commissioning

Index 1011 Restore default parameters

Index	Name	Meaning	Data type	Flags	Default
1011:0	Restore default parameters	Restore the default settings in the EtherCAT slave	UINT8	RO	0x01 (1_{dec})
1011:01	SubIndex 001	If this object is set to **"0x64616F6C"** ("Set Value Dialog") all terminal-specific objects are reset to their delivery state.	UINT32	RW	0x00000000 (0_{dec})

Index 8000 DIG Safe state active Ch.1

The outputs the bit *DIG Safe state active* is set for, are switched to the value that is specified in *Safe state value*, in case of status Operational (OP) is left.
Status Operational (OP) is left if communication to the master is interrupted, for example at power breakdown at the master or cable breakage.

Index	Name	Meaning	Data type	Flags	Default
8000:0	DIG Safe state active		UINT8	RO	0x08 (8_{dec})
8000:01	Output 1	0_{bin}: DIG Safe state for output 1 is disabled 1_{bin}: DIG Safe state for output 1 is enabled	boolean	RW	1_{bin}
8000:02	Output 2	0_{bin}: DIG Safe state for output 2 is disabled 1_{bin}: DIG Safe state for output 2 is enabled	boolean	RW	1_{bin}
8000:03	Output 3	0_{bin}: DIG Safe state for output 3 is disabled 1_{bin}: DIG Safe state for output 3 is enabled	boolean	RW	1_{bin}
8000:04	Output 4	0_{bin}: DIG Safe state for output 4 is disabled 1_{bin}: DIG Safe state for output 4 is enabled	boolean	RW	1_{bin}
8000:05	Output 5	0_{bin}: DIG Safe state for output 5 is disabled 1_{bin}: DIG Safe state for output 5 is enabled	boolean	RW	1_{bin}
8000:06	Output 6	0_{bin}: DIG Safe state for output 6 is disabled 1_{bin}: DIG Safe state for output 6 is enabled	boolean	RW	1_{bin}
8000:07	Output 7	0_{bin}: DIG Safe state for output 7 is disabled 1_{bin}: DIG Safe state for output 7 is enabled	boolean	RW	1_{bin}
8000:08	Output 8	0_{bin}: DIG Safe state for output 8 is disabled 1_{bin}: DIG Safe state for output 8 is enabled	boolean	RW	1_{bin}

Index 8001 DIG Safe state value Ch.1

Here the values are specified, the outputs are switched to if the status Operational (OP) is left.

Index	Name	Meaning	Data type	Flags	Default
8001:0	DIG Safe state value		UINT8	RO	0x08 (8_{dec})
8001:01	Output 1	0_{bin}: DIG Safe state value for output 1 = 0 1_{bin}: DIG Safe state value for output 1 = 1	boolean	RW	0_{bin}
8001:02	Output 2	0_{bin}: DIG Safe state value for output 2 = 0 1_{bin}: DIG Safe state value for output 2 = 1	boolean	RW	0_{bin}
8001:03	Output 3	0_{bin}: DIG Safe state value for output 3 = 0 1_{bin}: DIG Safe state value for output 3 = 1	boolean	RW	0_{bin}
8001:04	Output 4	0_{bin}: DIG Safe state value for output 4 = 0 1_{bin}: DIG Safe state value for output 4 = 1	boolean	RW	0_{bin}
8001:05	Output 5	0_{bin}: DIG Safe state value for output 5 = 0 1_{bin}: DIG Safe state value for output 5 = 1	boolean	RW	0_{bin}
8001:06	Output 6	0_{bin}: DIG Safe state value for output 6 = 0 1_{bin}: DIG Safe state value for output 6 = 1	boolean	RW	0_{bin}
8001:07	Output 7	0_{bin}: DIG Safe state value for output 7 = 0 1_{bin}: DIG Safe state value for output 7 = 1	boolean	RW	0_{bin}
8001:08	Output 8	0_{bin}: DIG Safe state value for output 8 = 0 1_{bin}: DIG Safe state value for output 8 = 1	boolean	RW	0_{bin}

Index 8010 DIG Safe state active Ch.2

The outputs the bit *DIG Safe state active* is set for, are switched to the value that is specified in *Safe state value*, in case of status Operational (OP) is left.
Status Operational (OP) is left if communication to the master is interrupted, for example at power breakdown at the master or cable breakage.

Index	Name	Meaning	Data type	Flags	Default
8010:0	DIG Safe state active		UINT8	RO	0x08 (8_{dec})
8010:01	Output 9	0_{bin}: DIG Safe state for output 9 is disabled 1_{bin}: DIG Safe state for output 9 is enabled	boolean	RW	1_{bin}
8010:02	Output 10	0_{bin}: DIG Safe state for output 10 is disabled 1_{bin}: DIG Safe state for output 10 is enabled	boolean	RW	1_{bin}
8010:03	Output 11	0_{bin}: DIG Safe state for output 11 is disabled 1_{bin}: DIG Safe state for output 11 is enabled	boolean	RW	1_{bin}
8010:04	Output 12	0_{bin}: DIG Safe state for output 12 is disabled 1_{bin}: DIG Safe state for output 12 is enabled	boolean	RW	1_{bin}
8010:05	Output 13	0_{bin}: DIG Safe state for output 13 is disabled 1_{bin}: DIG Safe state for output 13 is enabled	boolean	RW	1_{bin}
8010:06	Output 14	0_{bin}: DIG Safe state for output 14 is disabled 1_{bin}: DIG Safe state for output 14 is enabled	boolean	RW	1_{bin}
8010:07	Output 15	0_{bin}: DIG Safe state for output 15 is disabled 1_{bin}: DIG Safe state for output 15 is enabled	boolean	RW	1_{bin}
8010:08	Output 16	0_{bin}: DIG Safe state for output 16 is disabled 1_{bin}: DIG Safe state for output 16 is enabled	boolean	RW	1_{bin}

Index 8011 DIG Safe state value Ch.2

Here the values are specified, the outputs are switched to if the status Operational (OP) is left.

Index	Name	Meaning	Data type	Flags	Default
8011:0	DIG Safe state value		UINT8	RO	0x08 (8_{dec})
8011:01	Output 9	0_{bin}: DIG Safe state value for output 9 = 0 1_{bin}: DIG Safe state value for output 9 = 1	boolean	RW	0_{bin}
8011:02	Output 10	0_{bin}: DIG Safe state value for output 10 = 0 1_{bin}: DIG Safe state value for output 10 = 1	boolean	RW	0_{bin}
8011:03	Output 11	0_{bin}: DIG Safe state value for output 11 = 0 1_{bin}: DIG Safe state value for output 11 = 1	boolean	RW	0_{bin}
8011:04	Output 12	0_{bin}: DIG Safe state value for output 12 = 0 1_{bin}: DIG Safe state value for output 12 = 1	boolean	RW	0_{bin}
8011:05	Output 13	0_{bin}: DIG Safe state value for output 13 = 0 1_{bin}: DIG Safe state value for output 13 = 1	boolean	RW	0_{bin}
8011:06	Output 14	0_{bin}: DIG Safe state value for output 14 = 0 1_{bin}: DIG Safe state value for output 14 = 1	boolean	RW	0_{bin}
8011:07	Output 15	0_{bin}: DIG Safe state value for output 15 = 0 1_{bin}: DIG Safe state value for output 15 = 1	boolean	RW	0_{bin}
8011:08	Output 16	0_{bin}: DIG Safe state value for output 16 = 0 1_{bin}: DIG Safe state value for output 16 = 1	boolean	RW	0_{bin}

Objects for normal operation

The EP2xxx do not have objects like this.

Further objects

Standard objects (0x1000-0x1FFF)

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

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 supported CoE Profile (5001). The Hi-Word contains the Module Profile corresponding 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	EP2816-0008

Index 1009 Hardware version

Index	Name	Meaning	Data type	Flags	Default
1009:0	Hardware version	Hardware version of the EtherCAT slaves	STRING	RO	02

Index 100A Software version

Index	Name	Meaning	Data type	Flags	Default
100A:0	Software version	Firmware version of the EtherCAT slaves	STRING	RO	05

Index 1018 Identity

Index	Name	Meaning	Data type	Flags	Default
1018:0	Identity	contains information to identify the EtherCAT 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	0x0B004052 (184565842_{dec})
1018:03	Revision	Revision number of the EtherCAT-Slave, the Lo-Word (Bit 0-15) indicates the special functions terminal number; the Hi-Word (Bit 16-31) refers to the device description.	UINT32	RO	0x00130008 (1245192_{dec})
1018:04	Serial number	Serial number of the EtherCAT-Slave, the Lo-Byte (Bit 0-7) of the Lo-Word contains the year of manufacturing, the Hi-Byte (Bit 8-15) of the Lo-Word contains the week of manufacturing, the Hi-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	contains information for the standardized Upload and Download of the Backup Entries	UINT8	RO	0x01 (1_{dec})
10F0:01	Checksum	Checksum over all backup entries	UINT32	RO	0x00000000 (0_{dec})

