BECKHOFF New Automation Technology

Documentation | EN

EP1xxx

EtherCAT Box modules with digital inputs



2026-02-04 | Version: 3.9

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

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

Disclaimer

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

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

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

Trademarks

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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.

Signal words

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

Personal injury warnings

⚠ DANGER
Hazard with high risk of death or serious injury.

⚠ WARNING
Hazard with medium risk of death or serious injury.

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

Warning of damage to property or environment

NOTICE
The environment, equipment, or data may be damaged.

Information on handling the product



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

1.3 Documentation issue status

Version	Comment
3.9	• Signal interfaces updated
3.8	• EP1839-0022 added
3.7	• Technical data updated • EP1111-0000 moved to separate documentation
3.6	• EP1819-0005 added
3.5	• Technical data updated • Chapter “Connections” > “Digital inputs” updated
3.4	• Structure update
3.3	• EP1839-0042 added • Technical data updated
3.2	• Information on freedom from interference added: ◦ EP1809-0042 ◦ EP1859-0042 • Dimensions updated
3.1	• UL requirements updated • EP1816-3008: Chapter "Acceleration measurement" updated • EP1816-3008: Chapter "Inclination measurement" updated
3.0	• Front page updated • Scope of delivery added
2.8	• EP18x9-0042: Technical data and connections updated
2.7	• EP1809-0042 added • EP1816-0003 added • EP1819-0021 added • EP1859-0042 added
2.6	• Signal connection of EP1816-3008 corrected • BG2000-0010 protection enclosure supplemented • EP1098-0001 Introduction: 2-wire connection corrected • EP1816-1008 added
2.5.0	• EP1816-3008 added
2.4.1	• EP1111-0000 – technical data updated
2.4.0	• Nut torques for connectors updated
2.3.0	• *Torque wrench* diagram updated • Power Connection updated
2.2.0	• EP1008-0022 added • EP1819-0021 added • Cabling adjusted
2.1.0	• Nut torques for connectors extended
2.0.0	• Migration • Technical data updated
1.4.0	• Chapter *Accessories* added • Chapter on *Tightening torque for connectors* updated • Chapter *EtherCAT connection* updated • Chapter on *BG2000-0000 - protective housing for EtherCAT Box* updated

Version	Modifications
1.3.0	• EP1111-0000 added • EP1098-0001 and EP1098-0002 added • EP1809-0021, EP1809-0022 and EP1819-0022 updated
1.2.0	• ATEX notes added • Extended temperature range for activated modules documented • EP1809-0021, EP1809-0022 and EP1819-0022 added • Description of the power connection updated • Overview of EtherCAT cables extended
1.1.0	• Technical data: Current consumption values amended • Tightening torque for connectors added
1.0.0	• Process data description extended
0.7	• Description of status LEDs added • Signal connection extended • Explanation of the serial number adapted to the new standard
0.6	• Signal connection extended
0.5	• First preliminary version

Firmware and hardware versions

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

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

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

Syntax of the batch number (D-number)

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

Further information on this topic: Version identification of EtherCAT devices [▶ 210].

2 EtherCAT Box - Introduction

The EtherCAT system has been extended with EtherCAT Box modules with protection class IP67. Through the integrated EtherCAT interface the modules can be connected directly to an EtherCAT network without an additional Coupler Box. The high-performance of EtherCAT is thus maintained into each module.

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

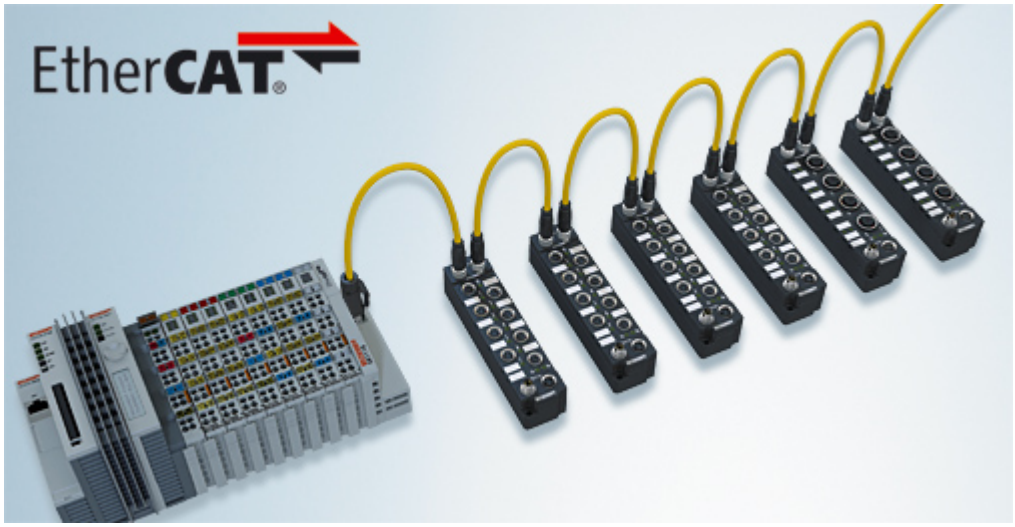


Fig. 1: EtherCAT Box Modules within an EtherCAT network

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

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

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

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

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



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



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

Basic EtherCAT documentation

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

3 Product overview

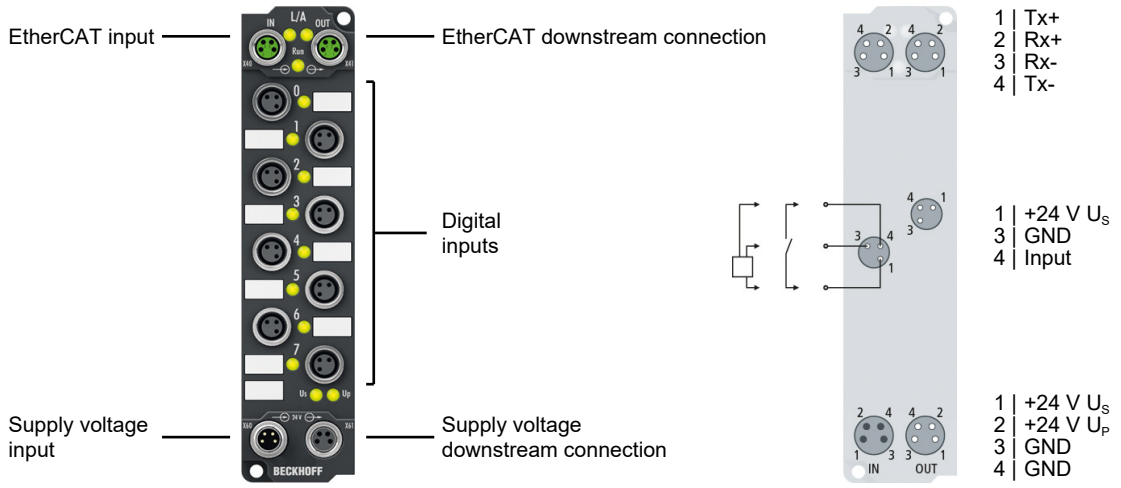
The following table shows the products described in this documentation and the main distinguishing features.

Module	Number inputs	Filter	Signal connection	EtherCAT connection	Comment
EP1008-0001 [▶ 14]	8	3.0 ms	8x M8 socket	M8	
EP1008-0002 [▶ 14]	8	3.0 ms	4x M12 socket	M8	
EP1008-0022 [▶ 19]	8	3.0 ms	8x M12 socket	M8	
EP1018-0001 [▶ 14]	8	10 µs	8x M8 socket	M8	
EP1018-0002 [▶ 14]	8	10 µs	4x M12 socket	M8	
EP1098-0001 [▶ 23]	8	10 µs	8x M8 socket	M8	ground switching
EP1809-0021 [▶ 28]	16	3.0 ms	16x M8 socket	M8	
EP1809-0022 [▶ 29]	16	3.0 ms	8x M12 socket	M8	
EP1809-0042 [▶ 33]	16	3.0 ms	8x M12 socket	M12	
EP1816-0003 [▶ 37]	16	10 µs	2x ZS2001	M8	Pluggable spring-loaded terminals
EP1816-0008 [▶ 41]	16	10 µs	1x D-sub socket, 25-pin	M8	
EP1816-1008 [▶ 41]	16	10 µs	1x D-sub socket, 25-pin	M8	Undervoltage detection
EP1816-3008 [▶ 41]	16	10 µs	1x D-sub socket, 25-pin	M8	Undervoltage detection, accelerometers
EP1819-0005 [▶ 50]	16	10 µs	8x M8 socket	M8	Evaluation of up to eight antivalent sensors.
EP1819-0021 [▶ 28]	16	10 µs	16x M8 socket	M8	
EP1819-0022 [▶ 29]	16	10 µs	8x M12 socket	M8	
EP1839-0022 [▶ 54]	16	adjustable	8x M12 socket	M8	Switchable sensor power supply, extended diagnostics.
EP1839-0042 [▶ 54]	16	adjustable	8x M12 socket	M12	Switchable sensor power supply, extended diagnostics.
EP1859-0042 [▶ 66]	8	3.0 ms	8x M12 socket	M12	8 digital outputs

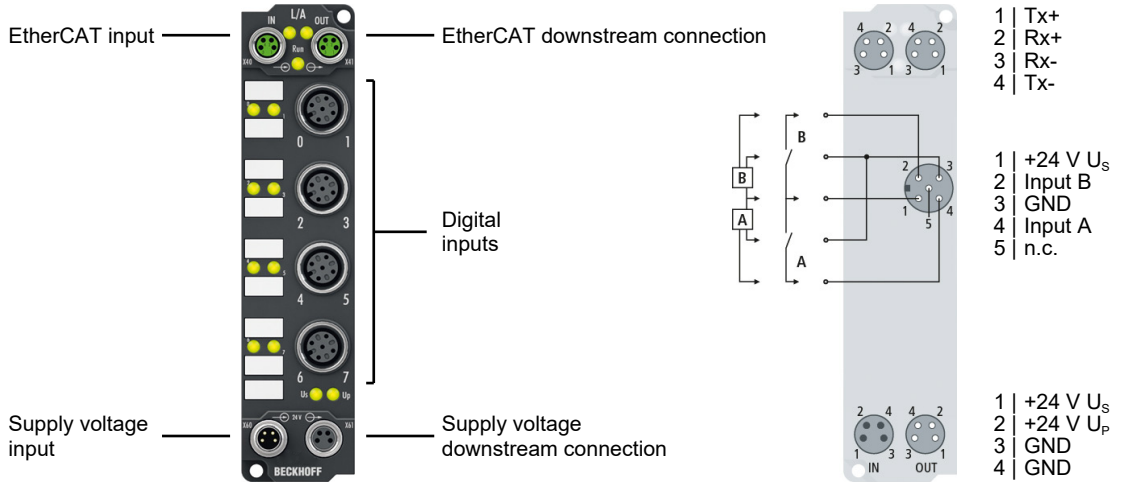
3.1 EP1008, EP1018

3.1.1 Introduction

EP1008-0001, EP1018-0001



EP1008-0002, EP1018-0002



8 digital inputs 24 V_{DC}

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

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

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

Quick links

EP1008-0001:

Technical data [▶ 16]
Process image [▶ 18]
Dimensions [▶ 72]
Signal interface [▶ 89]

EP1008-0002:

Technical data [▶ 16]
Process image [▶ 18]
Dimensions [▶ 73]
Signal interface [▶ 93]

EP1018-0001:

Technical data [▶ 16]
Process image [▶ 18]
Dimensions [▶ 72]
Signal interface [▶ 89]

EP1018-0002:

Technical data [▶ 16]
Process image [▶ 18]
Dimensions [▶ 73]
Signal interface [▶ 93]

3.1.2 Technical data - EP1008, EP1018

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

EtherCAT	
Connection	2 x M8 socket, 4-pin, A-coded, shielded
Electrical isolation	500 V

Supply voltages	
Connection	Input: M8 connector, 4-pin, A-coded Downstream connection: M8 socket, 4-pin, A-coded
U_S nominal voltage	24 V_{DC} (-15 % / +20 %)
U_S sum current: $I_{S,sum}$	max. 4 A
Current consumption from U_S	120 mA + sensor power supply
U_P nominal voltage	24 V_{DC} (-15 % / +20 %)
U_P sum current: $I_{P,sum}$	max. 4 A
Electrical isolation GND_S / GND_P	no

Digital inputs	EP1008-0001	EP1008-0002	EP1018-0001	EP1018-0002
Number of inputs	8			
Connection	8 x M8 socket, 3-pin, A-coded	4 x M12 socket, 5-pin, A-coded	8 x M8 socket, 3-pin, A-coded	4 x M12 socket, 5-pin, A-coded
Cable length	max. 30 m			
Characteristics	Type 3 according to EN 61131-2, compatible with type 1			
Nominal voltage	24 V_{DC} (-15 % / +20 %)			
Input filter	3.0 ms	3.0 ms	10 µs	10 µs
Signal voltage "0"	-3 … +5 V			
Signal voltage "1"	+11 … +30 V			
Input current	3 mA			
Sensor power supply	24 V_{DC} from U_S max. 0.5 A, short-circuit proof in total			

Housing data	
Dimensions W x H x D	30 mm x 126 mm x 26.5 mm (without connectors)
Weight	approx. 165 g
Installation position	variable
Material	PA6 (polyamide)

Environmental conditions	
Ambient temperature during operation	-25 … +60 °C -25 … +55 °C according to cURus 0 … +55 °C according to ATEX
Ambient temperature during storage	-40 … +85 °C
Vibration resistance, shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27 Additional tests [▶ 17]
EMC immunity / emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection rating	IP65, IP66, IP67 (according to EN 60529)

Approvals / markings	
Approvals / markings *)	ATEX [▶ 109], CE, cURus [▶ 108]

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

Additional tests

The devices have undergone the following additional tests:

Test	Explanation
Vibration	10 frequency sweeps 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

3.1.3 Scope of supply - EP1008, EP1018

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

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

Pre-assembled protective caps do not ensure IP67 protection

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

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

3.1.4 Process image - EP1008-000x

Channel 1 to Channel 8

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

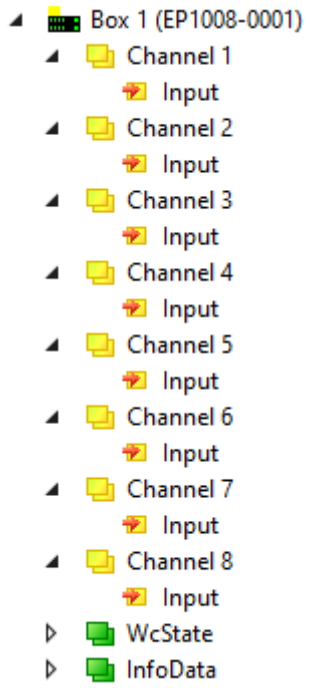
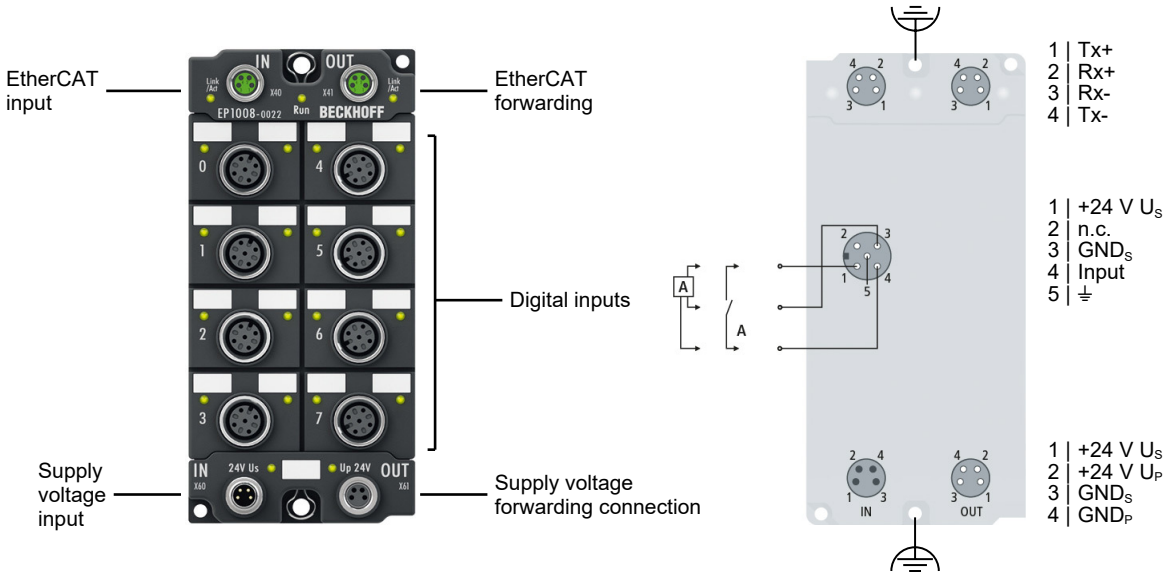


Fig. 4: EP1008-00xx, process image

3.2 EP1008-0022

3.2.1 Introduction



The EP1008-0022 EtherCAT Box with digital inputs acquires binary control signals from the process level and transfers them, with electrical isolation, to the controller. The signal state is displayed by LEDs; the signals are connected via screwable M12 connectors. One digital input is available for each M12 socket.

The sensors are supplied from the control voltage U_S. The load voltage U_P is not used in the input module, but it can optionally be connected for forwarding and is fed through to the next device.

The connected sensors are supplied via an internal, short-circuit proof driver block with a total of 0.5 A for all sensors.

Due to the input filter of 3.0 ms, the EP1008-0022 is particularly suitable for electronic and mechanical inputs, which undergo additional debouncing of the signal as a result.