Index 1600 DIG RxPDO-Map Outputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
1600:0	DIG RxPDO-Map Outputs Ch.1	PDO Mapping RxPDO 1	UINT8	RO	0x09 (9_{dec})
1600:01	SubIndex 001	1. PDO Mapping entry (object 0x7000 (DO Outputs Ch.1), entry 0x01 (Output 1))	UINT32	RO	0x7000:01, 1
1600:02	SubIndex 002	2. PDO Mapping entry (object 0x7000 (DO Outputs Ch.1), entry 0x02 (Output 2))	UINT32	RO	0x7000:02, 1
1600:03	SubIndex 003	3. PDO Mapping entry (object 0x7000 (DO Outputs Ch.1), entry 0x03 (Output 3))	UINT32	RO	0x7000:03, 1
1600:04	SubIndex 004	4. PDO Mapping entry (object 0x7000 (DO Outputs Ch.1), entry 0x04 (Output 4))	UINT32	RO	0x7000:04, 1
1600:05	SubIndex 005	5. PDO Mapping entry (object 0x7000 (DO Outputs Ch.1), entry 0x05 (Output 5))	UINT32	RO	0x7000:05, 1
1600:06	SubIndex 006	6. PDO Mapping entry (object 0x7000 (DO Outputs Ch.1), entry 0x06 (Output 6))	UINT32	RO	0x7000:06, 1
1600:07	SubIndex 007	7. PDO Mapping entry (object 0x7000 (DO Outputs Ch.1), entry 0x07 (Output 7))	UINT32	RO	0x7000:07, 1
1600:08	SubIndex 008	8. PDO Mapping entry (object 0x7000 (DO Outputs Ch.1), entry 0x08 (Output 8))	UINT32	RO	0x7000:08, 1
1600:09	SubIndex 009	9. PDO Mapping entry (8 bits align)	UINT32	RO	0x0000:00, 8

Index 1601 DIG RxPDO-Map Outputs Ch.2

Index	Name	Meaning	Data type	Flags	Default
1601:0	DIG RxPDO-Map Outputs Ch.2	PDO Mapping RxPDO 2	UINT8	RO	0x09 (9_{dec})
1601:01	SubIndex 001	1. PDO Mapping entry (object 0x7010 (DO Outputs Ch.2), entry 0x01 (Output 1))	UINT32	RO	0x7010:01, 1
1601:02	SubIndex 002	2. PDO Mapping entry (object 0x7010 (DO Outputs Ch.2), entry 0x02 (Output 2))	UINT32	RO	0x7010:02, 1
1601:03	SubIndex 003	3. PDO Mapping entry (object 0x7010 (DO Outputs Ch.2), entry 0x03 (Output 3))	UINT32	RO	0x7010:03, 1
1601:04	SubIndex 004	4. PDO Mapping entry (object 0x7010 (DO Outputs Ch.2), entry 0x04 (Output 4))	UINT32	RO	0x7010:04, 1
1601:05	SubIndex 005	5. PDO Mapping entry (object 0x7010 (DO Outputs Ch.2), entry 0x05 (Output 5))	UINT32	RO	0x7010:05, 1
1601:06	SubIndex 006	6. PDO Mapping entry (object 0x7010 (DO Outputs Ch.2), entry 0x06 (Output 6))	UINT32	RO	0x7010:06, 1
1601:07	SubIndex 007	7. PDO Mapping entry (object 0x7010 (DO Outputs Ch.2), entry 0x07 (Output 7))	UINT32	RO	0x7010:07, 1
1601:08	SubIndex 008	8. PDO Mapping entry (object 0x7010 (DO Outputs Ch.2), entry 0x08 (Output 8))	UINT32	RO	0x7010:08, 1
1601:09	SubIndex 009	9. PDO Mapping entry (8 bits align)	UINT32	RO	0x0000:00, 8

Index 1602 DIG RxPDO-Map Outputs Device

Index	Name	Meaning	Data type	Flags	Default
1602:0	DIG RxPDO-Map Outputs Device	PDO Mapping RxPDO 3	UINT8	RO	0x03 (3_{dec})
1602:01	SubIndex 001	1. PDO Mapping entry (object 0xF700 (DO Outputs), entry 0x01 (Set safe state))	UINT32	RO	0xF700:01, 1
1602:02	SubIndex 002	2. PDO Mapping entry (object 0xF700 (DO Outputs), entry 0x02 (Reset outputs))	UINT32	RO	0xF700:02, 1
1602:03	SubIndex 003	3. PDO Mapping entry (14 bits align)	UINT32	RO	0x0000:00, 14

Index 1A00 DIG TxPDO-Map Diag Inputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
1A00:0	DIG TxPDO-Map Diag Inputs Ch.1	PDO Mapping TxPDO 1	UINT8	RO	0x09 (9_{dec})
1A00:01	SubIndex 001	1. PDO Mapping entry (object 0x6000 (DO Inputs Ch.1), entry 0x01 (Input 1))	UINT32	RO	0x6001:01, 1
1A00:02	SubIndex 002	2. PDO Mapping entry (object 0x6000 (DO Inputs Ch.1), entry 0x02 (Input 2))	UINT32	RO	0x6001:02, 1
1A00:03	SubIndex 003	3. PDO Mapping entry (object 0x6000 (DO Inputs Ch.1), entry 0x03 (Input 3))	UINT32	RO	0x6001:03, 1
1A00:04	SubIndex 004	4. PDO Mapping entry (object 0x6000 (DO Inputs Ch.1), entry 0x04 (Input 4))	UINT32	RO	0x6001:04, 1
1A00:05	SubIndex 005	5. PDO Mapping entry (object 0x6000 (DO Inputs Ch.1), entry 0x05 (Input 5))	UINT32	RO	0x6001:05, 1
1A00:06	SubIndex 006	6. PDO Mapping entry (object 0x6000 (DO Inputs Ch.1), entry 0x06 (Input 6))	UINT32	RO	0x6001:06, 1
1A00:07	SubIndex 007	7. PDO Mapping entry (object 0x6000 (DO Inputs Ch.1), entry 0x07 (Input 7))	UINT32	RO	0x6001:07, 1
1A00:08	SubIndex 008	8. PDO Mapping entry (object 0x6000 (DO Inputs Ch.1), entry 0x08 (Input 8))	UINT32	RO	0x6001:08, 1
1A00:09	SubIndex 009	9. PDO Mapping entry (5 bits align)	UINT32	RO	0x0000:00, 8

Index 1A01 DIG TxPDO-Map Diag Inputs Ch.2

Index	Name	Meaning	Data type	Flags	Default
1A01:0	DIG TxPDO-Map Diag Inputs Ch.2	PDO Mapping TxPDO 2	UINT8	RO	0x09 (9_{dec})
1A01:01	SubIndex 001	1. PDO Mapping entry (object 0x6010 (DO Inputs Ch.2), entry 0x01 (Input 1))	UINT32	RO	0x6011:01, 1
1A01:02	SubIndex 002	2. PDO Mapping entry (object 0x6010 (DO Inputs Ch.2), entry 0x02 (Input 2))	UINT32	RO	0x6011:02, 1
1A01:03	SubIndex 003	3. PDO Mapping entry (object 0x6010 (DO Inputs Ch.2), entry 0x03 (Input 3))	UINT32	RO	0x6011:03, 1
1A01:04	SubIndex 004	4. PDO Mapping entry (object 0x6010 (DO Inputs Ch.2), entry 0x04 (Input 4))	UINT32	RO	0x6011:04, 1
1A01:05	SubIndex 005	5. PDO Mapping entry (object 0x6010 (DO Inputs Ch.2), entry 0x05 (Input 5))	UINT32	RO	0x6011:05, 1
1A01:06	SubIndex 006	6. PDO Mapping entry (object 0x6010 (DO Inputs Ch.2), entry 0x06 (Input 6))	UINT32	RO	0x6011:06, 1
1A01:07	SubIndex 007	7. PDO Mapping entry (object 0x6010 (DO Inputs Ch.2), entry 0x07 (Input 7))	UINT32	RO	0x6011:07, 1
1A01:08	SubIndex 008	8. PDO Mapping entry (object 0x6010 (DO Inputs Ch.2), entry 0x08 (Input 8))	UINT32	RO	0x6011:08, 1
1A01:09	SubIndex 009	9. PDO Mapping entry (5 bits align)	UINT32	RO	0x0000:00, 8

Index 1A02 DIG TxPDO-Map Inputs Device

Index	Name	Meaning	Data type	Flags	Default
1A02:0	DIG TxPDO-Map Inputs Device	PDO Mapping TxPDO 3	UINT8	RO	0x07 (7_{dec})
1A02:01	SubIndex 001	1. PDO Mapping entry (object 0xF600 (DO Inputs), entry 0x01 (Safe state active))	UINT32	RO	0xF600:01, 1
1A02:02	SubIndex 002	2. PDO Mapping entry (object 0xF600 (DO Inputs), entry 0x02 (Error channel 1))	UINT32	RO	0xF600:02, 1
1A02:03	SubIndex 003	3. PDO Mapping entry (object 0xF600 (DO Inputs), entry 0x03 (Error channel 2))	UINT32	RO	0xF600:03, 1
1A02:04	SubIndex 004	4. PDO Mapping entry (10 bits align)	UINT32	RO	0x0000:00, 10
1A02:05	SubIndex 005	5. PDO Mapping entry (object 0xF600 (DO Inputs), entry 0x0E (Sync Error))	UINT32	RO	0x1C32:20, 1
1A02:06	SubIndex 006	6. PDO Mapping entry (1 bits align)	UINT32	RO	0x0000:00, 1
1A02:07	SubIndex 007	7. PDO Mapping entry (object 0x1800, entry 0x09)	UINT32	RO	0x1800:09, 1

Index 1C00 Sync manager type

Index	Name	Meaning	Data type	Flags	Default
1C00:0	Sync manager type	Usage of the Sync Manager channels	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	RW	0x03 (3_{dec})
1C12:01	Subindex 001	1. assigned RxPDO (contains the index of the corresponding RxPDO Mapping object)	UINT16	RW	0x1600 (5632_{dec})
1C12:02	Subindex 002	2. assigned RxPDO (contains the index of the corresponding RxPDO Mapping object)	UINT16	RW	0x1601 (5633_{dec})
1C12:03	Subindex 003	3. assigned RxPDO (contains the index of the corresponding RxPDO Mapping object)	UINT16	RW	0x1602 (5634_{dec})