Quick links

Technical data [▶ 20]
Process image [▶ 22]
Dimensions [▶ 78]
Signal interface [▶ 94]

3.2.2 Technical data - EP1008-0022

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

EtherCAT	
Connection	2 x M8 socket, 4-pin, A-coded, shielded
Electrical isolation	500 V

Supply voltages	
Connection	Input: M8 connector, 4-pin, A-coded Downstream connection: M8 socket, 4-pin, A-coded
U_S nominal voltage	24 V_{DC} (-15 % / +20 %)
U_S sum current: $I_{S,sum}$	max. 4 A
Current consumption from U_S	120 mA + sensor power supply
U_P nominal voltage	24 V_{DC} (-15 % / +20 %)
U_P sum current: $I_{P,sum}$	max. 4 A
Electrical isolation GND_S / GND_P	yes

Digital inputs	
Number of inputs	8
Connection	4x M12 socket, 5-pin, A-coded
Cable length	max. 30 m
Characteristics	Type 3 according to EN 61131-2, compatible with type 1
Nominal voltage	24 V_{DC} (-15 % / +20 %)
Input filter	3.0 ms
Signal voltage "0"	-3 … +5 V
Signal voltage "1"	+11 … +30 V
Input current	3 mA
Sensor power supply	24 V_{DC} from U_S max. 0.5 A, short-circuit proof in total

Housing data	
Dimensions W x H x D	60 mm x 126 mm x 26.5 mm (without plug connectors)
Weight	approx. 250 g
Installation position	variable
Material	PA6 (polyamide)

Environmental conditions	
Ambient temperature during operation	-25 … +60 °C -25 … +55 °C according to cURus
Ambient temperature during storage	-40 … +85 °C
Vibration resistance, shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27 Additional tests [▶ 21]
EMC immunity / emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP65, IP66, IP67 (conforms to EN 60529)

Approvals/markings	
Approvals/markings *)	CE, cURus [▶ 108]

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

Additional tests

The devices have undergone the following additional tests:

Test	Explanation
Vibration	10 frequency sweeps 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

3.2.3 Scope of supply - EP1008-0022

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

- 1x EP1008-0022 EtherCAT Box
- 2x protective cap for EtherCAT socket, M8, green (pre-assembled)
- 1x protective cap for supply voltage input, M8, transparent (pre-assembled)
- 1x protective cap for supply voltage output, M8, black (pre-assembled)
- 10x labels, blank (1 strip of 10)

Pre-assembled protective caps do not ensure IP67 protection

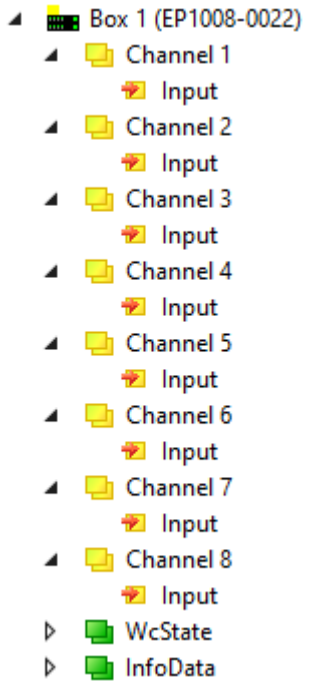
Protective caps are pre-assembled at the factory to protect connectors during transport. They may not be tight enough to ensure IP67 protection.

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

3.2.4 Process image - EP1008-0022

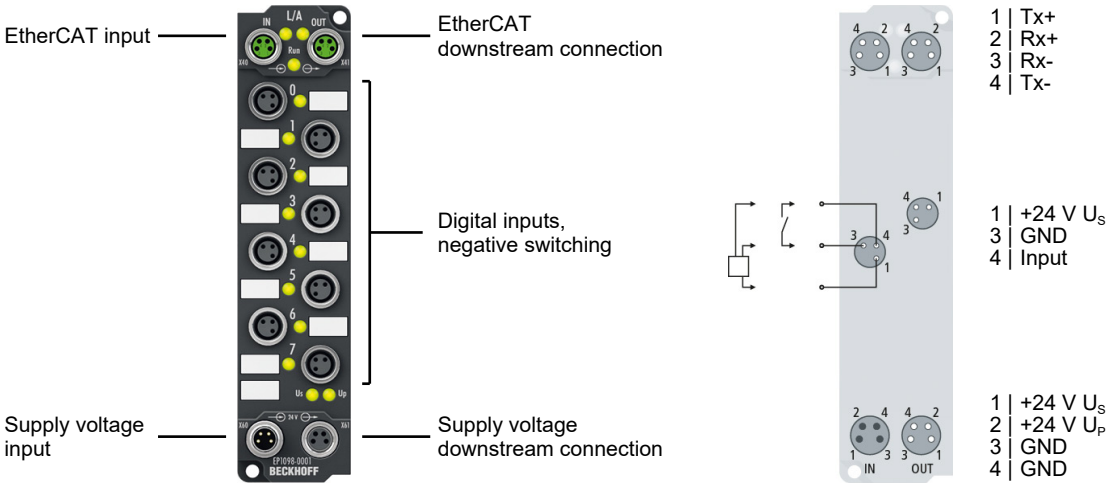
Channel 1 to Channel 8

Under "Channel 1" to "Channel 8" you will find the 8 digital inputs of the module.



3.3 EP1098-0001

3.3.1 Introduction



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

The EP1098-0001 and EP1098-0002 EtherCAT Box modules with digital inputs acquire binary control signals from the process level, and transfer them, electrically isolated, to the controller. The signal state is displayed by light emitting diodes; the signal connection is made optionally through M8 connectors (EP1098-0001) or M12 connectors (EP1098-0002)

The sensors are supplied from the control voltage U_S. The load voltage U_P is not used in the input module, but it can optionally be connected for forwarding and is fed through to the next device.

Quick links

Technical data [▶ 24]
Process image [▶ 27]
Dimensions [▶ 72]
Signal interface [▶ 89]

3.3.2 Technical data - EP1098-0001

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

EtherCAT	
Connection	2 x M8 socket, 4-pin, A-coded, shielded
Electrical isolation	500 V

Supply voltages	
Connection	Input: M8 connector, 4-pin, A-coded Downstream connection: M8 socket, 4-pin, A-coded
U_S nominal voltage	24 V_{DC} (-15 % / +20 %)
U_S sum current: $I_{S,sum}$	max. 4 A
Current consumption from U_S	120 mA + sensor supply
Rated voltage U_P	24 V_{DC} (-15 % / +20 %)
U_P sum current: $I_{P,sum}$	max. 4 A
Current consumption from U_P	None. U_P is only forwarded.
Electrical isolation GND_S / GND_P	no

Digital inputs, ground switching	
Number	8
Connection	8 x M8 socket, 3-pin, A-coded
Cable length	max. 30 m
Nominal input voltage	24 V_{DC} (-15 %/+20 %)
Input filter	10 µs
Characteristics	ground switching
Signal voltage "0"	11 … 30 V
Signal voltage "1"	0 … 7 V
Input current	typically 3 mA (EN 61131-2, type 3)
Sensor power supply	24 V_{DC} from U_S max. 0.5 A, short-circuit proof in total

Housing data	
Dimensions W x H x D	30 mm x 126 mm x 26.5 mm (without connectors)
Weight	approx. 165 g
Installation position	variable
Material	PA6 (polyamide)

Environmental conditions	
Ambient temperature during operation	-25 … +60 °C -25 … +55 °C according to cURus
Ambient temperature during storage	-40 … +85 °C
Vibration resistance, shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27 Additional tests [▶ 25]
EMC immunity / emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP65, IP66, IP67 (conforms to EN 60529)

Approvals/markings	
Approvals/markings *)	CE, cURus [▶ 108]

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

Additional tests

The devices have undergone the following additional tests:

Test	Explanation
Vibration	10 frequency sweeps 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

3.3.3 Scope of supply - EP1098-0001

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

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

Pre-assembled protective caps do not ensure IP67 protection

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

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

3.3.4 Process image - EP1098-0001

Channel 1 to Channel 8

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

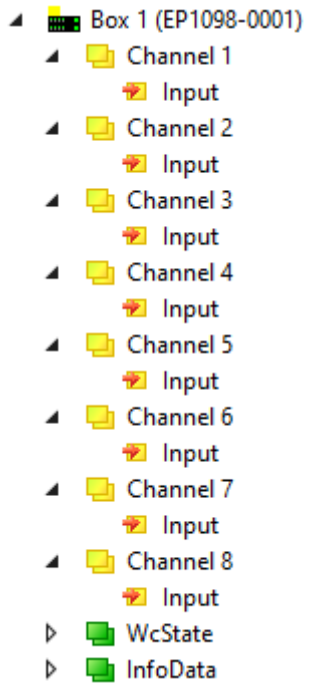
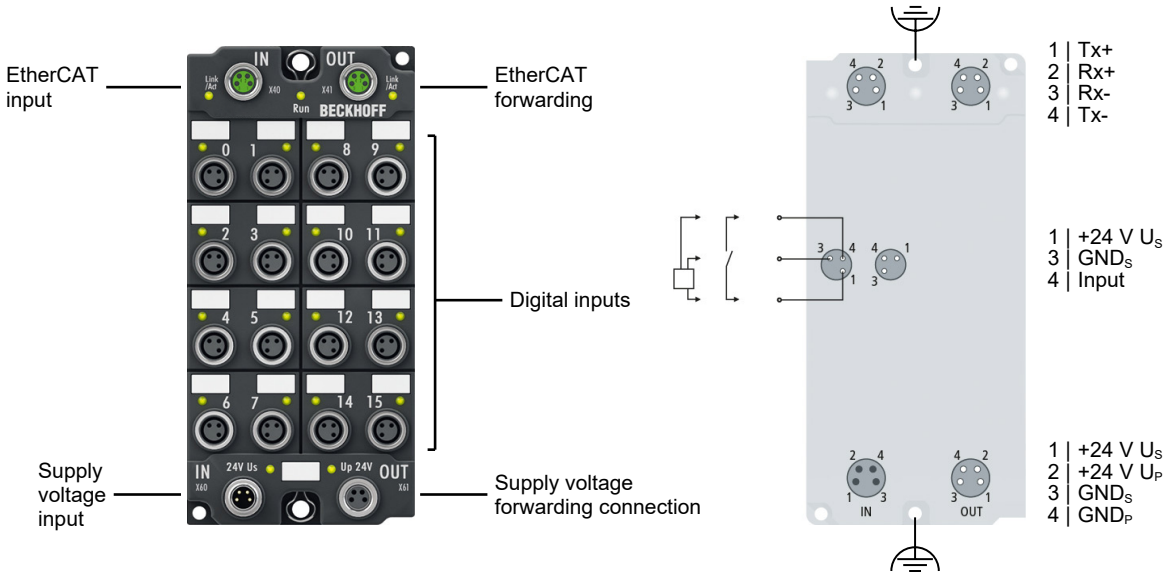


Fig. 5: EP1098-0001, Process image

3.4 EP1809, EP1819

3.4.1 Introduction - EP1809-0021, EP1819-0021



16 digital inputs 24 V_{DC}

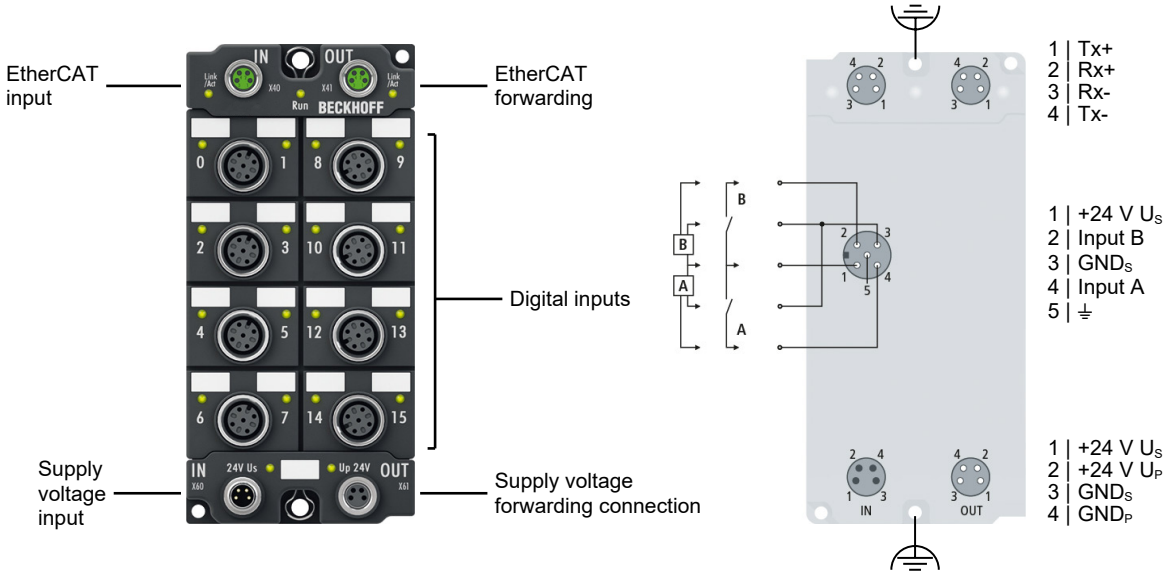
The EtherCAT modules EP1809-0021 and EP1819-0021 with digital inputs acquire binary control signals from the process level and transmit them, in an electrically isolated form, to the controller. The state of the signals is indicated by light emitting diodes. The signals are connected via M8 connectors.

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

Quick links

Technical data [▶ 30]
Process image [▶ 32]
Dimensions [▶ 77]
Functional earth [▶ 81]
Signal interface [▶ 89]

3.4.2 Introduction - EP1809-0022, EP1819-0022



16 digital inputs 24 V_{DC}

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

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

Quick links

Technical data [▶ 30]
Process image [▶ 32]
Dimensions [▶ 78]
Functional earth [▶ 81]
Signal interface EP1809-0022 [▶ 95]
Signal interface EP1819-0022 [▶ 97]

3.4.3 Technical data - EP1809, EP1819

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

EtherCAT	
Connection	2 x M8 socket, 4-pin, A-coded, shielded
Electrical isolation	500 V

Supply voltages	
Connection	Input: M8 connector, 4-pin, A-coded Downstream connection: M8 socket, 4-pin, A-coded
U_S nominal voltage	24 V_{DC} (-15 % / +20 %)
U_S sum current: $I_{S,sum}$	max. 4 A
Current consumption from U_S	130 mA
Rated voltage U_P	24 V_{DC} (-15 % / +20 %)
U_P sum current: $I_{P,sum}$	max. 4 A
Current consumption from U_P	None. U_P is only forwarded.
Electrical isolation GND_S / GND_P	yes

Digital inputs	EP1809-0021	EP1809-0022	EP1819-0021	EP1819-0022
Number	16			
Input connections	16 x M8 socket, 3-pin, A-coded	8 x M12 socket, 5-pin, A-coded	16 x M8 socket, 3-pin, A-coded	8 x M12 socket, 5-pin, A-coded
Cable length	max. 30 m			
Nominal input voltage	24 V_{DC} (-15 %/+20 %)			
Input filter	3 ms	3 ms	10 µs	10 µs
Signal voltage "0"	-3 … +5 V (similar to EN 61131-2, type 3)			
Signal voltage "1"	+11 … +30 V (similar to EN 61131-2, type 3)			
Input current	3 mA (similar to EN 61131-2, type 3)			
Sensor power supply	24 V_{DC} from U_S max. 0.5 A, short-circuit proof in total			

Housing data	
Dimensions W x H x D	60 mm x 126 mm x 26.5 mm (without plug connectors)
Weight	approx. 250 g
Installation position	variable
Material	PA6 (polyamide)

Environmental conditions	
Ambient temperature during operation	-25 … +60 °C -25 … +55 °C according to cURus
Ambient temperature during storage	-40 … +85 °C
Vibration resistance, shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27 Additional tests [▶ 31]
EMC immunity / emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP65, IP66, IP67 (conforms to EN 60529)

Approvals/markings	
Approvals/markings *)	CE, cURus [▶ 108]

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

Additional tests

The devices have undergone the following additional tests:

Test	Explanation
Vibration	10 frequency sweeps 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

3.4.4 Scope of supply - EP1809, EP1819

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

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

Pre-assembled protective caps do not ensure IP67 protection

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

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

3.4.5 Process image - EP1809-0021

Channel 1 to Channel 16

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

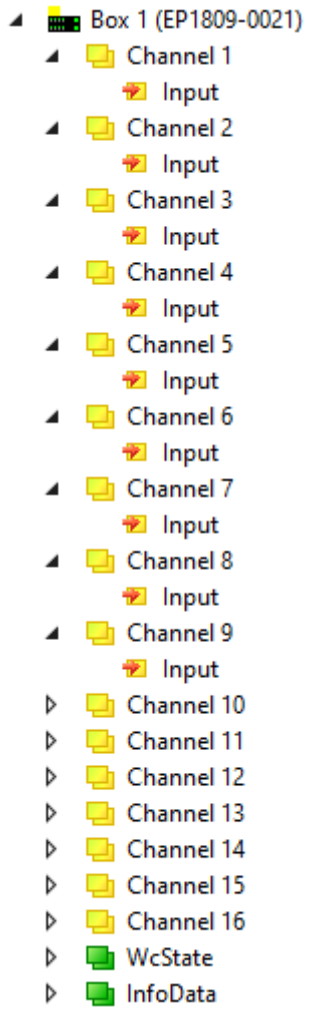
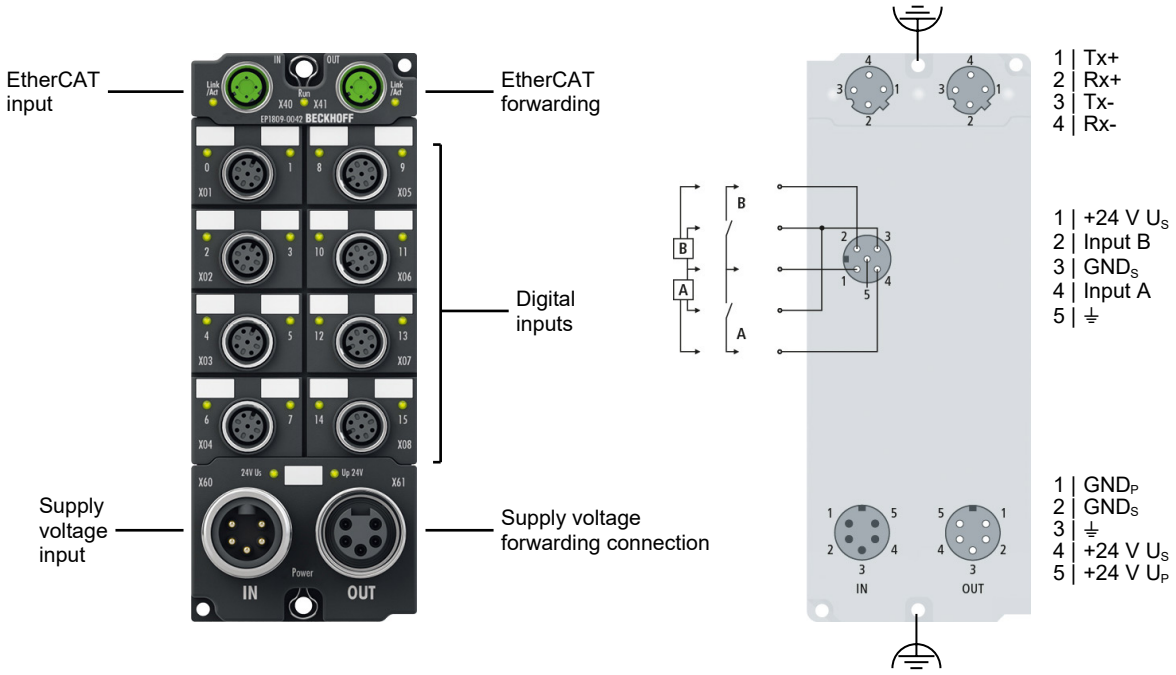