Index 1C13 TxPDO assign

Index	Name	Meaning	Data type	Flags	Default
1C13:0	TxPDO assign	PDO Assign Inputs	UINT8	RW	0x03 (3_{dec})
1C13:01	Subindex 001	1. assigned TxPDO (contains the index of the corresponding TxPDO Mapping object)	UINT16	RW	0x1A00 (6656_{dec})
1C13:02	Subindex 002	2. assigned TxPDO (contains the index of the corresponding TxPDO Mapping object)	UINT16	RW	0x1A01 (6657_{dec})
1C13:03	Subindex 003	3. assigned TxPDO (contains the index of the corresponding TxPDO Mapping object)	UINT16	RW	0x1A02 (6658_{dec})

Index 1C32 SM output parameter

Index	Name	Meaning	Data type	Flags	Default
1C32:0	SM output parameter	Synchronization parameter of the outputs	UINT8	RO	0x20 (32_{dec})
1C32:01	Sync mode	actual synchronization mode: • 0: Free Run • 1: Synchron with SM 2 Event • 2: DC-Mode - Synchron with SYNC0 Event • 3: DC-Mode - Synchron with SYNC1 Event	UINT16	RW	0x0001 (1_{dec})
1C32:02	Cycle time	Cycle time (in ns): • Free Run: cycle time of the local timer • Synchron with SM 2 Event: Cycle time of the master • DC-Mode: SYNC0/SYNC1 Cycle time	UINT32	RW	0x000F4240 (1000000_{dec})
1C32:03	Shift time	Time between SYNC0 Event and Outputs Valid (in ns, only in DC-Mode)	UINT32	RO	0x00020F58 (135000_{dec})
1C32:04	Sync modes supported	Supported synchronization modes: • Bit 0 = 1: Free Run is supported • Bit 1 = 1: Synchron with SM 2 Event is supported • Bit 2-3 = 01: DC-Mode is supported • Bit 4-5 = 10: Output Shift with SYNC1 Event (only DC-Mode) • Bit 14 = 1: dynamic times (could be measured by writing 1C32:08 [▶ 145])	UINT16	RO	0xC007 (49159_{dec})
1C32:05	Minimum cycle time	Minimum cycle time supported (in ns)	UINT32	RO	0x00030D40 (200000_{dec})
1C32:06	Calc and copy time	Minimal time between SYNC0 and SYNC1 Event (in ns, only in DC-Mode)	UINT32	RO	0x00000000 (0_{dec})
1C32:07	Minimum delay time		UINT32	RO	0x00020F58 (135000_{dec})
1C32:08	Command	• 0: Measurement of the times will be stopped • 1: Measurement of the times will be started The Entries 1C32:03 [▶ 145], 1C32:05 [▶ 145], 1C32:06 [▶ 145], 1C32:09 [▶ 145], 1C33:03 [▶ 146], 1C33:06 [▶ 145], 1C33:09 [▶ 146] will be updated with the maximum measured values.	UINT16	RW	0x0000 (0_{dec})
1C32:09	Maximum Delay time	Time between SYNC1 Event and Outputs Valid (in ns, only in DC-Mode)	UINT32	RO	0x00020F58 (135000_{dec})
1C32:0B	SM event missed counter	Number of the missed SM-Events in state OPERATIONAL (only in DC Mode)	UINT16	RO	0x0000 (0_{dec})
1C32:0C	Cycle exceeded counter	Number of the exceeded cycles in state OPERATIONAL	UINT16	RO	0x0000 (0_{dec})
1C32:0D	Shift too short counter	Number of the too short distances between SYNC0 and SYNC1 Event (only in DC Mode)	UINT16	RO	0x0000 (0_{dec})
1C32:20	Sync error	TRUE: In the last cycle the synchronization was not correct (only in DC Mode)	boolean	RO	0x00 (0_{dec})

Index 1C33 SM input parameter

Index	Name	Meaning	Data type	Flags	Default
1C33:0	SM input parameter	Synchronization parameter of the inputs	UINT8	RO	0x20 (32_{dec})
1C33:01	Sync mode	actual synchronization mode: • 0: Free Run • 1: Synchron with SM 3 Event (no Outputs available) • 2: DC - Synchron with SYNC0 Event • 3: DC - Synchron with SYNC1 Event • 34: Synchron with SM 2 Event (Outputs available)	UINT16	RW	0x0022 (34_{dec})
1C33:02	Cycle time	same as 1C32:02 [▶ 145]	UINT32	RW	0x000F4240 (1000000_{dec})
1C33:03	Shift time	time between SYNC0-Event and Input Latch (in ns, only in DC-Mode)	UINT32	RO	0x00000000 (0_{dec})
1C33:04	Sync modes supported	Supported synchronization modes: • Bit 0: Free Run is supported • Bit 1: Synchron with SM 2 Event is supported (Outputs available) • Bit 1: Synchron with SM 3 Event is supported (no Outputs available) • Bit 2-3 = 01: DC-Mode is supported • Bit 4-5 = 01: Input Shift with local event (Outputs available) • Bit 4-5 = 10: Input Shift with SYNC1 Event (no Outputs available) • Bit 14 = 1: dynamic times (could be measured by writing 1C32:08 [▶ 145] or 1C33:08 [▶ 146])	UINT16	RO	0xC007 (49159_{dec})
1C33:05	Minimum cycle time	same as 1C32:05 [▶ 145]	UINT32	RO	0x00030D40 (200000_{dec})
1C33:06	Calc and copy time	time between Input Latch and the availability of the inputs for the master (in ns, only in DC-Mode)	UINT32	RO	0x00000000 (0_{dec})
1C33:07	Minimum delay time		UINT32	RO	0x00000000 (0_{dec})
1C33:08	Command	same as 1C32:08 [▶ 145]	UINT16	RW	0x0000 (0_{dec})
1C33:09	Maximum Delay time	time between SYNC1-Event and Input Latch (in ns, only in DC-Mode)	UINT32	RO	0x00000000 (0_{dec})
1C33:0B	SM event missed counter	same as 1C32:11 [▶ 145]	UINT16	RO	0x0000 (0_{dec})
1C33:0C	Cycle exceeded counter	same as 1C32:12 [▶ 145]	UINT16	RO	0x0000 (0_{dec})
1C33:0D	Shift too short counter	same as 1C32:13 [▶ 145]	UINT16	RO	0x0000 (0_{dec})
1C33:20	Sync error	same as 1C32:32 [▶ 145]	boolean	RO	0x00 (0_{dec})

Profile specific objects (0x6000-0xFFFF)

The profile specific objects have the same meaning for all EtherCAT Slaves which support the profile 5001.

Index 6001 DIG Diag Inputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
6001:0	DIG Diag Inputs Ch.1		UINT8	RO	0x08 (8_{dec})
6001:01	Diag Input 1		boolean	RO	0x00 (0_{dec})
6001:02	Diag Input 2		boolean	RO	0x00 (0_{dec})
6001:03	Diag Input 3		boolean	RO	0x00 (0_{dec})
6001:04	Diag Input 4		boolean	RO	0x00 (0_{dec})
6001:05	Diag Input 5		boolean	RO	0x00 (0_{dec})
6001:06	Diag Input 6		boolean	RO	0x00 (0_{dec})
6001:07	Diag Input 7		boolean	RO	0x00 (0_{dec})
6001:08	Diag Input 8		boolean	RO	0x00 (0_{dec})

Index 6011 DIG Diag Inputs Ch.2

Index	Name	Meaning	Data type	Flags	Default
6011:0	DIG Diag Inputs Ch.2		UINT8	RO	0x08 (8_{dec})
6011:01	Diag Input 1		boolean	RO	0x00 (0_{dec})
6011:02	Diag Input 2		boolean	RO	0x00 (0_{dec})
6011:03	Diag Input 3		boolean	RO	0x00 (0_{dec})
6011:04	Diag Input 4		boolean	RO	0x00 (0_{dec})
6011:05	Diag Input 5		boolean	RO	0x00 (0_{dec})
6011:06	Diag Input 6		boolean	RO	0x00 (0_{dec})
6011:07	Diag Input 7		boolean	RO	0x00 (0_{dec})
6011:08	Diag Input 8		boolean	RO	0x00 (0_{dec})

Index 7000 DIG Outputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
7000:0	DIG Outputs Ch.1		UINT8	RO	0x08 (8_{dec})
7000:01	Output 1		boolean	RO	0x00 (0_{dec})
7000:02	Output 2		boolean	RO	0x00 (0_{dec})
7000:03	Output 3		boolean	RO	0x00 (0_{dec})
7000:04	Output 4		boolean	RO	0x00 (0_{dec})
7000:05	Output 5		boolean	RO	0x00 (0_{dec})
7000:06	Output 6		boolean	RO	0x00 (0_{dec})
7000:07	Output 7		boolean	RO	0x00 (0_{dec})
7000:08	Output 8		boolean	RO	0x00 (0_{dec})

Index 7010 DIG Outputs Ch.2

Index	Name	Meaning	Data type	Flags	Default
7010:0	DIG Outputs Ch.2		UINT8	RO	0x08 (8_{dec})
7010:01	Output 1		boolean	RO	0x00 (0_{dec})
7010:02	Output 2		boolean	RO	0x00 (0_{dec})
7010:03	Output 3		boolean	RO	0x00 (0_{dec})
7010:04	Output 4		boolean	RO	0x00 (0_{dec})
7010:05	Output 5		boolean	RO	0x00 (0_{dec})
7010:06	Output 6		boolean	RO	0x00 (0_{dec})
7010:07	Output 7		boolean	RO	0x00 (0_{dec})
7010:08	Output 8		boolean	RO	0x00 (0_{dec})

Index F000 Modular device profile

Index	Name	Meaning	Data type	Flags	Default
F000:0	Modular device profile	general information about the Modular Device Profile	UINT8	RO	0x02 (2_{dec})
F000:01	Module index distance	Index distance between the objects of two 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})

Index F600 DIG Inputs

Index	Name	Meaning	Data type	Flags	Default
F600:0	DIG Inputs		UINT8	RO	0x10 (16_{dec})
F600:01	Safe state active		boolean	RO	0x00 (0_{dec})
F600:02	Error channel 1		boolean	RO	0x00 (0_{dec})
F600:03	Error channel 2		boolean	RO	0x00 (0_{dec})
F600:0E	Sync error		boolean	RO	0x00 (0_{dec})
F600:10	TxPDO Toggle		boolean	RO	0x00 (0_{dec})

Index F700 DIG Outputs

Index	Name	Meaning	Data type	Flags	Default
F700:0	DIG Outputs		UINT8	RO	0x02 (2_{dec})
F700:01	Set safe state		boolean	RO	0x00 (0_{dec})
F700:02	Reset outputs		boolean	RO	0x00 (0_{dec})

Index F800 DIG Settings

Index	Name	Meaning	Data type	Flags	Default
F800:0	DIG Settings		UINT8	RO	0x11 (17_{dec})
F800:01	Disable shut off		boolean	RW	0x00 (0_{dec})
F800:11	Switch off time		UINT16	RW	0x03E8 (1000_{dec})

Also see about this

- Configuration via TwinCAT [▶ 123]
- Configuration via TwinCAT [▶ 120]

4.6 EP2817-0008 - Object description and parameterization

Note	**Parameterization** Terminals' parameterization will be conducted by the CoE tab (double-click on the referring object) or the Process data tab (PDO assignment)

Note	**EtherCAT XML Device Description** The description correspond 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.

Introduction

The CoE overview contains objects for different intended applications:

- Objects required for parameterization [▶ 149] during commissioning
- Objects for indicating internal settings [▶ 151] (may be fixed)
- Further profile-specific objects [▶ 158] indicating inputs, outputs and status information

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

Objects for parameterization during commissioning

Index 1011 Restore default parameters

Index	Name	Meaning	Data type	Flags	Default
1011:0	Restore default parameters	Restore the default settings in the EtherCAT slave	UINT8	RO	0x01 (1_{dec})
1011:01	SubIndex 001	If this object is set to **"0x64616F6C"** ("Set Value Dialog") all terminal-specific objects are reset to their delivery state.	UINT32	RW	0x00000000 (0_{dec})

Index 8000 DIG Safe state active Ch.1

The outputs the bit *DIG Safe state active* is set for, are switched to the value that is specified in *Safe state value*, in case of status Operational (OP) is left.
Status Operational (OP) is left if communication to the master is interrupted, for example at power breakdown at the master or cable breakage.

Index	Name	Meaning	Data type	Flags	Default
8000:0	DIG Safe state active		UINT8	RO	0x08 (8_{dec})
8000:01	Output 1	0_{bin}: DIG Safe state for output 1 is disabled 1_{bin}: DIG Safe state for output 1 is enabled	boolean	RW	1_{bin}
8000:02	Output 2	0_{bin}: DIG Safe state for output 2 is disabled 1_{bin}: DIG Safe state for output 2 is enabled	boolean	RW	1_{bin}
8000:03	Output 3	0_{bin}: DIG Safe state for output 3 is disabled 1_{bin}: DIG Safe state for output 3 is enabled	boolean	RW	1_{bin}
8000:04	Output 4	0_{bin}: DIG Safe state for output 4 is disabled 1_{bin}: DIG Safe state for output 4 is enabled	boolean	RW	1_{bin}
8000:05	Output 5	0_{bin}: DIG Safe state for output 5 is disabled 1_{bin}: DIG Safe state for output 5 is enabled	boolean	RW	1_{bin}
8000:06	Output 6	0_{bin}: DIG Safe state for output 6 is disabled 1_{bin}: DIG Safe state for output 6 is enabled	boolean	RW	1_{bin}
8000:07	Output 7	0_{bin}: DIG Safe state for output 7 is disabled 1_{bin}: DIG Safe state for output 7 is enabled	boolean	RW	1_{bin}
8000:08	Output 8	0_{bin}: DIG Safe state for output 8 is disabled 1_{bin}: DIG Safe state for output 8 is enabled	boolean	RW	1_{bin}

Index 8001 DIG Safe state value Ch.1

Here the values are specified, the outputs are switched to if the status Operational (OP) is left.

Index	Name	Meaning	Data type	Flags	Default
8001:0	DIG Safe state value		UINT8	RO	0x08 (8_{dec})
8001:01	Output 1	0_{bin}: DIG Safe state value for output 1 = 0 1_{bin}: DIG Safe state value for output 1 = 1	boolean	RW	0_{bin}
8001:02	Output 2	0_{bin}: DIG Safe state value for output 2 = 0 1_{bin}: DIG Safe state value for output 2 = 1	boolean	RW	0_{bin}
8001:03	Output 3	0_{bin}: DIG Safe state value for output 3 = 0 1_{bin}: DIG Safe state value for output 3 = 1	boolean	RW	0_{bin}
8001:04	Output 4	0_{bin}: DIG Safe state value for output 4 = 0 1_{bin}: DIG Safe state value for output 4 = 1	boolean	RW	0_{bin}
8001:05	Output 5	0_{bin}: DIG Safe state value for output 5 = 0 1_{bin}: DIG Safe state value for output 5 = 1	boolean	RW	0_{bin}
8001:06	Output 6	0_{bin}: DIG Safe state value for output 6 = 0 1_{bin}: DIG Safe state value for output 6 = 1	boolean	RW	0_{bin}
8001:07	Output 7	0_{bin}: DIG Safe state value for output 7 = 0 1_{bin}: DIG Safe state value for output 7 = 1	boolean	RW	0_{bin}
8001:08	Output 8	0_{bin}: DIG Safe state value for output 8 = 0 1_{bin}: DIG Safe state value for output 8 = 1	boolean	RW	0_{bin}

Index 8010 DIG Safe state active Ch.2

The outputs the bit *DIG Safe state active* is set for, are switched to the value that is specified in *Safe state value*, in case of status Operational (OP) is left.
Status Operational (OP) is left if communication to the master is interrupted, for example at power breakdown at the master or cable breakage.

Index	Name	Meaning	Data type	Flags	Default
8010:0	DIG Safe state active		UINT8	RO	0x08 (8_{dec})
8010:01	Output 9	0_{bin}: DIG Safe state for output 9 is disabled 1_{bin}: DIG Safe state for output 9 is enabled	boolean	RW	1_{bin}
8010:02	Output 10	0_{bin}: DIG Safe state for output 10 is disabled 1_{bin}: DIG Safe state for output 10 is enabled	boolean	RW	1_{bin}
8010:03	Output 11	0_{bin}: DIG Safe state for output 11 is disabled 1_{bin}: DIG Safe state for output 11 is enabled	boolean	RW	1_{bin}
8010:04	Output 12	0_{bin}: DIG Safe state for output 12 is disabled 1_{bin}: DIG Safe state for output 12 is enabled	boolean	RW	1_{bin}
8010:05	Output 13	0_{bin}: DIG Safe state for output 13 is disabled 1_{bin}: DIG Safe state for output 13 is enabled	boolean	RW	1_{bin}
8010:06	Output 14	0_{bin}: DIG Safe state for output 14 is disabled 1_{bin}: DIG Safe state for output 14 is enabled	boolean	RW	1_{bin}
8010:07	Output 15	0_{bin}: DIG Safe state for output 15 is disabled 1_{bin}: DIG Safe state for output 15 is enabled	boolean	RW	1_{bin}
8010:08	Output 16	0_{bin}: DIG Safe state for output 16 is disabled 1_{bin}: DIG Safe state for output 16 is enabled	boolean	RW	1_{bin}

Index 8011 DIG Safe state value Ch.2

Here the values are specified, the outputs are switched to if the status Operational (OP) is left.

Index	Name	Meaning	Data type	Flags	Default
8011:0	DIG Safe state value		UINT8	RO	0x08 (8_{dec})
8011:01	Output 9	0_{bin}: DIG Safe state value for output 9 = 0 1_{bin}: DIG Safe state value for output 9 = 1	boolean	RW	0_{bin}
8011:02	Output 10	0_{bin}: DIG Safe state value for output 10 = 0 1_{bin}: DIG Safe state value for output 10 = 1	boolean	RW	0_{bin}
8011:03	Output 11	0_{bin}: DIG Safe state value for output 11 = 0 1_{bin}: DIG Safe state value for output 11 = 1	boolean	RW	0_{bin}
8011:04	Output 12	0_{bin}: DIG Safe state value for output 12 = 0 1_{bin}: DIG Safe state value for output 12 = 1	boolean	RW	0_{bin}
8011:05	Output 13	0_{bin}: DIG Safe state value for output 13 = 0 1_{bin}: DIG Safe state value for output 13 = 1	boolean	RW	0_{bin}
8011:06	Output 14	0_{bin}: DIG Safe state value for output 14 = 0 1_{bin}: DIG Safe state value for output 14 = 1	boolean	RW	0_{bin}
8011:07	Output 15	0_{bin}: DIG Safe state value for output 15 = 0 1_{bin}: DIG Safe state value for output 15 = 1	boolean	RW	0_{bin}
8011:08	Output 16	0_{bin}: DIG Safe state value for output 16 = 0 1_{bin}: DIG Safe state value for output 16 = 1	boolean	RW	0_{bin}

Index 8020 DIG Safe state active Ch.3

The outputs the bit *DIG Safe state active* is set for, are switched to the value that is specified in *Safe state value*, in case of status Operational (OP) is left.
Status Operational (OP) is left if communication to the master is interrupted, for example at power breakdown at the master or cable breakage.