Fig. 6: EP1809-0021, Process image

3.5 EP1809-0042

3.5.1 Introduction



16-channel digital input 24 V_{DC}, 3.0 ms

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

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

The EP1809-0042 is interference-free. You can use the EP1809-0042 instead of an interference-free standard terminal in accordance with the following chapter of the TwinSAFE Application Guide:

- "All-pole disconnection of a potential group with downstream interference-free standard terminals (Category 4, PL e)"
- "Single-pole disconnection of a potential group with downstream interference-free standard terminals with fault exclusion (Category 4, PL e)"
- „EL2911 potential group with interference-free standard terminals (Category 4, PL e)"

Quick links

Technical data [▶ 34]
Process image [▶ 36]
Dimensions [▶ 79]
Functional earth [▶ 81]
Signal interface [▶ 96]

3.5.2 Technical data - EP1809-0042

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

EtherCAT	
Connection	2 x M12 socket, 4-pin, D-coded, shielded
Electrical isolation	500 V

Supply voltages	
Connection	Input: 7/8" plug, 5-pin, 16-UN thread Downstream connection: 7/8" socket, 5-pin, 16-UN thread
U_S nominal voltage	24 V_{DC} (-15 % / +20 %)
U_S sum current	max. 16 A at 40 °C
Current consumption from U_S	130 mA + sensor supply
Rated voltage U_P	24 V_{DC} (-15 % / +20 %)
U_P sum current	max. 16 A at 40 °C
Current consumption from U_P	None. U_P is only forwarded.
Electrical isolation GND_S / GND_P	yes

Digital inputs	
Number	16
Connection	8 x M12 socket, 5-pin, A-coded
Cable length	max. 30 m
Nominal input voltage	24 V_{DC} (-15 %/+20 %)
Input filter	3 ms
Signal voltage "0"	-3 … +5 V (similar to EN 61131-2, type 3)
Signal voltage "1"	+11 … +30 V (similar to EN 61131-2, type 3)
Input current	6 mA (similar to EN 61131-2, type 3)
Supply of the module electronics	from the control voltage U_S
Current consumption of the module electronics	130 mA
Sensor power supply	24 V_{DC} from U_S max. 0.5 A in total, short-circuit proof

Housing data	
Dimensions W x H x D	60 mm x 150 mm x 26,5 mm (without connectors)
Weight	approx. 440 g
Installation position	variable
Material	PA6 (polyamide)

Environmental conditions	
Ambient temperature during operation	-25 … +60 °C
Ambient temperature during storage	-40 … +85 °C
Vibration / shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27
EMC immunity / emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP65, IP66, IP67 conforms to EN 60529

Approvals / markings	
Approvals / markings *)	CE, UL under preparation

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

Additional tests

The devices have undergone the following additional tests:

Test	Explanation
Vibration	10 frequency sweeps 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

3.5.3 Scope of supply - EP1809-0042

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

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



Pre-assembled protective caps do not ensure IP67 protection

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

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

3.5.4 Process image - EP1809-0042

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

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

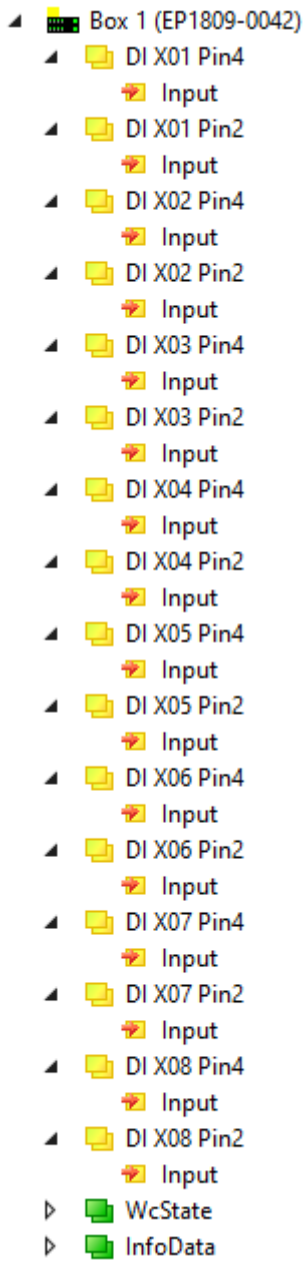
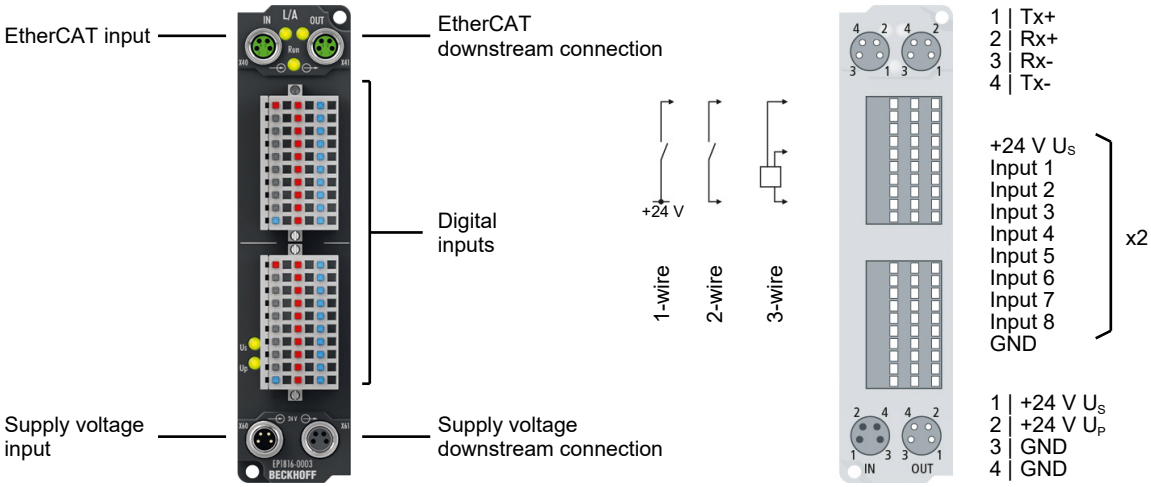


Fig. 7: EP1809-0042 - Process image

3.6 EP1816-0003

3.6.1 Introduction



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

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

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

Quick links

Technical data [▶ 38]
Process image [▶ 40]
Dimensions [▶ 74]
Signal interface [▶ 102]

3.6.2 Technical data - EP1816-0003

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

EtherCAT	
Connection	2 x M8 socket, 4-pin, A-coded, shielded
Electrical isolation	500 V
Distributed Clocks	yes

Supply voltages	
Connection	Input: M8 connector, 4-pin, A-coded Downstream connection: M8 socket, 4-pin, A-coded
U_S nominal voltage	24 V_{DC} (-15 % / +20 %)
U_S sum current: $I_{S,sum}$	max. 4 A
Current consumption from U_S	120 mA + sensor supply
Rated voltage U_P	24 V_{DC} (-15 % / +20 %)
U_P sum current: $I_{P,sum}$	max. 4 A
Current consumption from U_P	None. U_P is only forwarded.
Electrical isolation GND_S / GND_P	no

Digital inputs	
Number	16
Connection	2x pluggable spring-loaded terminal ZS2001 (not included)
Cable length	max. 30 m
Characteristics	Type 3 according to EN 61131-2, compatible with type 1
Nominal input voltage	24 V_{DC} (-15 %/+20 %)
Input filter	10 µs
Signal voltage "0"	-3 … +5 V
Signal voltage "1"	+11 … +30 V
Input current	typically 6 mA
Sensor power supply	24 V_{DC} from U_S max. 0.5 A, short-circuit proof in total

Housing data	
Dimensions W x H x D	30 mm x 126 mm x 26.5 mm (without connectors)
Weight	approx. 165 g
Installation position	variable
Material	PA6 (polyamide)

Environmental conditions	
Ambient temperature during operation	-25…+60 °C -25…+55 °C according to cURus
Ambient temperature during storage	-40 … +85 °C
Vibration resistance, shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27 Additional tests [▶ 39]
EMC immunity / emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection rating	IP20

Approvals/markings	
Approvals/markings *)	CE, cURus [▶ 108]

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

Additional tests

The devices have undergone the following additional tests:

Test	Explanation
Vibration	10 frequency sweeps 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

3.6.3 Scope of supply - EP1816-0003

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

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

Female headers with spring connection not included in the scope of supply

You can find suitable types in the chapter Accessories [▶ 209].

Pre-assembled protective caps do not ensure IP67 protection

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

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

3.6.4 Process image - EP1816-0003

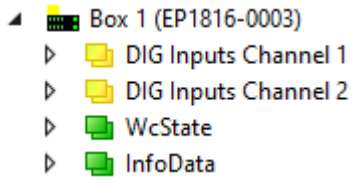
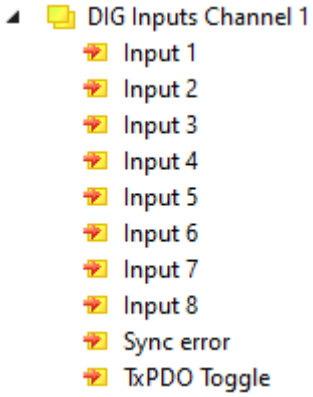
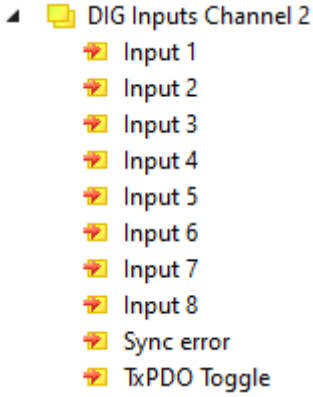


Fig. 8: EP1816-0003 – Process image

DIG Inputs Channel *n*

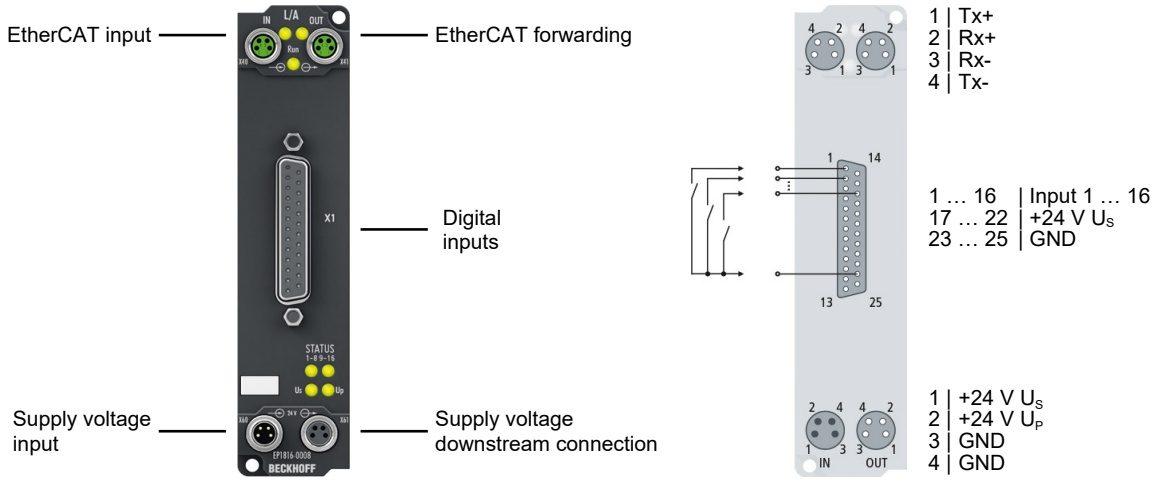




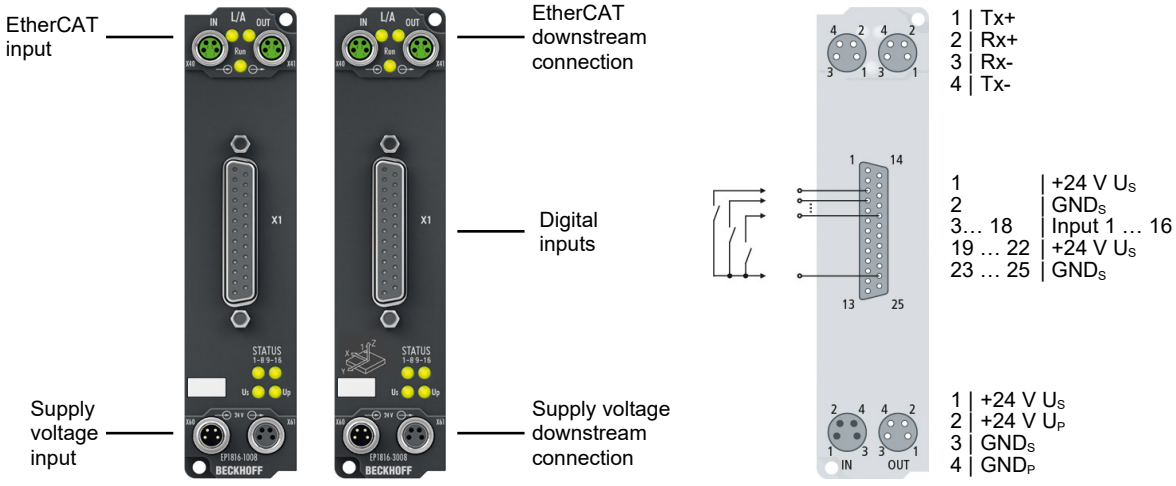
- Input x
  Digital inputs.
- Sync error
  This bit is only relevant in "distributed clocks" mode.
  It is TRUE if a synchronization error has occurred in the previous EtherCAT cycle.
- TxPDO Toggle
  This bit is inverted each time the digital inputs are updated.

3.7 EP1816-x008

3.7.1 Introduction



EP1816-0008



EP1816-1008 EP1816-3008

EP1816-x008 | 16-channel digital input

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

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

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

Quick links

Technical data [▶ 43]
Process image [▶ 46]
Dimensions [▶ 76]

Signal interface [▶ 104]
Acceleration measurement (EP1816-3008) [▶ 130]
Inclination measurement (EP1816-3008) [▶ 134]

3.7.2 Technical data - EP1816-x008

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

EtherCAT	EP1816-0008	EP1816-1008	EP1816-3008
Connection	2 x M8 socket, 4-pin, A-coded, shielded		
Electrical isolation	500 V		
Distributed Clocks	yes		
Minimum cycle time	-	-	500 µs

Supply voltages	EP1816-0008	EP1816-1008	EP1816-3008
Connection	Input: M8 connector, 4-pin, A-coded Downstream connection: M8 socket, 4-pin, A-coded		
U_S nominal voltage	24 V_{DC} (-15 % / +20 %)		
U_S sum current: $I_{S,sum}$	max. 4 A		
Current consumption from U_S	120 mA + sensor power supply		
U_P nominal voltage	24 V_{DC} (-15 % / +20 %)		
U_P sum current: $I_{P,sum}$	max. 4 A		
Current consumption from U_P	None. U_P is only forwarded.		
Undervoltage detection	-	< 18 V for U_S and U_P	< 18 V for U_S and U_P
Electrical isolation GND_S / GND_P	no	yes	yes

Digital inputs	EP1816-0008	EP1816-1008	EP1816-3008
Number	16		
Connection	D-sub socket, 25-pin, UNC4-40 thread		
Cable length	max. 30 m		
Characteristics	Type 3 according to EN 61131-2, compatible with type 1		
Nominal input voltage	24 V_{DC} (-15 %/+20 %)		
Input filter	10 µs		
Signal voltage "0"	-3 … +5 V		
Signal voltage "1"	+11 … +30 V		
Input current	6 mA	3 mA	3 mA
Sensor power supply	24 V_{DC} from U_S max. 0.5 A, short-circuit proof in total		

Housing data	
Dimensions W x H x D	30 mm x 126 mm x 26.5 mm (without connectors)
Weight	approx. 165 g
Installation position	variable
Material	PA6 (polyamide)

Environmental conditions	
Ambient temperature during operation	-25 … +60 °C -25 … +55 °C according to cURus
Ambient temperature during storage	-40 … +85 °C
Vibration resistance, shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27 Additional tests [▶ 44]
EMC immunity / emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP65, IP66, IP67 (conforms to EN 60529)

Approvals/markings	
Approvals/markings *)	CE, cURus [▶ 108]

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

Additional tests

The devices have undergone the following additional tests:

Test	Explanation
Vibration	10 frequency sweeps 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

3.7.2.1 Accelerometers (EP1816-3008 only)

Technical data	Accelerometers
Sensor type	Two 3-axis accelerometers, offset by 90°
Resolution of the measured acceleration values	10-bit When displayed in mg: 1 mg per LSB [1)]
Resolution of the measured inclination values	Depending on where the measured acceleration values are converted to angles of inclination: • 1° when converted in the EP1816-3008 • < 0.1° when converted in the controller
Measuring range of the acceleration measurement	±2 g / ±4 g / ±8 g / ± 16 g adjustable [1)]
Special features	Self-test
Sampling rate	1 Hz to 5 kHz

[1)] 1 g is the acceleration of gravity, 9.81 m/s^2.

Maximum transfer rate

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

3.7.3 Scope of supply - EP1816-000x

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

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

Pre-assembled protective caps do not ensure IP67 protection

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

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

3.7.4 Process image - EP1816-0008

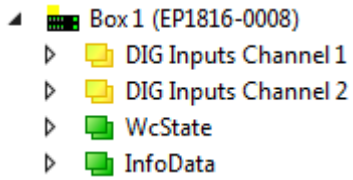


Fig. 9: EP1816-0008 Process image

DIG Inputs Channel 1

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

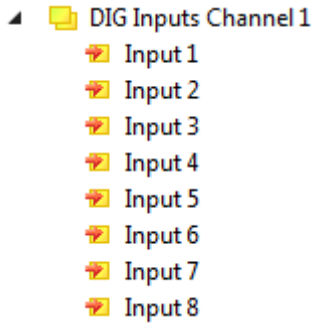


Fig. 10: EP1816-0008 process image, DIG Inputs Channel 1

DIG Inputs Channel 2

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

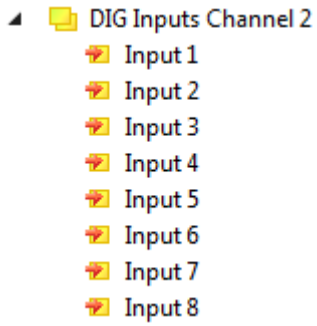


Fig. 11: EP1816-0008 process image, DIG Inputs Channel 2

3.7.5 Process image - EP1816-1008

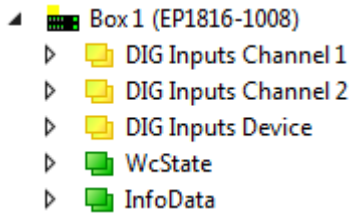


Fig. 12: EP1816-1008 Process image

DIG Inputs Channel 1

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

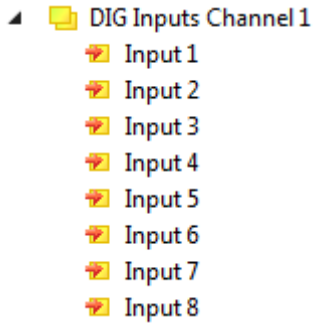


Fig. 13: EP1816-1008 process image, DIG Inputs Channel 1

DIG Inputs Channel 2

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

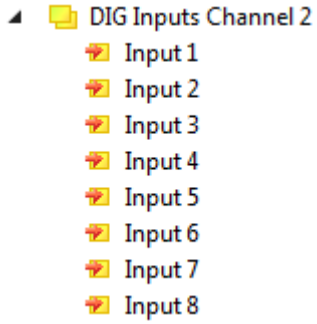


Fig. 14: EP1816-1008 process image, DIG Inputs Channel 2

DIG Inputs Device

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

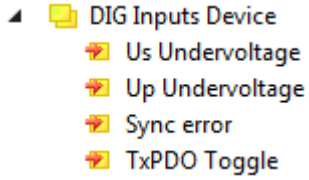


Fig. 15: EP1816-1008 process image, DIG Inputs Device

3.7.6 Process image - EP1816-3008

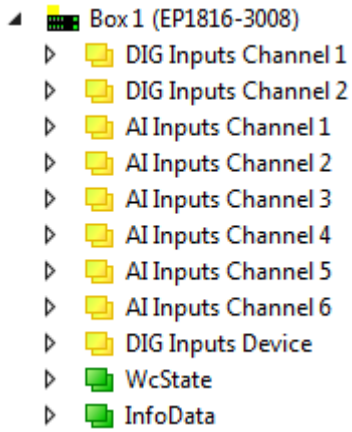


Fig. 16: EP1816-3008 Process image

DIG Inputs Channel 1

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

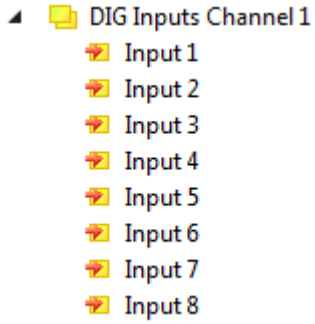


Fig. 17: EP1816-3008 process image, DIG Inputs Channel 1

DIG Inputs Channel 2

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

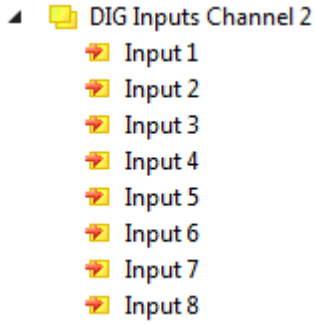


Fig. 18: EP1816-3008 process image, DIG Inputs Channel 2

DIG Inputs Device

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

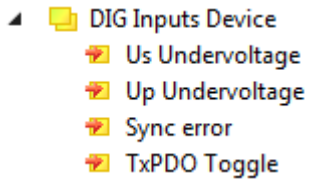


Fig. 19: EP1816-3008 process image, DIG Inputs Device

AI Inputs Channel 1 to 6

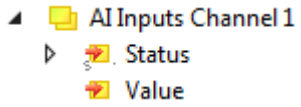


Fig. 20: EP1816-3008 process image, AI inputs

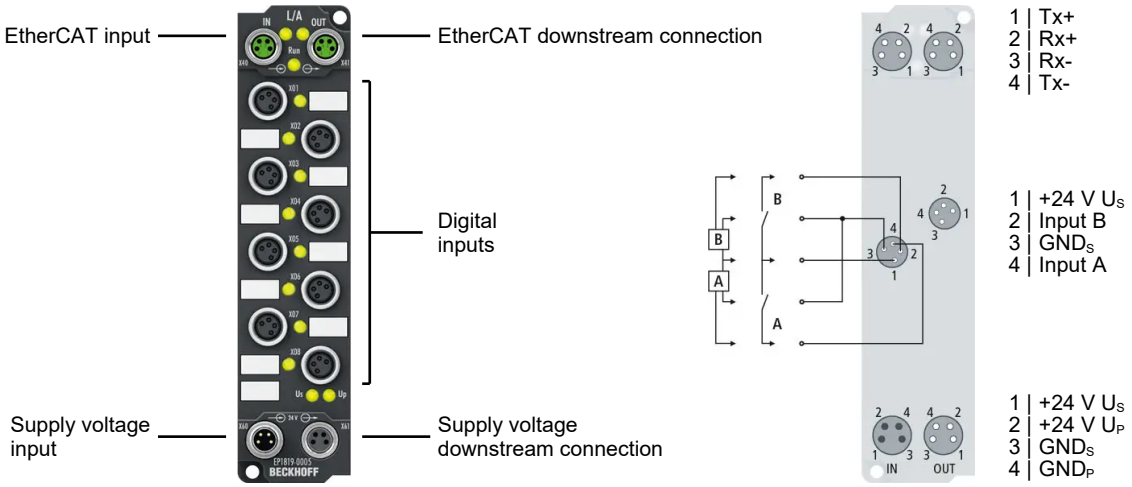
The data for the two accelerometers can be found under **AI inputs Channel**

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

Assignment of the acceleration axes [▶ 130]

3.8 EP1819-0005

3.8.1 Introduction



16-channel digital input

The EP1819-0005 EtherCAT Box with digital inputs acquires binary control signals from the process level and transfers them electrically isolated to the controller. The signal state is indicated by means of LEDs. The signal connection is made via screwable 4-pin M8 connectors. This means that sensors with antivalent channels (NC/NO, change-over) can be connected directly using a 4-pin cable.

The sensors are supplied from the control voltage U_S. The load voltage U_P is not used in the input module, but it can optionally be connected for forwarding and is fed through to the next device.

The connected sensors are supplied via an internal, short-circuit proof driver block with a total of 0.5 A for all sensors.

Thanks to the input filter of 10 µs, the EP1819-0005 is preferably suitable for electronic inputs that transmit to the controller with the shortest possible delay due to the short filter time. The use of antivalent sensors also enables the sensor to be diagnosed.

Quick links

Technical data [▶ 51]
Process image [▶ 53]
Dimensions [▶ 75]
Signal interface [▶ 90]
Diagnostics for antivalent sensors [▶ 143]

3.8.2 Technical data - EP1819-0005

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

EtherCAT	
Connection	2 x M8 socket, 4-pin, A-coded, shielded
Electrical isolation	500 V

Supply voltages	
Connection	Input: M8 connector, 4-pin, A-coded Downstream connection: M8 socket, 4-pin, A-coded
U_S nominal voltage	24 V_{DC} (-15 % / +20 %)
U_S sum current: $I_{S,sum}$	max. 4 A
Current consumption from U_S	100 mA + sensor power supply
U_P nominal voltage	24 V_{DC} (-15 % / +20 %)
U_P sum current: $I_{P,sum}$	max. 4 A
Electrical isolation GND_S / GND_P	yes

Digital inputs	
Number of inputs	16
Connection	8 x M8 socket, 4-pin, A-coded
Cable length	max. 30 m
Characteristics	Type 3 according to EN 61131-2, compatible with type 1
Nominal voltage	24 V_{DC} (-15 % / +20 %)
Input filter	10 µs
Signal voltage "0"	-3 … +5 V
Signal voltage "1"	+11 … +30 V
Input current	3 mA
Sensor power supply	24 V_{DC} from U_S max. 0.5 A, short-circuit proof in total

Housing data	
Dimensions W x H x D	30 mm x 126 mm x 26.5 mm (without connectors)
Weight	approx. 165 g
Installation position	variable
Material	PA6 (polyamide)

Environmental conditions	
Ambient temperature during operation	-25 … +60 °C -25 … +55 °C according to cURus
Ambient temperature during storage	-40 … +85 °C
Vibration resistance, shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27 Additional tests [▶ 52]
EMC immunity / emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP65, IP66, IP67 (conforms to EN 60529)

Approvals/markings	
Approvals/markings *)	CE, cURus [▶ 108]

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

Additional tests

The devices have undergone the following additional tests:

Test	Explanation
Vibration	10 frequency sweeps 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

3.8.3 Scope of supply - EP1819-0005

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

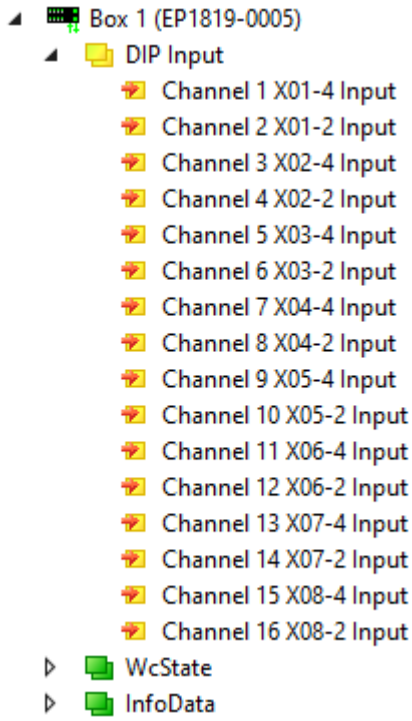
- 1x EP1819-0005 EtherCAT Box
- 2x protective cap for EtherCAT socket, M8, green (pre-assembled)
- 1x protective cap for supply voltage input, M8, transparent (pre-assembled)
- 1x protective cap for supply voltage output, M8, black (pre-assembled)
- 10x labels, blank (1 strip of 10)

Pre-assembled protective caps do not ensure IP67 protection

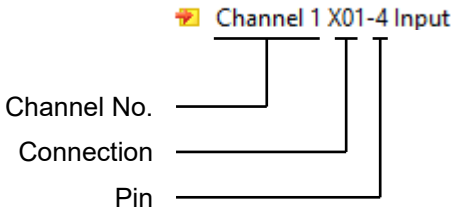
Protective caps are pre-assembled at the factory to protect connectors during transport. They may not be tight enough to ensure IP67 protection.

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

3.8.4 Process image - EP1819-0005

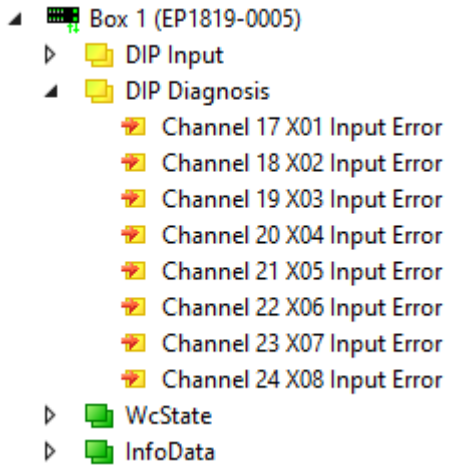


"DIP Input" contains the input variables of the digital inputs. The variable names are structured as follows:



3.8.4.1 Optional: "DIP Diagnosis" for diagnosing antivalent sensors

The process data object "DIP Diagnosis" contains status bits for diagnosing antivalent sensors.

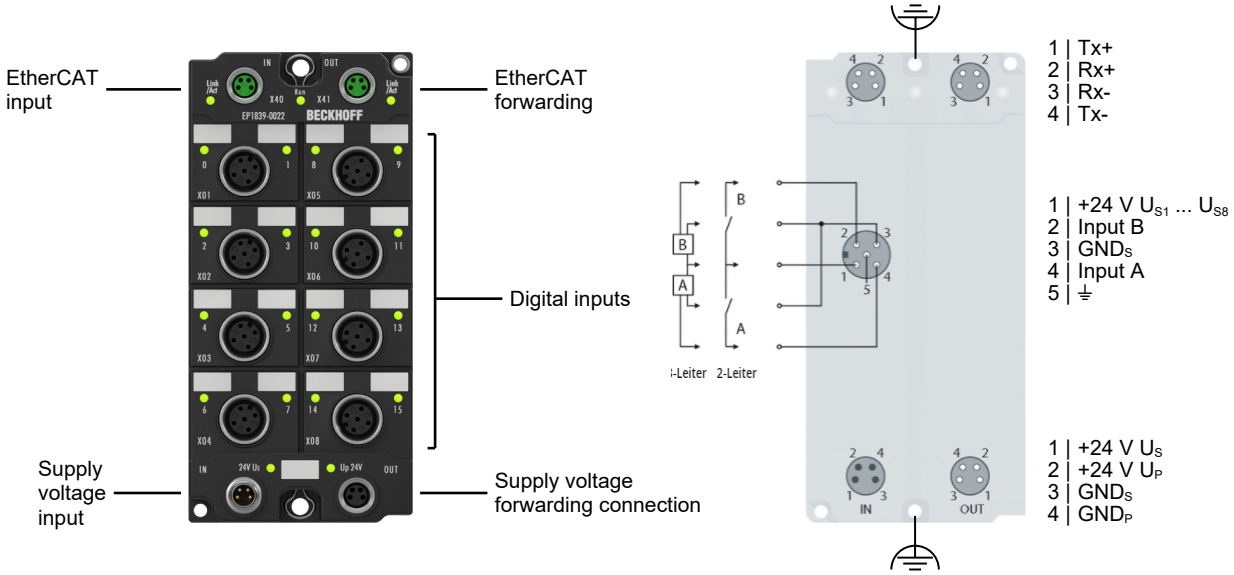


Further information can be found in chapter Antivalent sensors (EP1819-0005) [▶ 143].

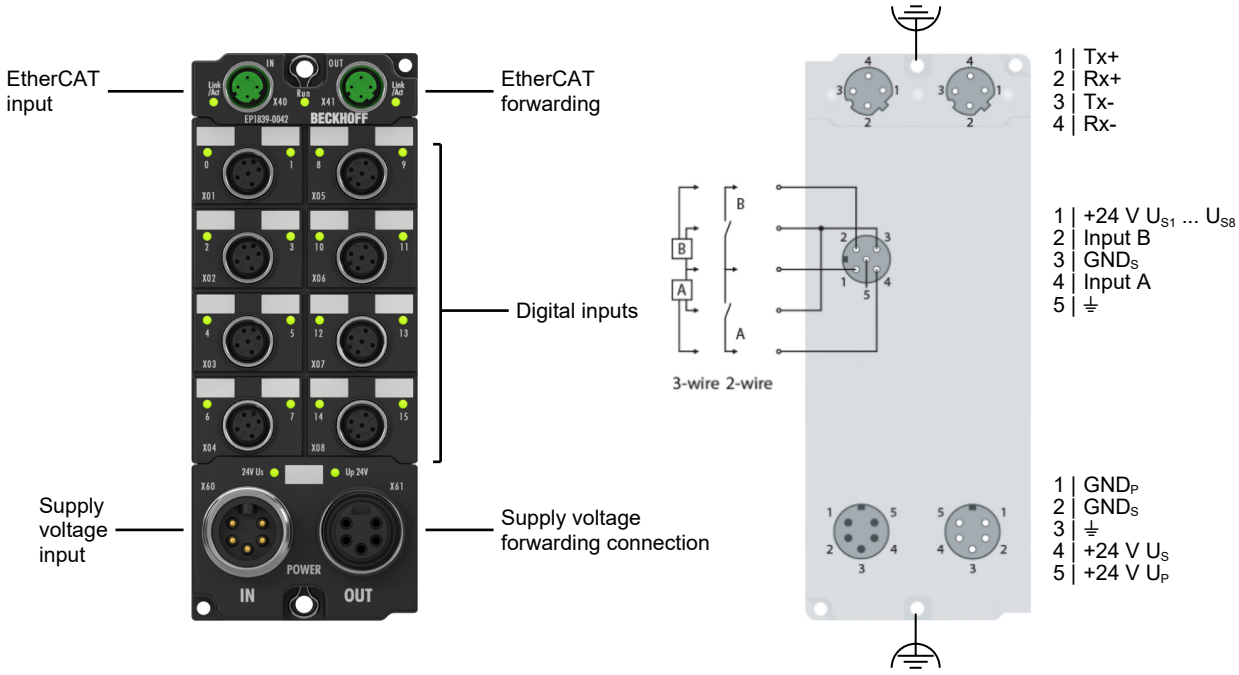
3.9 EP1839-0022, EP1839-0042

3.9.1 Introduction

EP1839-0022



EP1839-0042



16-channel digital input with diagnostics

The EP1839-00x2 EtherCAT Box with 16 digital inputs acquires binary control signals from the process level and transfers them electrically isolated to the controller. The signal state is displayed by LEDs; the signals are connected via screwable M12 connectors. A wire break detection can be enabled/disabled for each channel. The signal input filters are individually adjustable.

Each M12 socket has an independent 24 V DC/0.5 A short-circuit proof sensor power supply from U_S for the two connected sensors. This is monitored and any errors are reported to the controller via a diagnosis. Module-related undervoltage detection of the input voltage takes place.

The peripheral voltage U_P is not used in the input module, but it can optionally be connected for forwarding and is fed through to the next device. Due to the adjustable input filter and the comprehensive supply and diagnostics logic, the EP1839-00x2 is particularly suitable for applications in which a high system availability and thus fast fault-finding and troubleshooting are required.