Index	Name	Meaning	Data type	Flags	Default
8020:0	DIG Safe state active		UINT8	RO	0x08 (8_{dec})
8020:01	Output 17	0_{bin}: DIG Safe state for output 17 is disabled 1_{bin}: DIG Safe state for output 17 is enabled	boolean	RW	1_{bin}
8020:02	Output 18	0_{bin}: DIG Safe state for output 18 is disabled 1_{bin}: DIG Safe state for output 18 is enabled	boolean	RW	1_{bin}
8020:03	Output 19	0_{bin}: DIG Safe state for output 19 is disabled 1_{bin}: DIG Safe state for output 19 is enabled	boolean	RW	1_{bin}
8020:04	Output 20	0_{bin}: DIG Safe state for output 20 is disabled 1_{bin}: DIG Safe state for output 20 is enabled	boolean	RW	1_{bin}
8020:05	Output 21	0_{bin}: DIG Safe state for output 21 is disabled 1_{bin}: DIG Safe state for output 21 is enabled	boolean	RW	1_{bin}
8020:06	Output 22	0_{bin}: DIG Safe state for output 22 is disabled 1_{bin}: DIG Safe state for output 22 is enabled	boolean	RW	1_{bin}
8020:07	Output 23	0_{bin}: DIG Safe state for output 23 is disabled 1_{bin}: DIG Safe state for output 23 is enabled	boolean	RW	1_{bin}
8020:08	Output 24	0_{bin}: DIG Safe state for output 24 is disabled 1_{bin}: DIG Safe state for output 24 is enabled	boolean	RW	1_{bin}

Index 8021 DIG Safe state value Ch.3

Here the values are specified, the outputs are switched to if the status Operational (OP) is left.

Index	Name	Meaning	Data type	Flags	Default
8021:0	DIG Safe state value		UINT8	RO	0x08 (8_{dec})
8021:01	Output 17	0_{bin}: DIG Safe state value for output 17 = 0 1_{bin}: DIG Safe state value for output 17 = 1	boolean	RW	0_{bin}
8021:02	Output 18	0_{bin}: DIG Safe state value for output 18 = 0 1_{bin}: DIG Safe state value for output 18 = 1	boolean	RW	0_{bin}
8021:03	Output 19	0_{bin}: DIG Safe state value for output 19 = 0 1_{bin}: DIG Safe state value for output 19 = 1	boolean	RW	0_{bin}
8021:04	Output 20	0_{bin}: DIG Safe state value for output 20 = 0 1_{bin}: DIG Safe state value for output 20 = 1	boolean	RW	0_{bin}
8021:05	Output 21	0_{bin}: DIG Safe state value for output 21 = 0 1_{bin}: DIG Safe state value for output 21 = 1	boolean	RW	0_{bin}
8021:06	Output 22	0_{bin}: DIG Safe state value for output 22 = 0 1_{bin}: DIG Safe state value for output 22 = 1	boolean	RW	0_{bin}
8021:07	Output 23	0_{bin}: DIG Safe state value for output 23 = 0 1_{bin}: DIG Safe state value for output 23 = 1	boolean	RW	0_{bin}
8021:08	Output 24	0_{bin}: DIG Safe state value for output 24 = 0 1_{bin}: DIG Safe state value for output 24 = 1	boolean	RW	0_{bin}

Further objects

Standard objects (0x1000-0x1FFF)

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

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 supported CoE Profile (5001). The Hi-Word contains the Module Profile corresponding 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	EP2817-0008

Index 1009 Hardware version

Index	Name	Meaning	Data type	Flags	Default
1009:0	Hardware version	Hardware version of the EtherCAT slaves	STRING	RO	

Index 100A Software version

Index	Name	Meaning	Data type	Flags	Default
100A:0	Software version	Firmware version of the EtherCAT slaves	STRING	RO	00

Index 1018 Identity

Index	Name	Meaning	Data type	Flags	Default
1018:0	Identity	contains information to identify the EtherCAT 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	0x0B014052 (184631378_{dec})
1018:03	Revision	Revision number of the EtherCAT-Slave, the Lo-Word (Bit 0-15) indicates the special functions terminal number; the Hi-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 Lo-Byte (Bit 0-7) of the Lo-Word contains the year of manufacturing, the Hi-Byte (Bit 8-15) of the Lo-Word contains the week of manufacturing, the Hi-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	contains information for the standardized Upload and Download of the Backup Entries	UINT8	RO	0x01 (1_{dec})
10F0:01	Checksum	Checksum over all backup entries	UINT32	RO	0x00000000 (0_{dec})

Index 1600 DIG RxPDO-Map OutputsCh.1

Index	Name	Meaning	Data type	Flags	Default
1600:0	DIG RxPDO-Map OutputsCh.1	PDO Mapping RxPDO 1	UINT8	RO	0x09 (9_{dec})
1600:01	SubIndex 001	1. PDO Mapping entry (object 0x7000 (DIG Outputs Ch.1), entry 0x01 (Output 1))	UINT32	RO	0x7000:01, 1
1600:02	SubIndex 002	2. PDO Mapping entry (object 0x7000 (DIG Outputs Ch.1), entry 0x02 (Output 2))	UINT32	RO	0x7000:02, 1
1600:03	SubIndex 003	3. PDO Mapping entry (object 0x7000 (DIG Outputs Ch.1), entry 0x03 (Output 3))	UINT32	RO	0x7000:03, 1
1600:04	SubIndex 004	4. PDO Mapping entry (object 0x7000 (DIG Outputs Ch.1), entry 0x04 (Output 4))	UINT32	RO	0x7000:04, 1
1600:05	SubIndex 005	5. PDO Mapping entry (object 0x7000 (DIG Outputs Ch.1), entry 0x05 (Output 5))	UINT32	RO	0x7000:05, 1
1600:06	SubIndex 006	6. PDO Mapping entry (object 0x7000 (DIG Outputs Ch.1), entry 0x06 (Output 6))	UINT32	RO	0x7000:06, 1
1600:07	SubIndex 007	7. PDO Mapping entry (object 0x7000 (DIG Outputs Ch.1), entry 0x07 (Output 7))	UINT32	RO	0x7000:07, 1
1600:08	SubIndex 008	8. PDO Mapping entry (object 0x7000 (DIG Outputs Ch.1), entry 0x08 (Output 8))	UINT32	RO	0x7000:08, 1
1600:09	SubIndex 009	9. PDO Mapping entry (8 bits align)	UINT32	RO	0x0000:00, 8

Index 1601 DIG RxPDO-Map OutputsCh.2

Index	Name	Meaning	Data type	Flags	Default
1601:0	DIG RxPDO-Map OutputsCh.2	PDO Mapping RxPDO 2	UINT8	RO	0x09 (9_{dec})
1601:01	SubIndex 001	1. PDO Mapping entry (object 0x7010 (DIG Outputs Ch.2), entry 0x01 (Output 1))	UINT32	RO	0x7010:01, 1
1601:02	SubIndex 002	2. PDO Mapping entry (object 0x7010 (DIG Outputs Ch.2), entry 0x02 (Output 2))	UINT32	RO	0x7010:02, 1
1601:03	SubIndex 003	3. PDO Mapping entry (object 0x7010 (DIG Outputs Ch.2), entry 0x03 (Output 3))	UINT32	RO	0x7010:03, 1
1601:04	SubIndex 004	4. PDO Mapping entry (object 0x7010 (DIG Outputs Ch.2), entry 0x04 (Output 4))	UINT32	RO	0x7010:04, 1
1601:05	SubIndex 005	5. PDO Mapping entry (object 0x7010 (DIG Outputs Ch.2), entry 0x05 (Output 5))	UINT32	RO	0x7010:05, 1
1601:06	SubIndex 006	6. PDO Mapping entry (object 0x7010 (DIG Outputs Ch.2), entry 0x06 (Output 6))	UINT32	RO	0x7010:06, 1
1601:07	SubIndex 007	7. PDO Mapping entry (object 0x7010 (DIG Outputs Ch.2), entry 0x07 (Output 7))	UINT32	RO	0x7010:07, 1
1601:08	SubIndex 008	8. PDO Mapping entry (object 0x7010 (DIG Outputs Ch.2), entry 0x08 (Output 8))	UINT32	RO	0x7010:08, 1
1601:09	SubIndex 009	9. PDO Mapping entry (8 bits align)	UINT32	RO	0x0000:00, 8

Index 1602 DIG RxPDO-Map OutputsCh.3

Index	Name	Meaning	Data type	Flags	Default
1602:0	DIG RxPDO-Map OutputsCh.3	PDO Mapping RxPDO 3	UINT8	RO	0x09 (9_{dec})
1602:01	SubIndex 001	1. PDO Mapping entry (object 0x7020 (DIG Outputs Ch.3), entry 0x01 (Output 1))	UINT32	RO	0x7020:01, 1
1602:02	SubIndex 002	2. PDO Mapping entry (object 0x7020 (DIG Outputs Ch.3), entry 0x02 (Output 2))	UINT32	RO	0x7020:02, 1
1602:03	SubIndex 003	3. PDO Mapping entry (object 0x7020 (DIG Outputs Ch.3), entry 0x03 (Output 3))	UINT32	RO	0x7020:03, 1
1602:04	SubIndex 004	4. PDO Mapping entry (object 0x7020 (DIG Outputs Ch.3), entry 0x04 (Output 4))	UINT32	RO	0x7020:04, 1
1602:05	SubIndex 005	5. PDO Mapping entry (object 0x7020 (DIG Outputs Ch.3), entry 0x05 (Output 5))	UINT32	RO	0x7020:05, 1
1602:06	SubIndex 006	6. PDO Mapping entry (object 0x7020 (DIG Outputs Ch.3), entry 0x06 (Output 6))	UINT32	RO	0x7020:06, 1
1602:07	SubIndex 007	7. PDO Mapping entry (object 0x7020 (DIG Outputs Ch.3), entry 0x07 (Output 7))	UINT32	RO	0x7020:07, 1
1602:08	SubIndex 008	8. PDO Mapping entry (object 0x7020 (DIG Outputs Ch.3), entry 0x08 (Output 8))	UINT32	RO	0x7020:08, 1
1602:09	SubIndex 009	9. PDO Mapping entry (8 bits align)	UINT32	RO	0x0000:00, 8

Index 1603 DIG RxPDO-Map Outputs Device

Index	Name	Meaning	Data type	Flags	Default
1603:0	DIG RxPDO-Map Outputs Device	PDO Mapping RxPDO 4	UINT8	RO	0x03 (3_{dec})
1603:01	SubIndex 001	1. PDO Mapping entry (object 0xF700 (DIG Outputs), entry 0x01 (Set safe state))	UINT32	RO	0xF700:01, 1
1603:02	SubIndex 002	2. PDO Mapping entry (object 0xF700 (DIG Outputs), entry 0x02 (Reset outputs))	UINT32	RO	0xF700:02, 1
1603:03	SubIndex 003	3. PDO Mapping entry (14 bits align)	UINT32	RO	0x0000:00, 14

Index 1A00 DIG TxPDO-Map Diag Inputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
1A00:0	DIG TxPDO-Map Diag Inputs Ch.1	PDO Mapping TxPDO 1	UINT8	RO	0x09 (9_{dec})
1A00:01	SubIndex 001	1. PDO Mapping entry (object 0x6001 (DIG Diag Inputs Ch.1), entry 0x01 (Diag Input 1))	UINT32	RO	0x6001:01, 1
1A00:02	SubIndex 002	2. PDO Mapping entry (object 0x6001 (DIG Diag Inputs Ch.1), entry 0x02 (Diag Input 2))	UINT32	RO	0x6001:02, 1
1A00:03	SubIndex 003	3. PDO Mapping entry (object 0x6001 (DIG Diag Inputs Ch.1), entry 0x03 (Diag Input 3))	UINT32	RO	0x6001:03, 1
1A00:04	SubIndex 004	4. PDO Mapping entry (object 0x6001 (DIG Diag Inputs Ch.1), entry 0x04 (Diag Input 4))	UINT32	RO	0x6001:04, 1
1A00:05	SubIndex 005	5. PDO Mapping entry (object 0x6001 (DIG Diag Inputs Ch.1), entry 0x05 (Diag Input 5))	UINT32	RO	0x6001:05, 1
1A00:06	SubIndex 006	6. PDO Mapping entry (object 0x6001 (DIG Diag Inputs Ch.1), entry 0x06 (Diag Input 6))	UINT32	RO	0x6001:06, 1
1A00:07	SubIndex 007	7. PDO Mapping entry (object 0x6001 (DIG Diag Inputs Ch.1), entry 0x07 (Diag Input 7))	UINT32	RO	0x6001:07, 1
1A00:08	SubIndex 008	8. PDO Mapping entry (object 0x6001 (DIG Diag Inputs Ch.1), entry 0x08 (Diag Input 8))	UINT32	RO	0x6001:08, 1
1A00:09	SubIndex 009	9. PDO Mapping entry (8 bits align)	UINT32	RO	0x0000:00, 8

Index 1A01 DIG TxPDO-Map Diag Inputs Ch.2

Index	Name	Meaning	Data type	Flags	Default
1A01:0	DIG TxPDO-Map Diag Inputs Ch.2	PDO Mapping TxPDO 2	UINT8	RO	0x09 (9_{dec})
1A01:01	SubIndex 001	1. PDO Mapping entry (object 0x6011 (DIG Diag Inputs Ch.2), entry 0x01 (Diag Input 1))	UINT32	RO	0x6011:01, 1
1A01:02	SubIndex 002	2. PDO Mapping entry (object 0x6011 (DIG Diag Inputs Ch.2), entry 0x02 (Diag Input 2))	UINT32	RO	0x6011:02, 1
1A01:03	SubIndex 003	3. PDO Mapping entry (object 0x6011 (DIG Diag Inputs Ch.2), entry 0x03 (Diag Input 3))	UINT32	RO	0x6011:03, 1
1A01:04	SubIndex 004	4. PDO Mapping entry (object 0x6011 (DIG Diag Inputs Ch.2), entry 0x04 (Diag Input 4))	UINT32	RO	0x6011:04, 1
1A01:05	SubIndex 005	5. PDO Mapping entry (object 0x6011 (DIG Diag Inputs Ch.2), entry 0x05 (Diag Input 5))	UINT32	RO	0x6011:05, 1
1A01:06	SubIndex 006	6. PDO Mapping entry (object 0x6011 (DIG Diag Inputs Ch.2), entry 0x06 (Diag Input 6))	UINT32	RO	0x6011:06, 1
1A01:07	SubIndex 007	7. PDO Mapping entry (object 0x6011 (DIG Diag Inputs Ch.2), entry 0x07 (Diag Input 7))	UINT32	RO	0x6011:07, 1
1A01:08	SubIndex 008	8. PDO Mapping entry (object 0x6011 (DIG Diag Inputs Ch.2), entry 0x08 (Diag Input 8))	UINT32	RO	0x6011:08, 1
1A01:09	SubIndex 009	9. PDO Mapping entry (8 bits align)	UINT32	RO	0x0000:00, 8

Index 1A02 DIG TxPDO-Map Diag Inputs Ch.3

Index	Name	Meaning	Data type	Flags	Default
1A02:0	DIG TxPDO-Map Diag Inputs Ch.3	PDO Mapping TxPDO 3	UINT8	RO	0x09 (9_{dec})
1A02:01	SubIndex 001	1. PDO Mapping entry (object 0x6021 (DIG Diag Inputs Ch.3), entry 0x01 (Diag Input 1))	UINT32	RO	0x6021:01, 1
1A02:02	SubIndex 002	2. PDO Mapping entry (object 0x6021 (DIG Diag Inputs Ch.3), entry 0x02 (Diag Input 2))	UINT32	RO	0x6021:02, 1
1A02:03	SubIndex 003	3. PDO Mapping entry (object 0x6021 (DIG Diag Inputs Ch.3), entry 0x03 (Diag Input 3))	UINT32	RO	0x6021:03, 1
1A02:04	SubIndex 004	4. PDO Mapping entry (object 0x6021 (DIG Diag Inputs Ch.3), entry 0x04 (Diag Input 4))	UINT32	RO	0x6021:04, 1
1A02:05	SubIndex 005	5. PDO Mapping entry (object 0x6021 (DIG Diag Inputs Ch.3), entry 0x05 (Diag Input 5))	UINT32	RO	0x6021:05, 1
1A02:06	SubIndex 006	6. PDO Mapping entry (object 0x6021 (DIG Diag Inputs Ch.3), entry 0x06 (Diag Input 6))	UINT32	RO	0x6021:06, 1
1A02:07	SubIndex 007	7. PDO Mapping entry (object 0x6021 (DIG Diag Inputs Ch.3), entry 0x07 (Diag Input 7))	UINT32	RO	0x6021:07, 1
1A02:08	SubIndex 008	8. PDO Mapping entry (object 0x6021 (DIG Diag Inputs Ch.3), entry 0x08 (Diag Input 8))	UINT32	RO	0x6021:08, 1
1A02:09	SubIndex 009	9. PDO Mapping entry (8 bits align)	UINT32	RO	0x0000:00, 8

Index 1A03 DIG TxPDO-Map Inputs Device

Index	Name	Meaning	Data type	Flags	Default
1A03:0	DIG TxPDO-Map Inputs Device	PDO Mapping TxPDO 4	UINT8	RO	0x0A (10_{dec})
1A03:01	SubIndex 001	1. PDO Mapping entry (object 0xF600 (DIG Inputs), entry 0x01 (Safe state active))	UINT32	RO	0xF600:01, 1
1A03:02	SubIndex 002	2. PDO Mapping entry (object 0xF600 (DIG Inputs), entry 0x02 (Error channel 1))	UINT32	RO	0xF600:02, 1
1A03:03	SubIndex 003	3. PDO Mapping entry (object 0xF600 (DIG Inputs), entry 0x03 (Error channel 2))	UINT32	RO	0xF600:03, 1
1A03:04	SubIndex 004	4. PDO Mapping entry (object 0xF600 (DIG Inputs), entry 0x04 (Error channel 3))	UINT32	RO	0xF600:04, 1
1A03:05	SubIndex 005	5. PDO Mapping entry (object 0xF600 (DIG Inputs), entry 0x05 (Us Undervoltage))	UINT32	RO	0xF600:05, 1
1A03:06	SubIndex 006	6. PDO Mapping entry (object 0xF600 (DIG Inputs), entry 0x06 (Up Undervoltage))	UINT32	RO	0xF600:06, 1
1A03:07	SubIndex 007	7. PDO Mapping entry (7 bits align)	UINT32	RO	0x0000:00, 7
1A03:08	SubIndex 008	8. PDO Mapping entry (object 0xF600 (DIG Inputs), entry 0x0E (Sync error))	UINT32	RO	0xF600:0E, 1
1A03:09	SubIndex 009	9. PDO Mapping entry (1 bits align)	UINT32	RO	0x0000:00, 1
1A03:0A	SubIndex 010	10. PDO Mapping entry (object 0xF600 (DIG Inputs), entry 0x10 (TxPDO Toggle))	UINT32	RO	0xF600:10, 1