The EP1839-0022 has M8 EtherCAT connections and M8 connectors for the power supply.

The EP1839-0042 has M12 D-coded EtherCAT connections and 7/8" connectors for the power supply.

Special features:

- adjustable wire break detection per sensor
- Undervoltage detection of the sensor power supply U_S
- short-circuit proof sensor power supply U_S 0.5 A per M12 socket
- parameterizable input filters per signal

The EP1839-0042 is interference-free. You can use the EP1839-0042 instead of an interference-free standard terminal in accordance with the following chapters of the TwinSAFE Application Guide:

- "All-pole disconnection of a potential group with downstream interference-free standard terminals (Category 4, PL e)"
- "Single-pole disconnection of a potential group with downstream interference-free standard terminals with fault exclusion (Category 4, PL e)"
- „EL2911 potential group with interference-free standard terminals (Category 4, PL e)"

Quick links

Technical data [▶ 56]
Process image [▶ 59]
Dimensions EP1839-0022 [▶ 78]
Dimensions EP1839-0042 [▶ 79]
Signal interface [▶ 99]
Configure inputs [▶ 122]
Configure sensor power supply [▶ 127]
Wire break detection [▶ 144]

3.9.2 Technical data - EP1839-0022, EP1839-0042

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

EtherCAT	EP1839-0022	EP1839-0042
Connection	2 x M8 socket, 4-pin, A-coded, shielded	2 x M12 socket, 4-pin, D-coded, shielded
Electrical isolation	500 V	
Distributed Clocks	yes	Firmware 02 and higher: yes Firmware 01: no

Supply voltages	EP1839-0022	EP1839-0042
Connection input	M8 connector, 4-pin, A-coded	7/8" connector, 5-pin, 16-UN thread
Downstream connection	M8 socket, 4-pin, A-coded	7/8" socket, 5-pin, 16-UN thread
U_S nominal voltage	24 V_{DC} (-15 % / +20 %)	24 V_{DC} (-15 % / +20 %)
U_S sum current: $I_{S,sum}$	max. 4 A	max. 16 A at 40 °C
Current consumption from U_S	130 mA + sensor power supply U_{S1} … U_{S8} (current consumption of connected sensors)	
U_P nominal voltage	24 V_{DC} (-15 % / +20 %)	24 V_{DC} (-15 % / +20 %)
U_P sum current: $I_{P,sum}$	max. 4 A	max. 16 A at 40 °C
Current consumption from U_P	None. U_P is only forwarded.	None. U_P is only forwarded.
Diagnosis	U_S undervoltage detection.	U_S undervoltage detection.

Digital inputs	
Number	16
Connection	8 x M12 socket, 5-pin, A-coded
Cable length	max. 30 m
Characteristics	Type 3 according to EN 61131-2, compatible with type 1
Input filter	Adjustable. • Firmware 02 and higher: 0…100 ms • Firmware 01: 0…3 ms
Signal voltage "0"	-3 … +5 V
Signal voltage "1"	+11 … +30 V
Input current	3 mA
Sensor power supply U_{S1} … U_{S8}	24 V_{DC} from U_S. Max. 0.5 A per M12 socket, individually short-circuit proof.
Diagnosis	• Wire break detection • Sensor power supply

Housing data	EP1839-0022	EP1839-0042
Dimensions W x H x D	60 mm x 126 mm x 26.5 mm (without connectors)	60 mm x 150 mm x 26.5 mm (without connectors)
Weight	approx. 250 g	approx. 440 g
Installation position	variable	
Material	PA6 (polyamide)	

Environmental conditions	
Ambient temperature during operation	-25 … +60 °C -25 … +55 °C according to cURus
Ambient temperature during storage	-40 … +85 °C
Vibration resistance, shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27 Additional tests [▶ 57]
EMC immunity / emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP65, IP66, IP67 (conforms to EN 60529)

Approvals	EP1839-0022	EP1839-0042
Approvals	CE, cURus [▶ 108]	CE, cURus in preparation

Additional tests

The devices have undergone the following additional tests:

Test	Explanation
Vibration	10 frequency sweeps 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

3.9.3 Scope of supply - EP1839-0022, EP1839-0042

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

EP1839-0022

- 1x EP1839-0022
- 2x protective cap for EtherCAT socket, M8, green (pre-assembled)
- 1x protective cap for supply voltage input, M8, transparent (pre-assembled)
- 1x protective cap for supply voltage output, M8, black (pre-assembled)
- 10x labels, blank (1 strip of 10)

EP1839-0042

- 1x EP1839-0042
- 2x protective cap for EtherCAT socket, M12 (pre-assembled)
- 1x Protective cap for supply voltage output, 7/8”, black (pre-fitted)
- 10x labels, blank (1 strip of 10)

Pre-assembled protective caps do not ensure IP67 protection

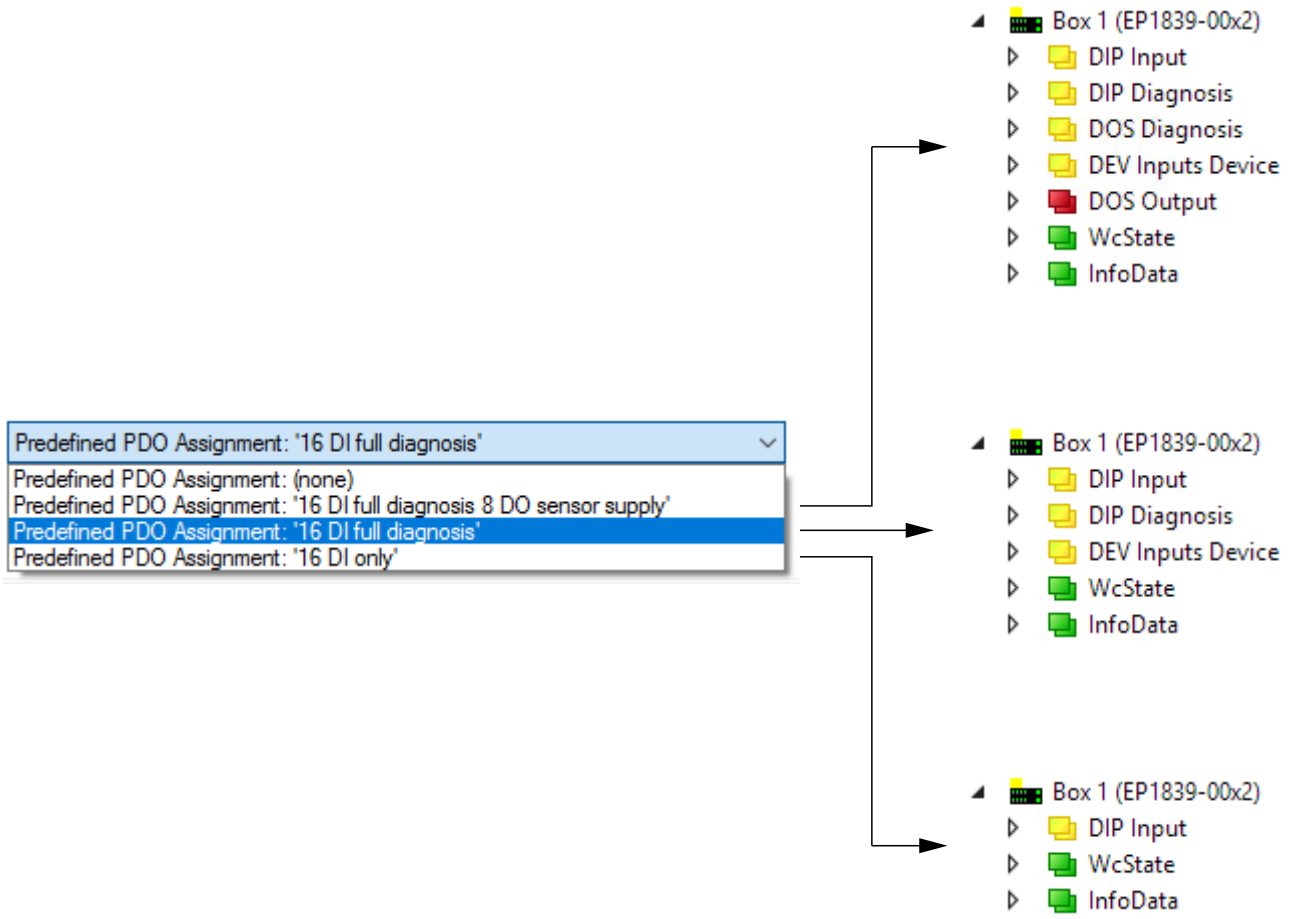
Protective caps are pre-assembled at the factory to protect connectors during transport. They may not be tight enough to ensure IP67 protection.

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

3.9.4 Process image - EP1839-0022, EP1839-0042

You can choose between several predefined variants of the process image, the "Predefined PDO Assignments". The procedure for setting a Predefined PDO Assignment can be found in chapter Adapt process image (EP1819-0005, EP1839-0022, EP1839-0042) [▶ 117].

In the factory setting, the Predefined PDO Assignment "16 DI full diagnosis" is selected.

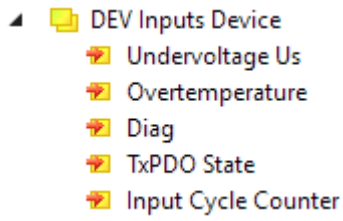


The individual process data objects are described in chapter Process data objects [▶ 60].

3.9.4.1 Process data objects

DEV Inputs Device

"DEV Inputs Device" contains status bits for diagnostic messages that affect the entire box.



Undervoltage Us
Undervoltage of the supply voltage U_S.
As a result, all sensor supply outputs are switched off.

Overtemperature
Internal overtemperature. All sensor supply outputs are deactivated.
The bit is reset and the sensor supply outputs are automatically reactivated when the temperature has dropped again.

Diag
Without function. Reserved for future use.

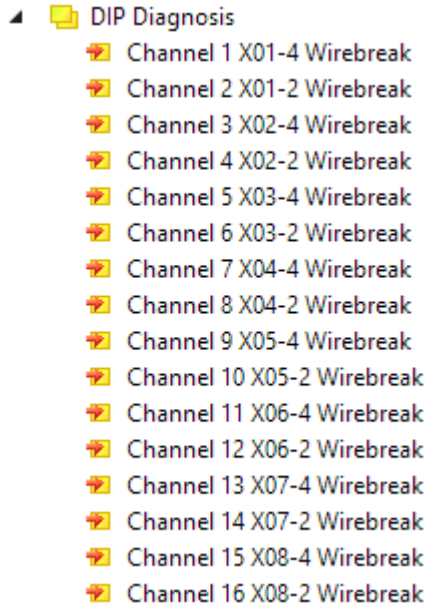
TxPDO State
Validity of the input data. This bit is set if the input data could not be read correctly due to an error.

Input cycle counter
A 2-bit counter. It is incremented each time the input data is updated in the process image. After it reaches its maximum value of 3, it jumps back to 0.

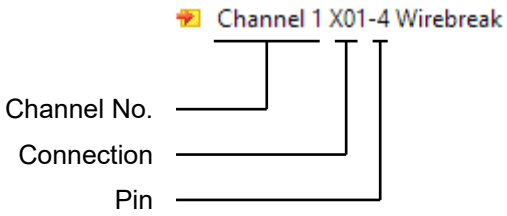
DIP Diagnosis

"DIP Diagnosis" contains the status bits of the wire break detection. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].
If a status bit has the value 1, a wire break has been detected at the corresponding input.

As an alternative to "DIP Diagnosis", you can enable the process data object "DIP Extended Diagnosis". See section "DIP Extended Diagnosis" [▶ 62].



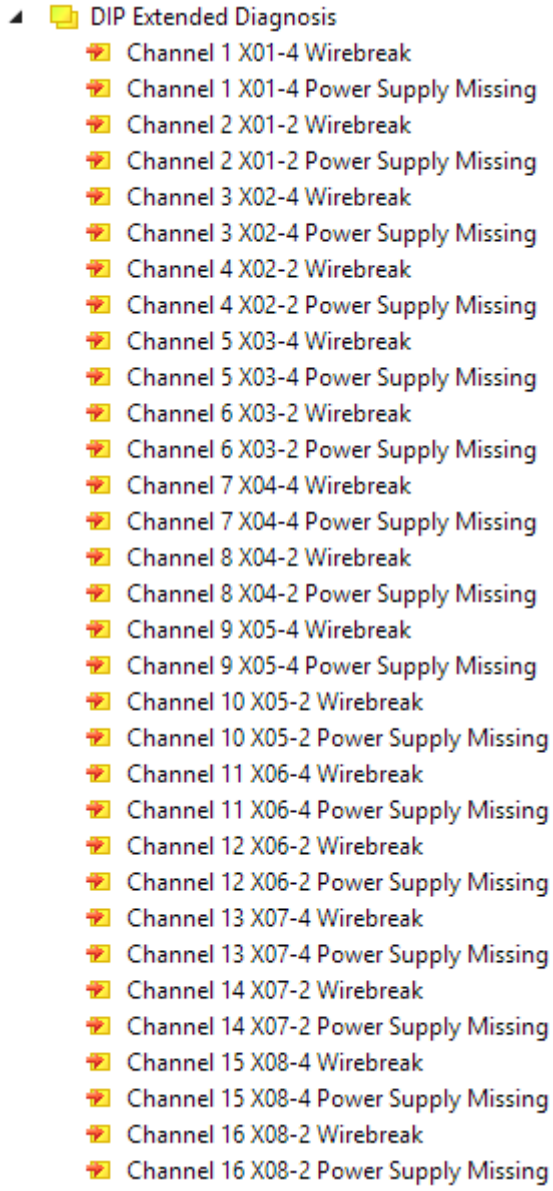
The variable names are structured as follows:



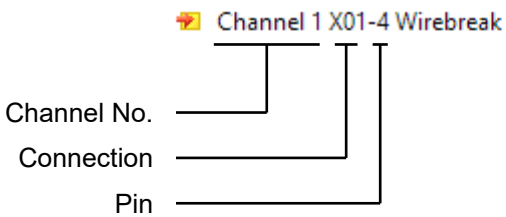
DIP Extended Diagnosis

"DIP Extended Diagnosis" is an extension of the process data object "DIP Diagnosis" with additional status bits. With the EP1839-0042, it is only available in firmware 02 and higher.

"DIP Extended Diagnosis" is disabled in the factory settings. The procedure for enabling a process data object can be found in the chapter Enabling individual process data objects [▶ 119].



The variable names are structured as follows:



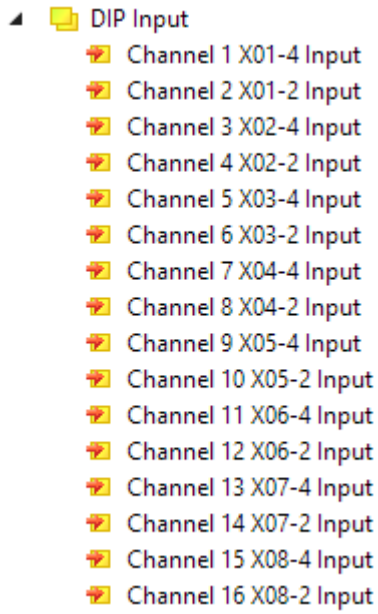
A "Wirebreak" bit has the value 1 if a wire break has been detected at the respective input. See also Chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].

A "Power Supply Missing" bit has the value 1 if the supply voltage output at the respective connection is switched off , e.g. due to overload.

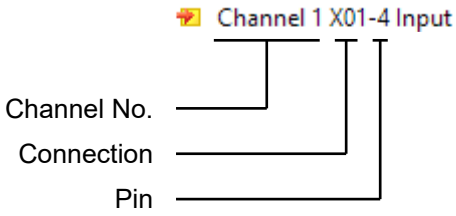
In both cases, the input value of the respective channel is potentially invalid.

DIP Input

"DIP Input" contains the input variables of the digital inputs.



The variable names are structured as follows:



DOS Diagnosis

Disabled diagnostic functions

In the factory setting, the diagnostic functions "Open Load" and "Short to 24V" are disabled and the corresponding status bits always have the value 0.

To enable them, set the corresponding parameters in the CoE objects 0x81n0 to TRUE.

"DOS Diagnosis" contains the status bits for the sensor power supply outputs.

This process data object is deactivated in the factory setting. You can enable it by setting the Predefined PDO Assignment "16 DI full diagnosis 8 DO sensor supply", see chapter Adapt process image (EP1819-0005, EP1839-0022, EP1839-0042) [▶ 117].

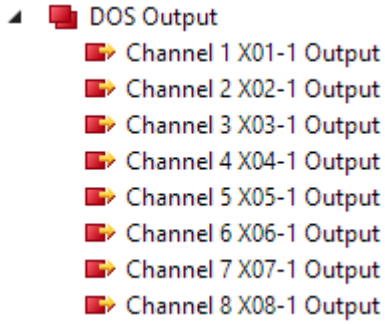
- DOS Diagnosis
  - Channel 1 X01-1 Overcurrent
  - Channel 1 X01-1 Overload
  - Channel 1 X01-1 Open Load
  - Channel 1 X01-1 Short to 24V
  - Channel 2 X02-1 Overcurrent
  - Channel 2 X02-1 Overload
  - Channel 2 X02-1 Open Load
  - Channel 2 X02-1 Short to 24V
  - Channel 3 X03-1 Overcurrent
  - Channel 3 X03-1 Overload
  - Channel 3 X03-1 Open Load
  - Channel 3 X03-1 Short to 24V
  - Channel 4 X04-1 Overcurrent
  - Channel 4 X04-1 Overload
  - Channel 4 X04-1 Open Load
  - Channel 4 X04-1 Short to 24V
  - Channel 5 X05-1 Overcurrent
  - Channel 5 X05-1 Overload
  - Channel 5 X05-1 Open Load
  - Channel 5 X05-1 Short to 24V
  - Channel 6 X06-1 Overcurrent
  - Channel 6 X06-1 Overload
  - Channel 6 X06-1 Open Load
  - Channel 6 X06-1 Short to 24V
  - Channel 7 X07-1 Overcurrent
  - Channel 7 X07-1 Overload
  - Channel 7 X07-1 Open Load
  - Channel 7 X07-1 Short to 24V
  - Channel 8 X08-1 Overcurrent
  - Channel 8 X08-1 Overload
  - Channel 8 X08-1 Open Load
  - Channel 8 X08-1 Short to 24V

If an error is detected at a sensor power supply output, the error is additionally signaled by the status LEDs at the corresponding connection. See chapter EP1839-0022, EP1839-0042 [▶ 99].