Index 1C00 Sync manager type

Index	Name	Meaning	Data type	Flags	Default
1C00:0	Sync manager type	Usage of the Sync Manager channels	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	RW	0x04 (4_{dec})
1C12:01	Subindex 001	1. assigned RxPDO (contains the index of the corresponding RxPDO Mapping object)	UINT16	RW	0x1600 (5632_{dec})
1C12:02	Subindex 002	2. assigned RxPDO (contains the index of the corresponding RxPDO Mapping object)	UINT16	RW	0x1601 (5633_{dec})
1C12:03	Subindex 003	3. assigned RxPDO (contains the index of the corresponding RxPDO Mapping object)	UINT16	RW	0x1602 (5634_{dec})
1C12:04	Subindex 004	4. assigned RxPDO (contains the index of the corresponding RxPDO Mapping object)	UINT16	RW	0x1603 (5635_{dec})

Index 1C13 TxPDO assign

Index	Name	Meaning	Data type	Flags	Default
1C13:0	TxPDO assign	PDO Assign Inputs	UINT8	RW	0x04 (4_{dec})
1C13:01	Subindex 001	1. assigned TxPDO (contains the index of the corresponding TxPDO Mapping object)	UINT16	RW	0x1A00 (6656_{dec})
1C13:02	Subindex 002	2. assigned TxPDO (contains the index of the corresponding TxPDO Mapping object)	UINT16	RW	0x1A01 (6657_{dec})
1C13:03	Subindex 003	3. assigned TxPDO (contains the index of the corresponding TxPDO Mapping object)	UINT16	RW	0x1A02 (6658_{dec})
1C13:04	Subindex 004	4. assigned TxPDO (contains the index of the corresponding TxPDO Mapping object)	UINT16	RW	0x1A03 (6659_{dec})

Index 1C32 SM Output parameter

Index	Name	Meaning	Data type	Flags	Default
1C32:0	SM output parameter	Synchronization parameter of the outputs	UINT8	RO	0x20 (32_{dec})
1C32:01	Sync mode	actual synchronization mode: • 0: Free Run • 1: Synchronous with SM 2 Event • 2: DC-Mode - Synchronous with SYNC0 Event • 3: DC-Mode - Synchronous with SYNC1 Event	UINT16	RW	0x0001 (1_{dec})
1C32:02	Cycle time	Cycle time (in ns): • Free Run: cycle time of the local timer • Synchronous with SM 2 Event: Cycle time of the master • DC-Mode: SYNC0/SYNC1 Cycle time	UINT32	RW	0x003D0900 (4000000_{dec})
1C32:03	Shift time	Time between SYNC0 Event and Outputs Valid (in ns, only in DC-Mode)	UINT32	RO	0x00000000 (0_{dec})
1C32:04	Sync modes supported	Supported synchronization modes: • Bit 0 = 1: Free Run is supported • Bit 1 = 1: Synchronous with SM 2 Event is supported • Bit 2-3 = 01: DC-Mode is supported • Bit 4-5 = 10: Output Shift with SYNC1 Event (only DC-Mode) • Bit 14 = 1: dynamic times (could be measured by writing 1C32:08 [▶ 157])	UINT16	RO	0x000A (10_{dec})
1C32:05	Minimum cycle time	Minimum cycle time supported (in ns)	UINT32	RO	0x000493E0 (300000_{dec})
1C32:06	Calc and copy time	Minimal time between SYNC0 and SYNC1 Event (in ns, only in DC-Mode)	UINT32	RO	0x00000000 (0_{dec})
1C32:07	Minimum delay time		UINT32	RO	0x00000000 (0_{dec})
1C32:08	Command	• 0: Measurement of the times will be stopped • 1: Measurement of the times will be started The Entries 1C32:03 [▶ 157], 1C32:05 [▶ 157], 1C32:06 [▶ 157], 1C32:09 [▶ 157], 1C33:03 [▶ 158], 1C33:06 [▶ 157], 1C33:09 [▶ 158] will be updated with the maximum measured values.	UINT16	RW	0x0000 (0_{dec})
1C32:09	Maximum delay time	Time between SYNC1 Event and Outputs Valid (in ns, only in DC-Mode)	UINT32	RO	0x00000000 (0_{dec})
1C32:0B	SM event missed counter	Number of the missed SM-Events in state OPERATIONAL (only in DC Mode)	UINT16	RO	0x0000 (0_{dec})
1C32:0C	Cycle exceeded counter	Number of the exceeded cycles in state OPERATIONAL	UINT16	RO	0x0000 (0_{dec})
1C32:0D	Shift too short counter	Number of the too short distances between SYNC0 and SYNC1 Event (only in DC Mode)	UINT16	RO	0x0000 (0_{dec})
1C32:20	Sync error	TRUE: In the last cycle the synchronization was not correct (only in DC Mode)	boolean	RO	0x00 (0_{dec})

Index 1C33 SM input parameter

Index	Name	Meaning	Data type	Flags	Default
1C33:0	SM input parameter	Synchronization parameter of the inputs	UINT8	RO	0x20 (32_{dec})
1C33:01	Sync mode	actual synchronization mode: • 0: Free Run • 1: Synchronous with SM 3 Event (no Outputs available) • 2: DC - Synchronous with SYNC0 Event • 3: DC - Synchronous with SYNC1 Event • 34: Synchronous with SM 2 Event (Outputs available)	UINT16	RW	0x0022 (34_{dec})
1C33:02	Cycle time	same as 1C32:02 [▶ 157]	UINT32	RW	0x003D0900 (4000000_{dec})
1C33:03	Shift time	time between SYNC0-Event and Input Latch (in ns, only in 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 with local event (Outputs available) • Bit 4-5 = 10: Input Shift with SYNC1 Event (no Outputs available) • Bit 14 = 1: dynamic times (could be measured by writing 1C32:08 [▶ 157] or 1C33:08 [▶ 158])	UINT16	RO	0x000A (10_{dec})
1C33:05	Minimum cycle time	same as 1C32:05 [▶ 157]	UINT32	RO	0x000493E0 (300000_{dec})
1C33:06	Calc and copy time	time between Input Latch and the availability of the inputs for the master (in ns, only in DC-Mode)	UINT32	RO	0x00000000 (0_{dec})
1C33:07	Minimum delay time		UINT32	RO	0x00000000 (0_{dec})
1C33:08	Command	same as 1C32:08 [▶ 157]	UINT16	RW	0x0000 (0_{dec})
1C33:09	Maximum delay time	time between SYNC1-Event and Input Latch (in ns, only in DC-Mode)	UINT32	RO	0x00000000 (0_{dec})
1C33:0B	SM event missed counter	same as 1C32:11 [▶ 157]	UINT16	RO	0x0000 (0_{dec})
1C33:0C	Cycle exceeded counter	same as 1C32:12 [▶ 157]	UINT16	RO	0x0000 (0_{dec})
1C33:0D	Shift too short counter	same as 1C32:13 [▶ 157]	UINT16	RO	0x0000 (0_{dec})
1C33:20	Sync error	same as 1C32:32 [▶ 157]	boolean	RO	0x00 (0_{dec})

Profile specific objects (0x6000-0xFFFF)

The profile specific objects have the same meaning for all EtherCAT Slaves which support the profile 5001.