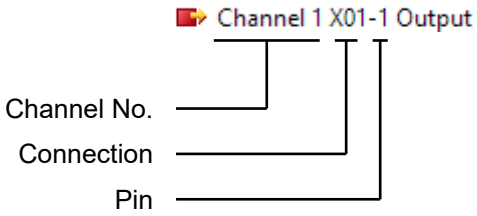
DOS Output

"DOS Output" contains the output variables of the digital outputs.

This process data object is deactivated in the factory setting. You can enable it by setting the Predefined PDO Assignment "16 DI full diagnosis 8 DO sensor supply", see chapter Adapt process image (EP1819-0005, EP1839-0022, EP1839-0042) [▶ 117].

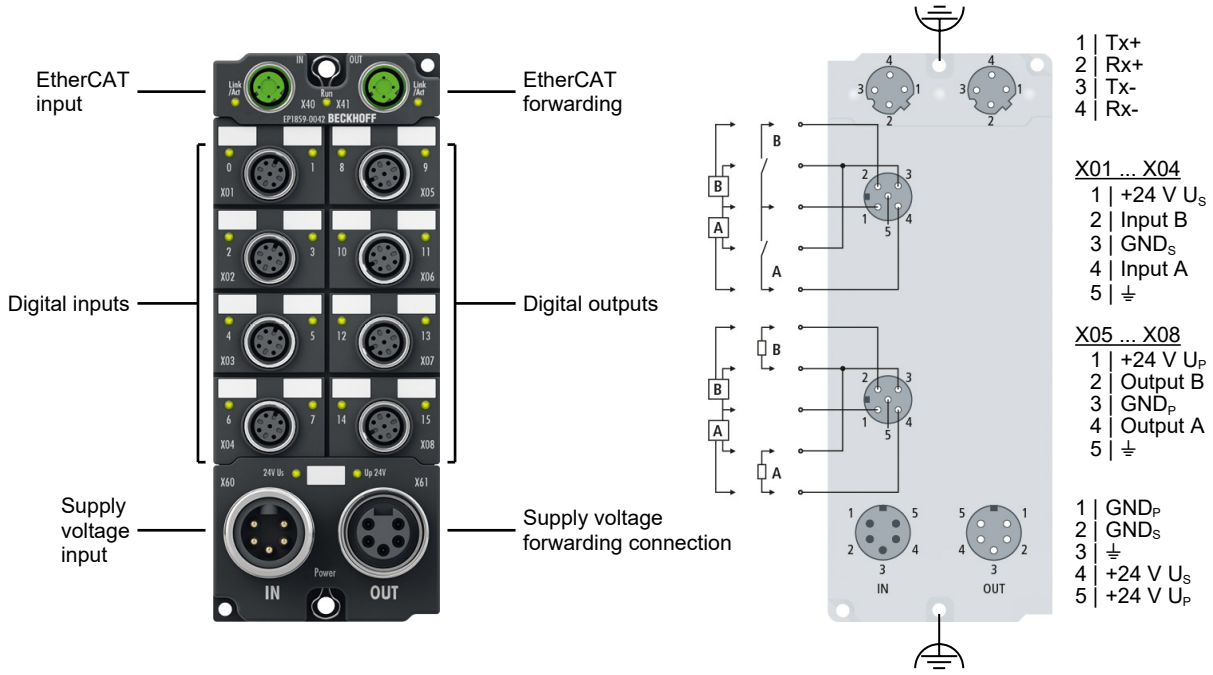


The variable names are structured as follows:



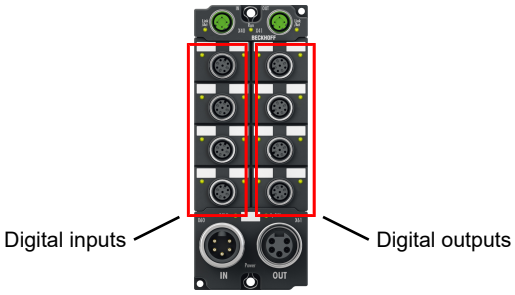
3.10 EP1859-0042

3.10.1 Introduction



8 x digital input + 8 x digital output 24 V_{DC}, Imax = 0.5 A, 3.0 ms

The EP1859-0042 EtherCAT Box has eight digital inputs (four M12 sockets on the left) and eight digital outputs (four M12 sockets on the right).



The inputs have a filter of 3.0 ms. The outputs process load currents up to 0.5 A, are short-circuit proof and protected against polarity reversal. The state of the signals is indicated by light emitting diodes. The signals are connected via M12 screw type connectors.

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

The EP1859-0042 is interference-free. You can use the EP1859-0042 instead of an interference-free standard terminal in accordance with the following chapters of the TwinSAFE Application Guide:

- "All-pole disconnection of a potential group with downstream interference-free standard terminals (Category 4, PL e)"
- "Single-pole disconnection of a potential group with downstream interference-free standard terminals with fault exclusion (Category 4, PL e)"
- „EL2911 potential group with interference-free standard terminals (Category 4, PL e)"

Quick links

Technical data [▶ 68]
Process image [▶ 71]
Dimensions [▶ 79]
Functional earth [▶ 81]
Signal connection for inputs [▶ 96]: X01, X02, X03, X04
Signal connection for outputs [▶ 107]: X05, X06, X07, X08

3.10.2 Technical data - EP1859-0042

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

EtherCAT	
Connection	2 x M12 socket, 4-pin, D-coded, shielded
Electrical isolation	500 V

Supply voltages	
Connection	Input: 7/8" plug, 5-pin, 16-UN thread Downstream connection: 7/8" socket, 5-pin, 16-UN thread
U_S nominal voltage	24 V_{DC} (-15 % / +20 %)
U_S sum current	max. 16 A at 40 °C
Current consumption from U_S	120 mA
Rated voltage U_P	24 V_{DC} (-15 % / +20 %)
U_P sum current	max. 16 A at 40 °C
Current consumption from U_P	20 mA + load
Electrical isolation GND_S / GND_P	yes

Digital inputs	
Number	8
Connection	4 x M12 socket, 5-pin, A-coded: X01, X02, X03, X04
Cable length	max. 30 m
Rated input voltage	24 V_{DC} (-15 %/+20 %)
Input filter	3 ms
Signal voltage "0"	-3 … +5 V (similar to EN 61131-2, type 3)
Signal voltage "1"	+11 … +30 V (similar to EN 61131-2, type 3)
Input current	6 mA (similar to EN 61131-2, type 3)
Sensor power supply	from U_S, max. 0.5 A in total, short-circuit proof.

Digital outputs	
Number	8
Connection	4 x M12 socket, 5-pin, A-coded: X05, X06, X07, X08
Cable length	max. 30 m
Load type	Ohmic, inductive, lamp load
Output current	max. 0.5 A per channel, individually short-circuit proof
Short-circuit current	1.5 A typ.
Switching times	T_{ON}: 50 µs typ., T_{OFF}: 100 µs typ.
Auxiliary voltage output	from U_P, max. 0.5 A in total, short-circuit proof.

Housing data	
Dimensions W x H x D	60 mm x 150 mm x 26,5 mm (without connectors)
Weight	approx. 440 g
Installation position	variable
Material	PA6 (polyamide)

Environmental conditions	
Ambient temperature during operation	-25 … +60 °C
Ambient temperature during storage	-40 … +85 °C
Vibration / shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27
EMC immunity / emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP65, IP66, IP67 conforms to EN 60529

Approvals / markings	
Approvals / markings *)	CE, UL under preparation

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

Additional tests

The devices have undergone the following additional tests:

Test	Explanation
Vibration	10 frequency sweeps 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

3.10.3 Scope of supply - EP1859-0042

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

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

Pre-assembled protective caps do not ensure IP67 protection

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

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

3.10.4 Process image - EP1859-0042

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

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

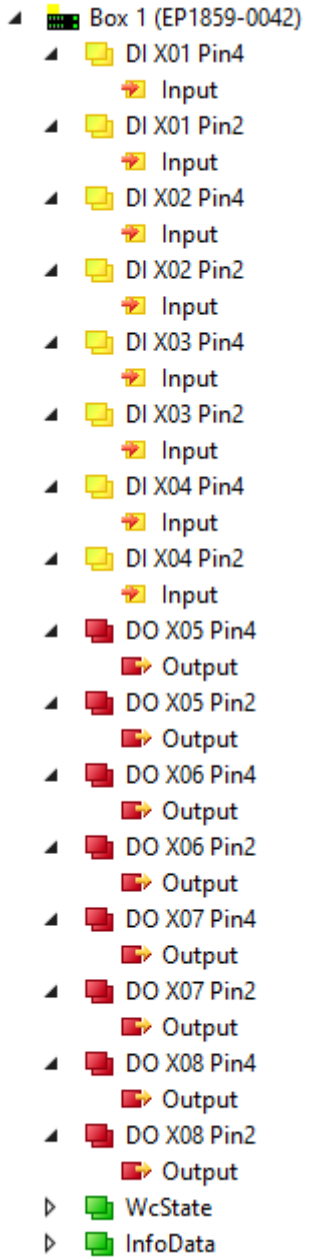
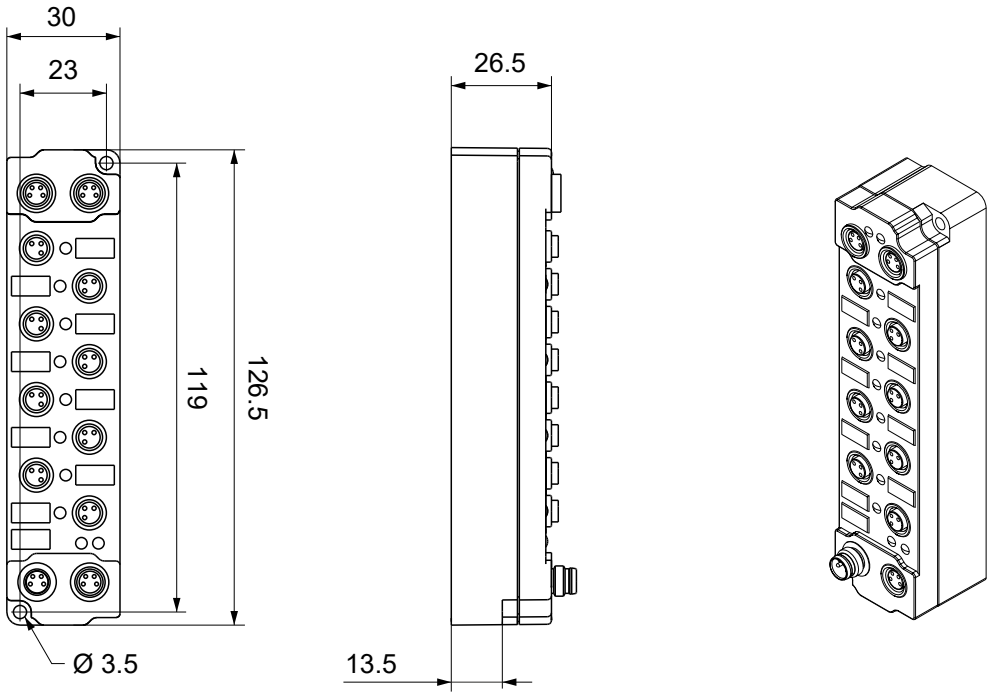


Fig. 21: EP1859-0042 - Process image

4 Mounting and connection

4.1 Mounting

4.1.1 EPxxxx-0001 dimensions

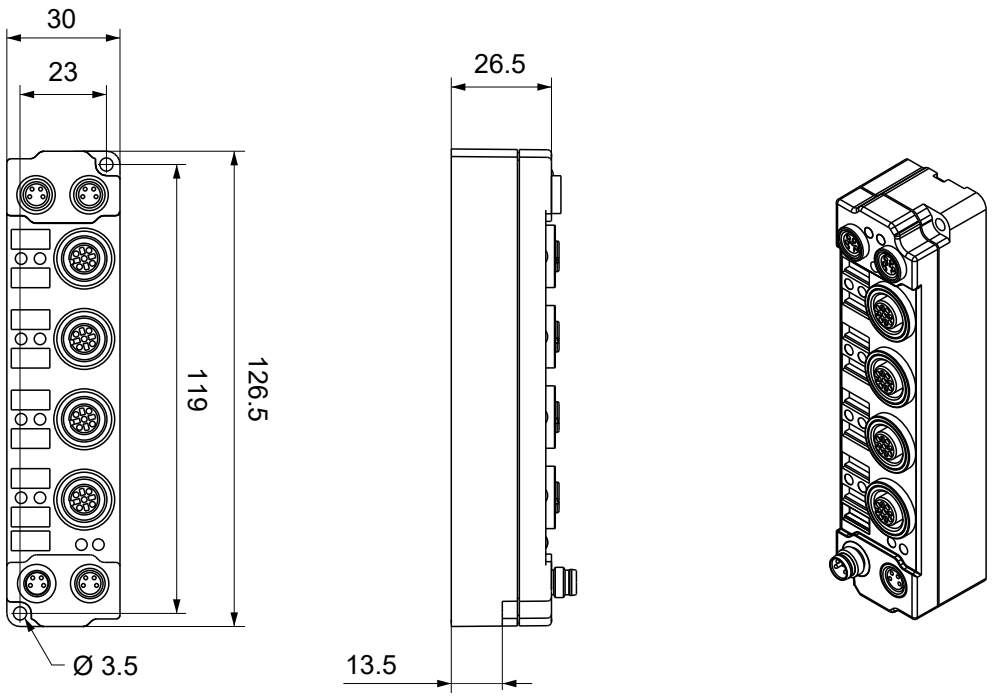


All dimensions are given in millimeters.
The drawing is not true to scale.

Housing features

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

4.1.2 EPxxxx-0002 dimensions

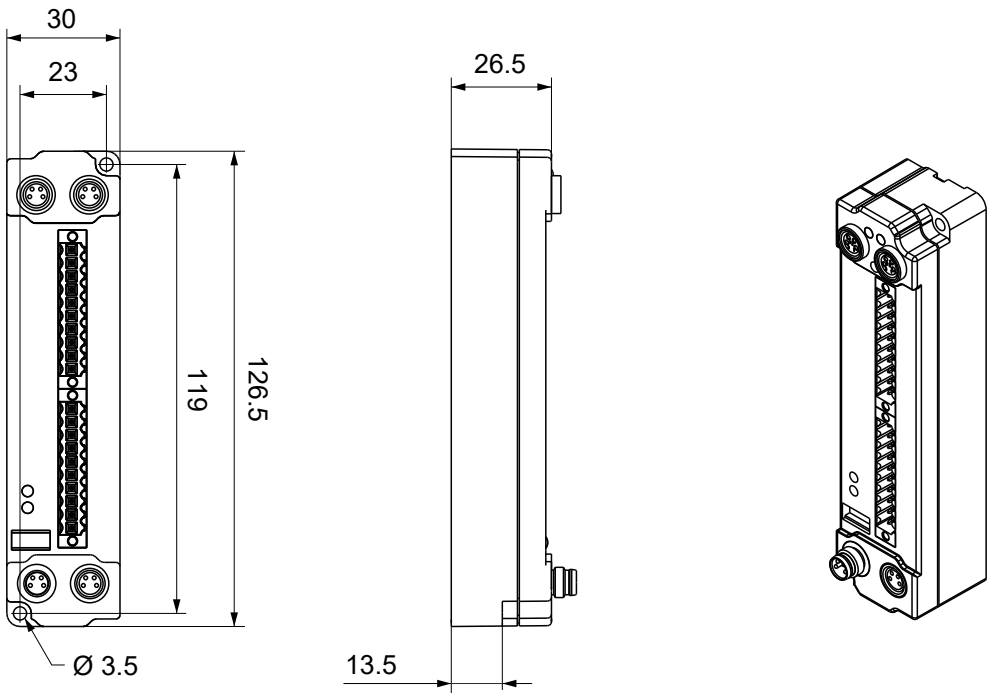


All dimensions are given in millimeters.
The drawing is not true to scale.

Housing features

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

4.1.3 EPxxxx-0003 dimensions

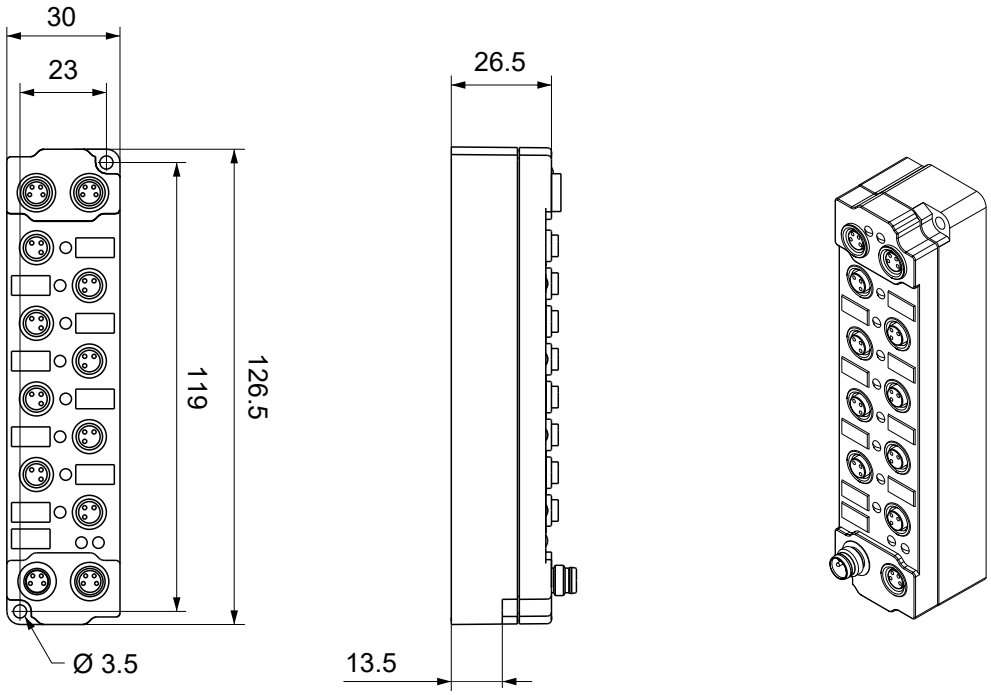


All dimensions are given in millimeters.
The drawing is not true to scale.

Housing features

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

4.1.4 EPxxxx-0005 dimensions

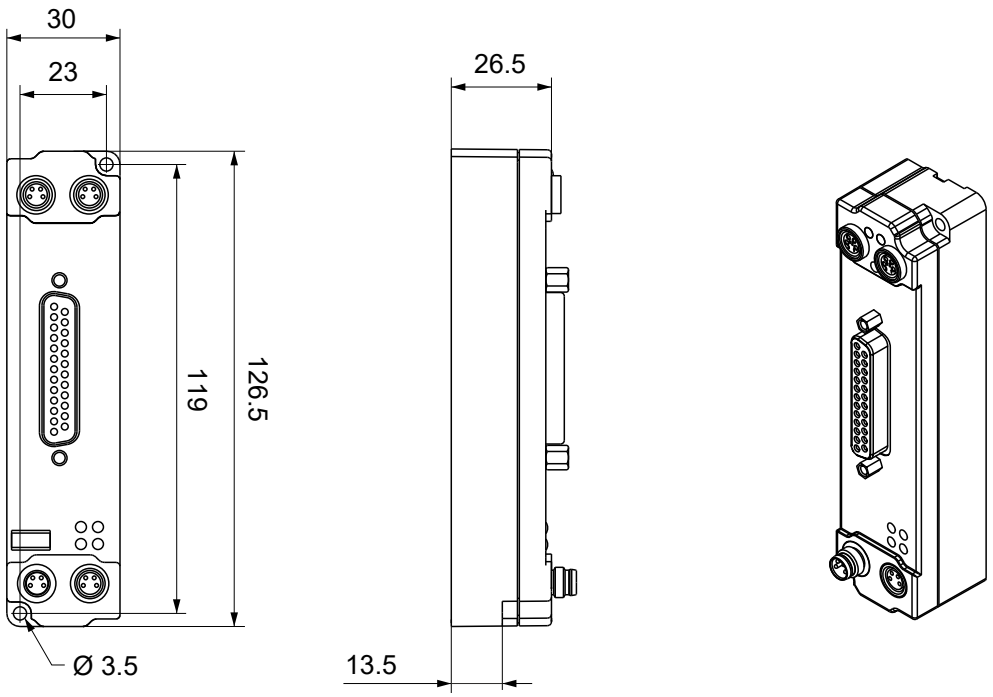


All dimensions are given in millimeters.
The drawing is not true to scale.

Housing features

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

4.1.5 EPxxxx-x008 dimensions

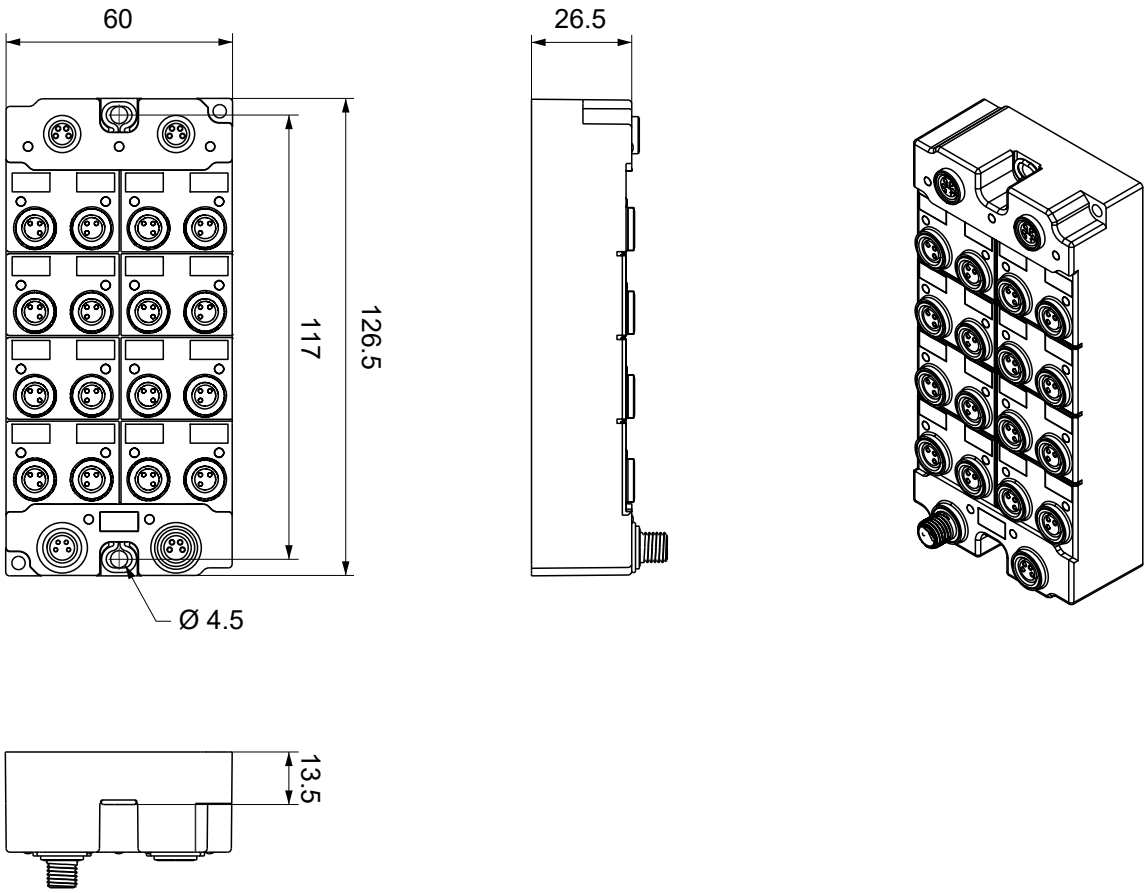


All dimensions are given in millimeters.
The drawing is not true to scale.

Housing features

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

4.1.6 EPxxxx-0021 dimensions

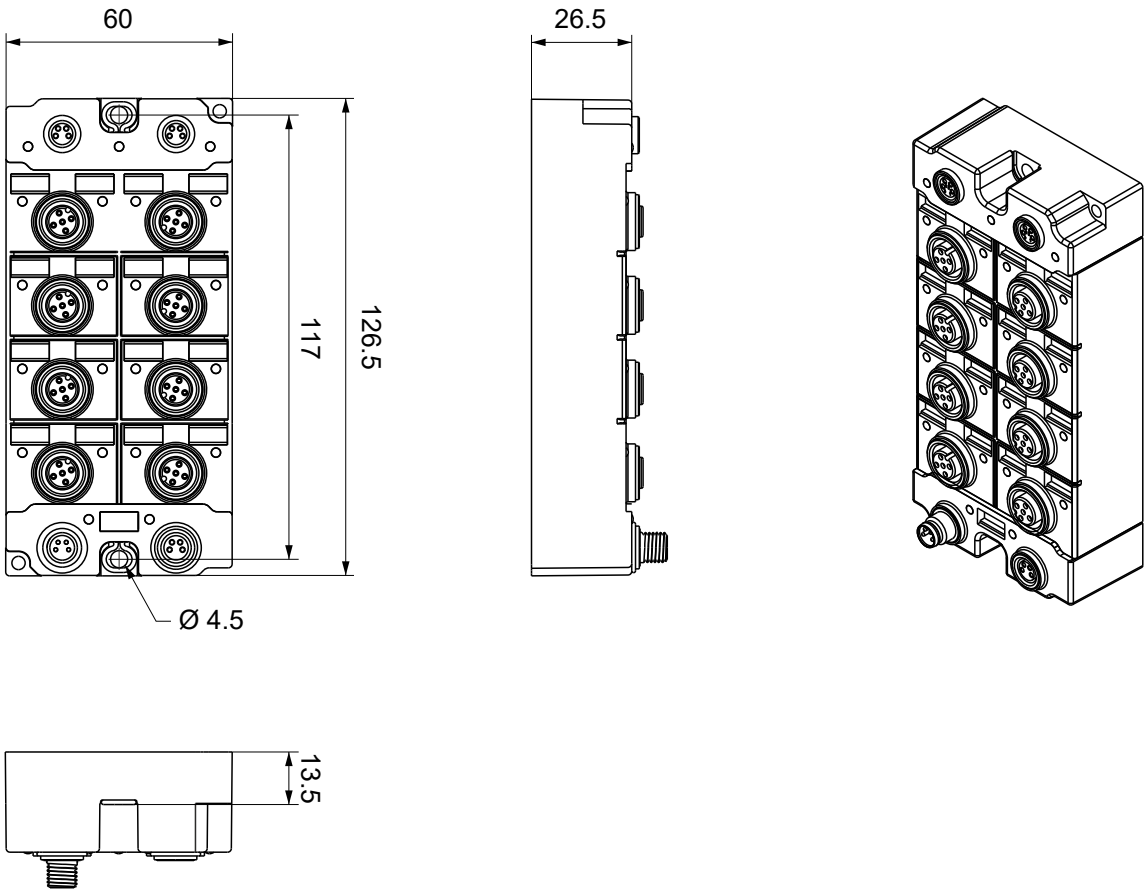


All dimensions are given in millimeters.
The drawing is not true to scale.

Housing features

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

4.1.7 EPxxxx-0022 dimensions

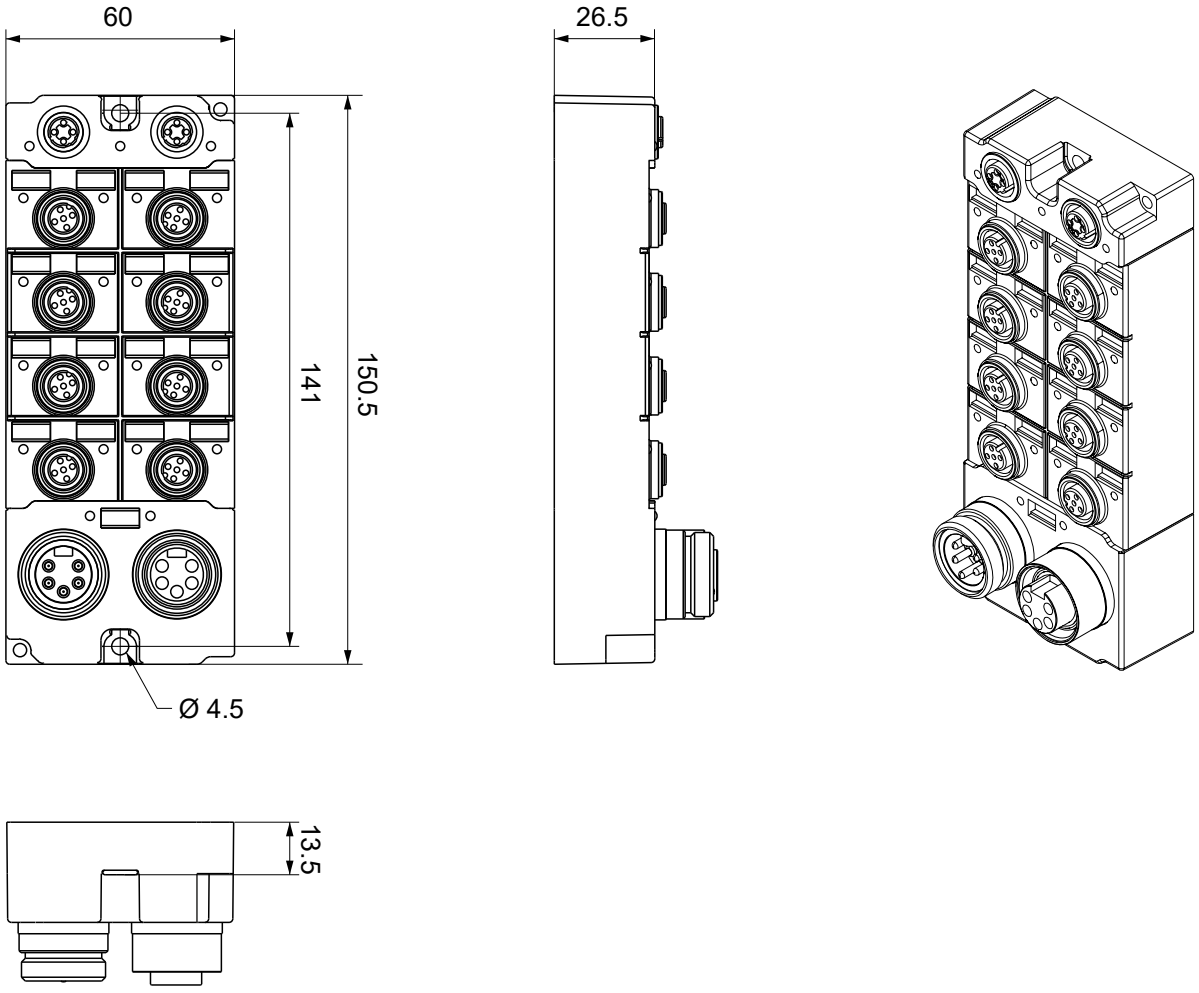


All dimensions are given in millimeters.
The drawing is not true to scale.

Housing features

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

4.1.8 EPxxxx-0042 dimensions



All dimensions are given in millimeters.
The drawing is not true to scale.

Housing features

Housing material	PA6 (polyamide)
Sealing compound	polyurethane
Mounting	two mounting holes Ø 4.5 mm for M4
Metal parts	brass, nickel-plated
Contacts	CuZn, gold-plated
Installation position	variable
Protection class	IP65, IP66, IP67 (conforms to EN 60529) when screwed together
Dimensions (H x W x D)	approx. 150 x 60 x 26.5 mm (without connectors)

4.1.9 Fixing

Protection of connectors against contamination!

While mounting the modules, protect all connectors, 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 mounting holes located at the corners or mounted with two M4 bolts to the mounting holes located centrally.

The bolts must be longer than 15 mm. The mounting 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.

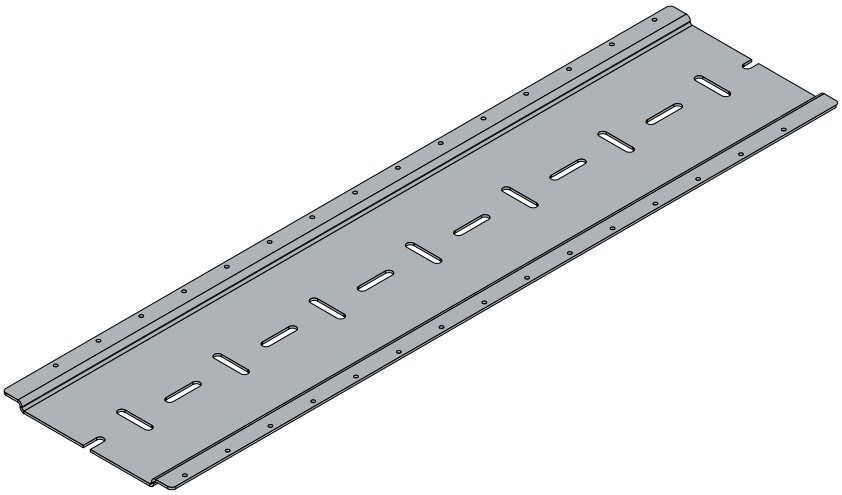


Fig. 22: Mounting Rail ZS5300-000

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

Mounting Rail ZS5300-0011

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

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

4.1.10 Functional earth

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

The mounting holes also serve as connections for the functional earth.

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



Fig. 23: Functional earth via the fastening holes

4.2 Connections

4.2.1 Tightening torques for plug connectors

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

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

4.2.2 Protective caps

- Seal unused connectors with protective caps.
- Ensure the correct seating of pre-assembled protective caps.
  Protective caps are pre-assembled at the factory to protect connectors during transport. They may not be tight enough to ensure IP67 protection.

4.2.3 EtherCAT

4.2.3.1 Connectors

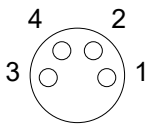
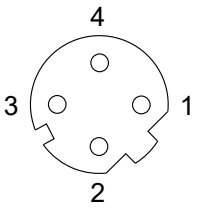
NOTICE

Risk of confusion: supply voltages and EtherCAT

Defect possible through incorrect insertion.

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

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

M8 sockets		M12 sockets
		
		

Assignment

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

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

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

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

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

4.2.3.2 Status LEDs



L/A (Link/Act)

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

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

Run

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

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

Description of the EtherCAT slave states

4.2.3.3 Cables

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

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

Detailed recommendations for the cabling of EtherCAT devices

4.2.4 Supply voltages

⚠ WARNING

Power supply from SELV / PELV power supply unit!

SELV / PELV circuits (safety extra-low voltage / protective extra-low voltage) according to IEC 61010-2-201 must be used to supply this device.

Notes:

- SELV / PELV circuits may give rise to further requirements from standards such as IEC 60204-1 et al, for example with regard to cable spacing and insulation.
- A SELV supply provides safe electrical isolation and limitation of the voltage without a connection to the protective conductor, a PELV supply also requires a safe connection to the protective conductor.

⚠ CAUTION

Observe the UL requirements

- When operating under UL conditions, observe the warnings in the chapter UL Requirements [▶ 108].

The EtherCAT Box has one input for two supply voltages:

- **Control voltage U_S**
  The following sub-functions are supplied from the control voltage U_S:
  - the fieldbus
  - the processor logic
  - typically the inputs and the sensors if the EtherCAT Box has inputs.
- **Peripheral voltage U_P**
  For EtherCAT Box modules with digital outputs the digital outputs are typically supplied from the peripheral voltage U_P. U_P can be supplied separately. If U_P is switched off, the fieldbus function, the function of the inputs and the supply of the sensors are maintained.

The exact assignment of U_S and U_P can be found in the pin assignment of the I/O connections.

Redirection of the supply voltages

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

NOTICE

Note the maximum current!

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

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

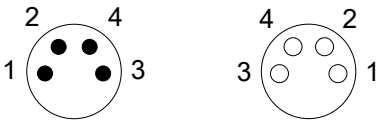
NOTICE

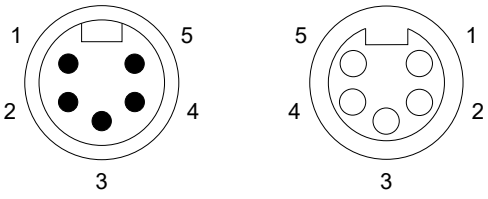
Unintentional cancellation of the electrical isolation possible

In some types of EtherCAT Box modules the ground potentials GND_S and GND_P are connected.