Index 6001 DIG Diag Inputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
6001:0	DIG Diag Inputs Ch.1		UINT8	RO	0x08 (8_{dec})
6001:01	Diag Input 1		boolean	RO	0x00 (0_{dec})
6001:02	Diag Input 2		boolean	RO	0x00 (0_{dec})
6001:03	Diag Input 3		boolean	RO	0x00 (0_{dec})
6001:04	Diag Input 4		boolean	RO	0x00 (0_{dec})
6001:05	Diag Input 5		boolean	RO	0x00 (0_{dec})
6001:06	Diag Input 6		boolean	RO	0x00 (0_{dec})
6001:07	Diag Input 7		boolean	RO	0x00 (0_{dec})
6001:08	Diag Input 8		boolean	RO	0x00 (0_{dec})

Index 6011 DIG Diag Inputs Ch.2

Index	Name	Meaning	Data type	Flags	Default
6011:0	DIG Diag Inputs Ch.2		UINT8	RO	0x08 (8_{dec})
6011:01	Diag Input 1		boolean	RO	0x00 (0_{dec})
6011:02	Diag Input 2		boolean	RO	0x00 (0_{dec})
6011:03	Diag Input 3		boolean	RO	0x00 (0_{dec})
6011:04	Diag Input 4		boolean	RO	0x00 (0_{dec})
6011:05	Diag Input 5		boolean	RO	0x00 (0_{dec})
6011:06	Diag Input 6		boolean	RO	0x00 (0_{dec})
6011:07	Diag Input 7		boolean	RO	0x00 (0_{dec})
6011:08	Diag Input 8		boolean	RO	0x00 (0_{dec})

Index 6021 DIG Diag Inputs Ch.3

Index	Name	Meaning	Data type	Flags	Default
6021:0	DIG Diag Inputs Ch.3		UINT8	RO	0x08 (8_{dec})
6021:01	Diag Input 1		boolean	RO	0x00 (0_{dec})
6021:02	Diag Input 2		boolean	RO	0x00 (0_{dec})
6021:03	Diag Input 3		boolean	RO	0x00 (0_{dec})
6021:04	Diag Input 4		boolean	RO	0x00 (0_{dec})
6021:05	Diag Input 5		boolean	RO	0x00 (0_{dec})
6021:06	Diag Input 6		boolean	RO	0x00 (0_{dec})
6021:07	Diag Input 7		boolean	RO	0x00 (0_{dec})
6021:08	Diag Input 8		boolean	RO	0x00 (0_{dec})

Index 7000 DIG Outputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
7000:0	DIG Outputs Ch.1		UINT8	RO	0x08 (8_{dec})
7000:01	Output 1		boolean	RO	0x00 (0_{dec})
7000:02	Output 2		boolean	RO	0x00 (0_{dec})
7000:03	Output 3		boolean	RO	0x00 (0_{dec})
7000:04	Output 4		boolean	RO	0x00 (0_{dec})
7000:05	Output 5		boolean	RO	0x00 (0_{dec})
7000:06	Output 6		boolean	RO	0x00 (0_{dec})
7000:07	Output 7		boolean	RO	0x00 (0_{dec})
7000:08	Output 8		boolean	RO	0x00 (0_{dec})

Index 7010 DIG Outputs Ch.2

Index	Name	Meaning	Data type	Flags	Default
7010:0	DIG Outputs Ch.2		UINT8	RO	0x08 (8_{dec})
7010:01	Output 1		boolean	RO	0x00 (0_{dec})
7010:02	Output 2		boolean	RO	0x00 (0_{dec})
7010:03	Output 3		boolean	RO	0x00 (0_{dec})
7010:04	Output 4		boolean	RO	0x00 (0_{dec})
7010:05	Output 5		boolean	RO	0x00 (0_{dec})
7010:06	Output 6		boolean	RO	0x00 (0_{dec})
7010:07	Output 7		boolean	RO	0x00 (0_{dec})
7010:08	Output 8		boolean	RO	0x00 (0_{dec})

Index 7020 DIG Outputs Ch.3

Index	Name	Meaning	Data type	Flags	Default
7020:0	DIG Outputs Ch.3		UINT8	RO	0x08 (8_{dec})
7020:01	Output 1		boolean	RO	0x00 (0_{dec})
7020:02	Output 2		boolean	RO	0x00 (0_{dec})
7020:03	Output 3		boolean	RO	0x00 (0_{dec})
7020:04	Output 4		boolean	RO	0x00 (0_{dec})
7020:05	Output 5		boolean	RO	0x00 (0_{dec})
7020:06	Output 6		boolean	RO	0x00 (0_{dec})
7020:07	Output 7		boolean	RO	0x00 (0_{dec})
7020:08	Output 8		boolean	RO	0x00 (0_{dec})

Index F000 Modular device profile

Index	Name	Meaning	Data type	Flags	Default
F000:0	Modular device profile	general information about the Modular Device Profile	UINT8	RO	0x02 (2_{dec})
F000:01	Module index distance	Index distance between the objects of two channels	UINT16	RO	0x0010 (16_{dec})
F000:02	Maximum number of modules	number of channels	UINT16	RO	0x0003 (3_{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	0x03 (3_{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	0x00000118 (280_{dec})

Index F600 DIG Inputs

Index	Name	Meaning	Data type	Flags	Default
F600:0	DIG Inputs		UINT8	RO	0x10 (16_{dec})
F600:01	Safe state active		boolean	RO	0x00 (0_{dec})
F600:02	Error channel 1		boolean	RO	0x00 (0_{dec})
F600:03	Error channel 2		boolean	RO	0x00 (0_{dec})
F600:04	Error channel 3		boolean	RO	0x00 (0_{dec})
F600:05	Us Undervoltage		boolean	RO	0x00 (0_{dec})
F600:06	Up Undervoltage		boolean	RO	0x00 (0_{dec})
F600:0E	Sync error		boolean	RO	0x00 (0_{dec})
F600:10	TxPDO Toggle		boolean	RO	0x00 (0_{dec})

Index F700 DIG Outputs

Index	Name	Meaning	Data type	Flags	Default
F700:0	DIG Outputs		UINT8	RO	0x02 (2_{dec})
F700:01	Set safe state		boolean	RO	0x00 (0_{dec})
F700:02	Reset outputs		boolean	RO	0x00 (0_{dec})

Index F800 DIG Settings

Index	Name	Meaning	Data type	Flags	Default
F800:0	DIG Settings		UINT8	RO	0x11 (17_{dec})
F800:01	Disable shut off		boolean	RW	0x00 (0_{dec})
F800:11	Switch off time		UINT16	RW	0x000A (10_{dec})

Also see about this

- Configuration via TwinCAT [▶ 123]
- Configuration via TwinCAT [▶ 120]

4.7 Restoring the delivery state

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

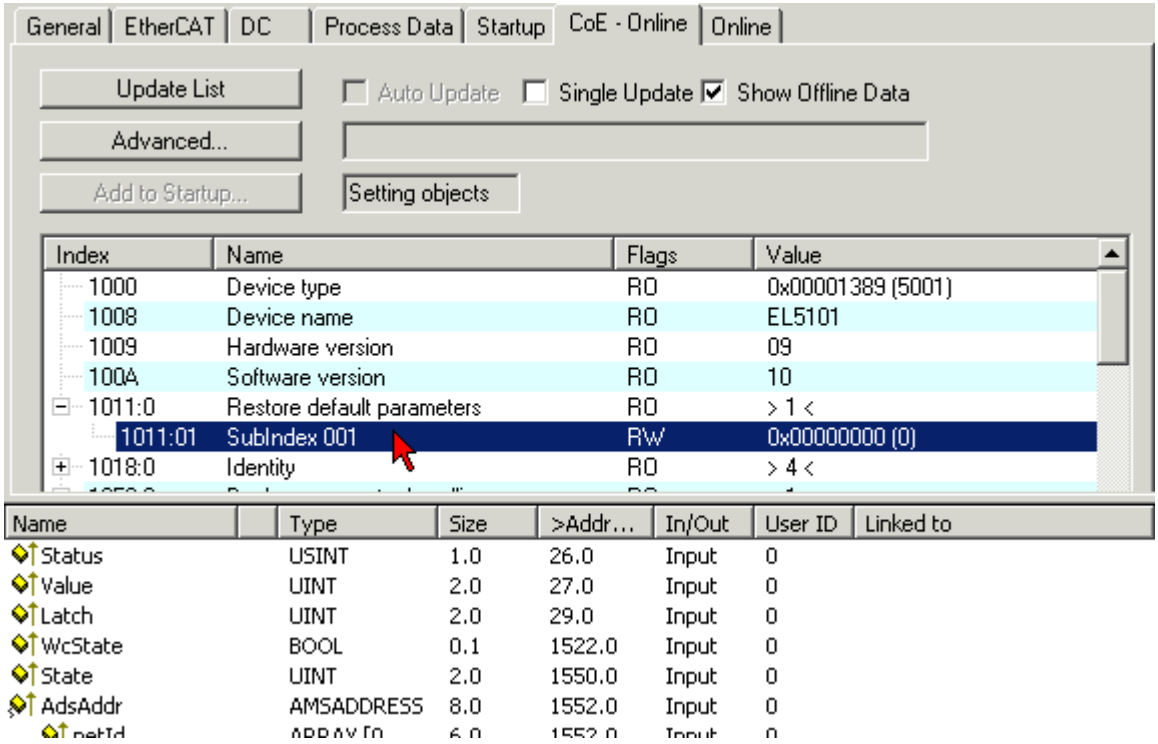


Fig. 127: Selecting the Restore default parameters PDO

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.

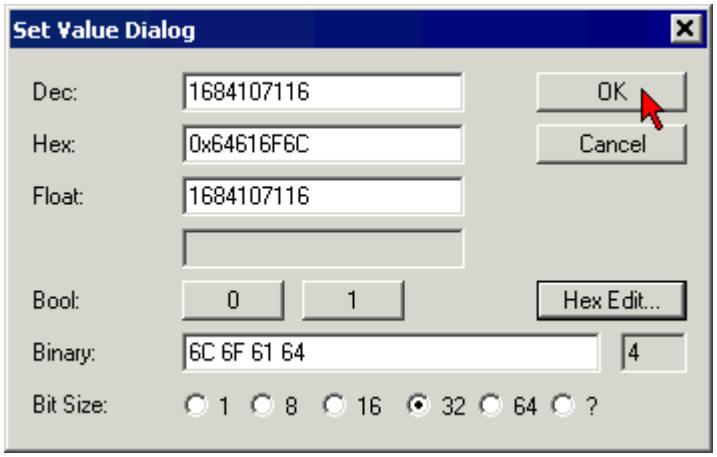


Fig. 128: Entering a restore value in the Set Value dialog

Note

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 Appendix

5.1 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 Fieldbus/EtherCAT Box 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

5.2 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

Note

Further accessories

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

5.3 Support and Service

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