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

4.2.4.1 Connectors

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

Plug
Input
Socket
Forwarding</td><td>

Plug
Feed-in
Socket
Forwarding</td></tr>
</table>

Function	M8	7/8“	Description	Core color [1]
U_S	1	4	Control voltage	Brown
U_P	2	5	Peripheral voltage	White
GND_S	3	2	GND to U_S	Blue
GND_P	4	1	GND to U_P	Black
⏚	-	3	Functional Earth	Gray

[1] The core colors apply for Beckhoff ZK2020-xxxx-xxxx cables

In some modules, GND_S and GND_P are connected, in others they are separate. See Technical data of the respective module.

4.2.4.2 Status LEDs



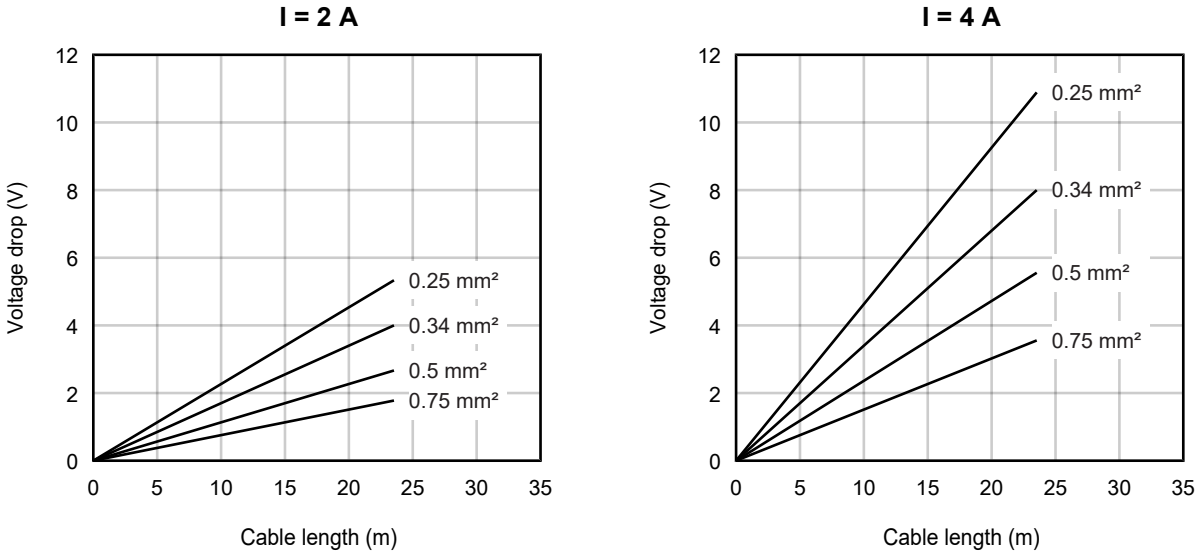
Fig. 24: Status LEDs for the supply voltages

LED	Display	Meaning
U_S (control voltage)	off	The supply voltage U_S is not available.
	green illuminated	The supply voltage U_S is available.
	red illuminated	Red illumination of this LED has different meanings for different products: • EP1839-0042: Undervoltage of the supply voltage U_S. • Other products: Sensor supply overload. In both cases all sensor supply outputs were switched off.
U_P (peripheral voltage)	off	The supply voltage U_P is not available.
	green illuminated	The supply voltage U_P is available.
	red illuminated (EP1859-0042 only)	Due to overload (current > 0.5 A), the sensor supply generated from the supply voltage U_P was switched off for all sensors supplied from it.

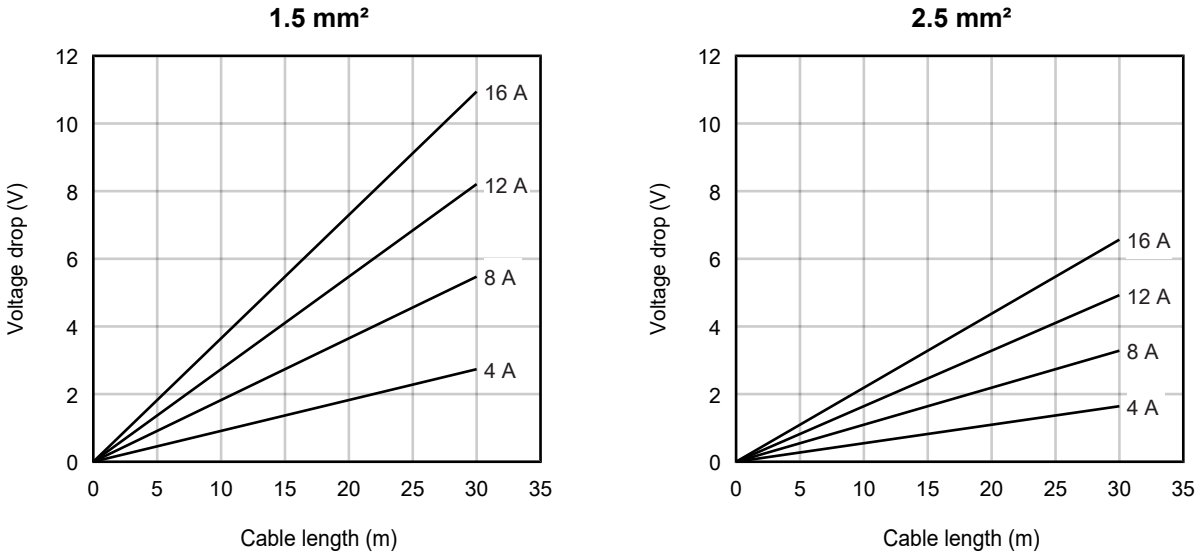
4.2.4.3 Conductor losses

Take into account the voltage drop on the supply line when planning a system. Avoid the voltage drop being so high that the supply voltage at the box lies below the minimum nominal voltage.
Variations in the voltage of the power supply unit must also be taken into account.

Voltage drop on cables with M8 connectors



Voltage drop on cables with 7/8" connectors



4.2.5 Digital inputs

4.2.5.1 M8 sockets, 3-pin

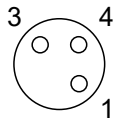
NOTICE

Incorrect signal levels due to electromagnetic interference

Digital inputs with a 10 µs input filter are optimized for fast signal transmission and are therefore susceptible to electromagnetic interference.

Under the influence of electromagnetic interference, a false signal level can be detected.

- If necessary, use shielded signal lines.

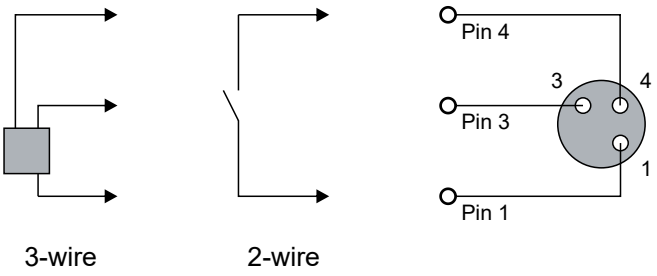


Pin assignment

Pin	Function	Wire color [1]
1	U_S	brown
3	GND_S	blue
4	Input	black

[1] The core colors apply to sensor cables from Beckhoff. See chapter Accessories [▶ 209].

Connection examples



Status LEDs

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



4.2.5.2 M8 sockets, 4-pin

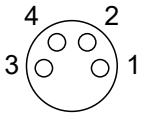
NOTICE

Incorrect signal levels due to electromagnetic interference

Digital inputs with a 10 µs input filter are optimized for fast signal transmission and are therefore susceptible to electromagnetic interference.

Under the influence of electromagnetic interference, a false signal level can be detected.

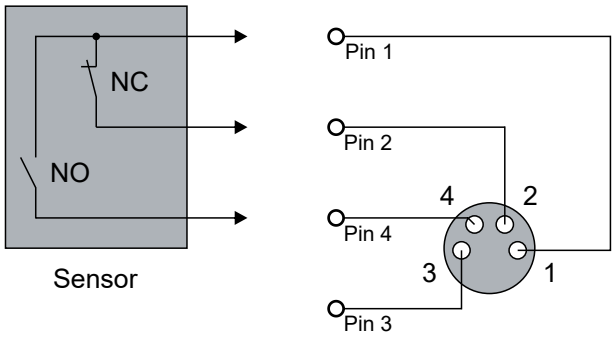
- If necessary, use shielded signal lines.



Pin assignment

Pin	Function
1	+24 V U_S
2	Input B
3	GND_S
4	Input A

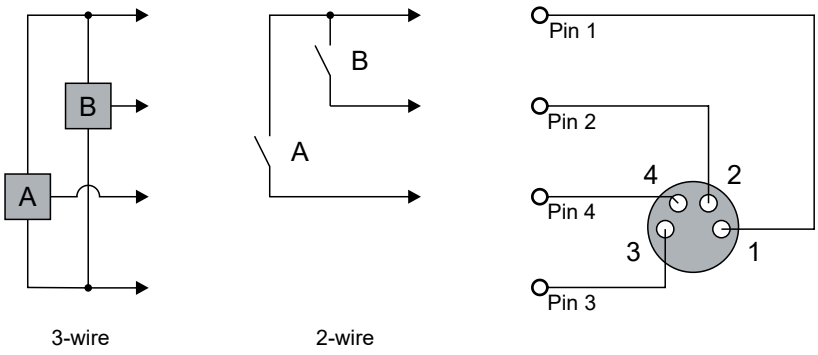
Connection example: An antivalent sensor



Diagnosis

The EP1819-0005 has a diagnostic function for antivalent sensors. See chapter Antivalent sensors (EP1819-0005) [▶ 143].

Connection example: Two non-antivalent sensors



Status LEDs

There is a green LED next to each M8 socket.



The behavior of the status LED depends on whether the diagnosis for antivalent sensors is enabled.

LED signal	Meaning with disabled diagnosis	Meaning with enabled diagnosis
off	Low level on pin 2 and pin 4.	No error. Low level on pin 4 and high level on pin 2.
green	High level on pin 2 and/or pin 4.	No error. High level on pin 4 and low level on pin 2.
red	n/a	Error

The procedure for enabling diagnosis can be found in the chapter Antivalent sensors (EP1819-0005) [▶ 143].

4.2.5.3 M12 sockets

Several EtherCAT Box modules with M12 sockets are described in this documentation. The M12 sockets of different EtherCAT Box modules have different pin assignments.

Select the correct EtherCAT Box from the following list:

EP1008-0002 [▶ 93]

EP1008-0022 [▶ 94]

EP1018-0002 [▶ 93]

EP1258-0002 [▶ 93]

EP1809-0022 [▶ 95]

EP1809-0042 [▶ 96]

EP1819-0022 [▶ 97]

EP1839-0022 [▶ 99]

EP1839-0042 [▶ 99]

EP1859-0042 [▶ 101]

4.2.5.3.1 EP1xxx-0002

NOTICE

Incorrect signal levels due to electromagnetic interference

Digital inputs with a 10 µs input filter are optimized for fast signal transmission and are therefore susceptible to electromagnetic interference.

Under the influence of electromagnetic interference, a false signal level can be detected.

- If necessary, use shielded signal lines.

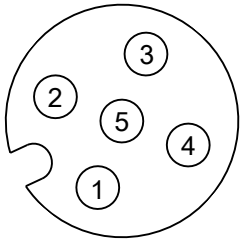
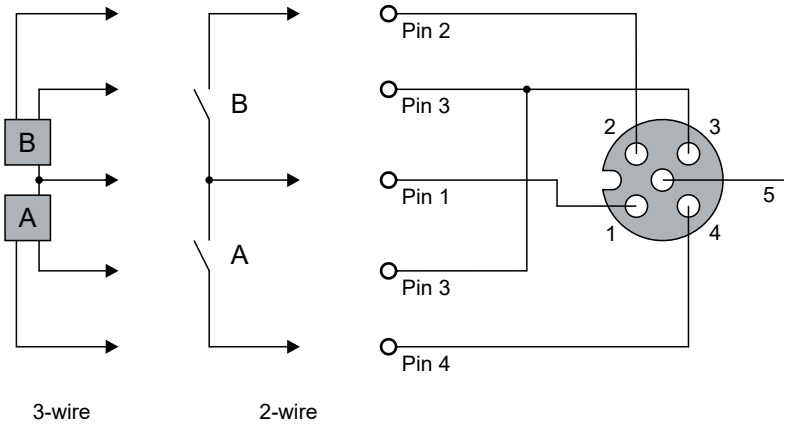


Fig. 25: M12 socket

Pin	Function	Wire color [1]
1	U_S	brown
2	Input B	white
3	GND_S	blue
4	Input A	black
5	-	gray

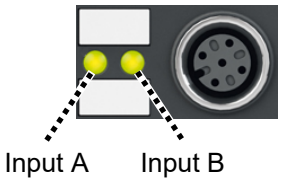
[1] The core colors apply to M12 cables from Beckhoff: ZK2000-5xxx, ZK2000-6xxx, ZK2000-7xxx

Connection examples



Status LEDs

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



4.2.5.3.2 EP1008-0022

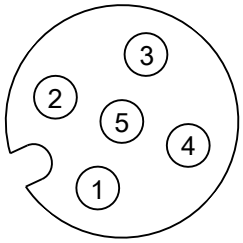


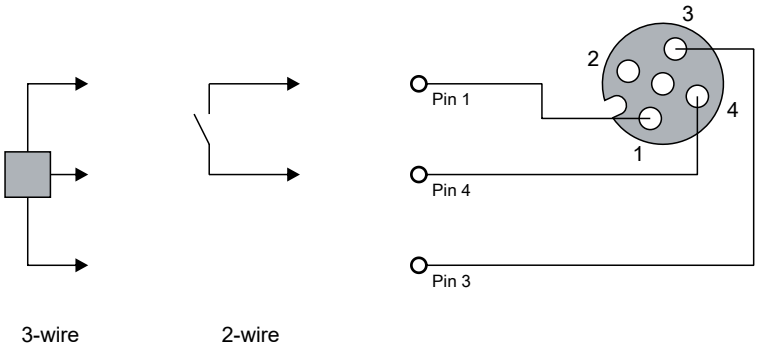
Fig. 26: M12 socket

Pin	Function	Core color [1]
1	U_S	brown
2	n.c.	white
3	GND_S	blue
4	Input	black
5	⏚ [2]	gray

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

[2] EP1008-0022: ⏚ from hardware 06. Up to hardware 05: n.c.
ER1008-0022: ⏚ from hardware 02. Up to hardware 01: n.c.

Connection examples



Status LEDs

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



Fig. 27: Status LED on an M12 socket for EP1008-0022

4.2.5.3.3 EP1809-0022

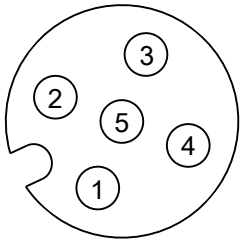


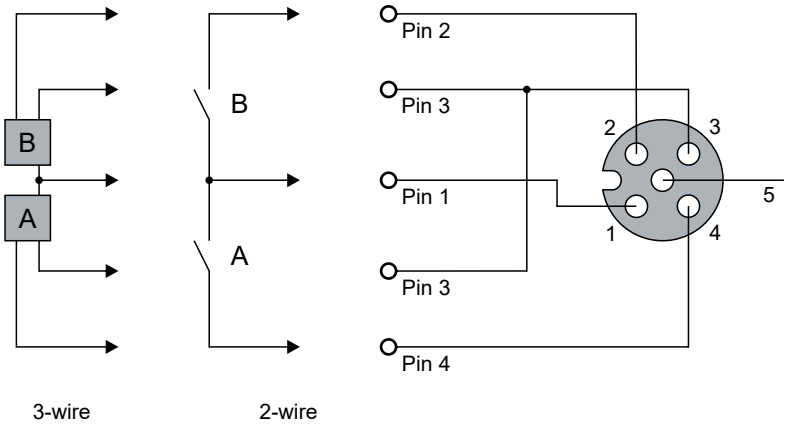
Fig. 28: M12 socket

Pin	Function	Core color [1]
1	U_S	brown
2	Input B	white
3	GND_S	blue
4	Input A	black
5	⏚ [2]	gray

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

[2] EP1809-0022: ⏚ from hardware 07. Up to hardware 06: n.c.
EQ1809-0022: ⏚ from hardware 07. Up to hardware 06: n.c.
ER1809-0022: ⏚ from hardware 02. Up to hardware 01: n.c.

Connection examples



Status LEDs

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



4.2.5.3.4 EP1809-0042

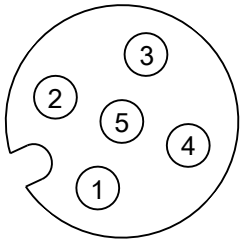
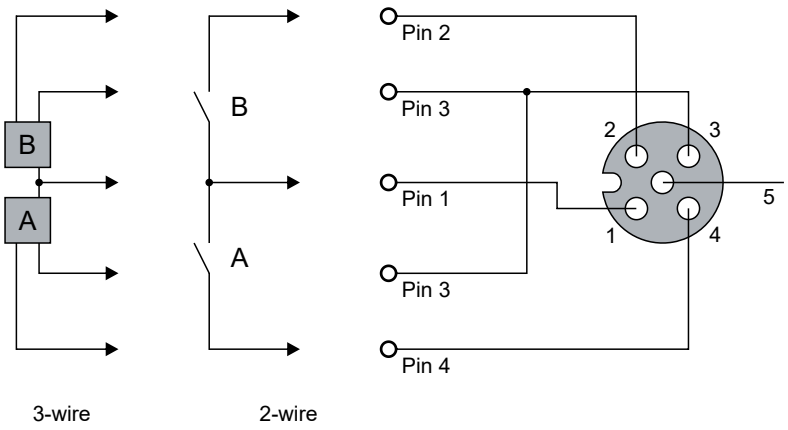


Fig. 29: M12 socket

Pin	Function	Core color [1)]
1	U_S	brown
2	Input B	white
3	GND_S	blue
4	Input A	black
5	⏚	gray

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

Connection examples



Status LEDs

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



4.2.5.3.5 EP1819-0022

NOTICE

Incorrect signal levels due to electromagnetic interference

Digital inputs with a 10 µs input filter are optimized for fast signal transmission and are therefore susceptible to electromagnetic interference.

Under the influence of electromagnetic interference, a false signal level can be detected.

- If necessary, use shielded signal lines.

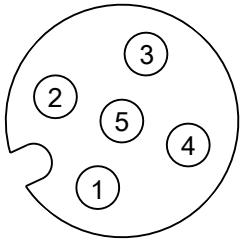


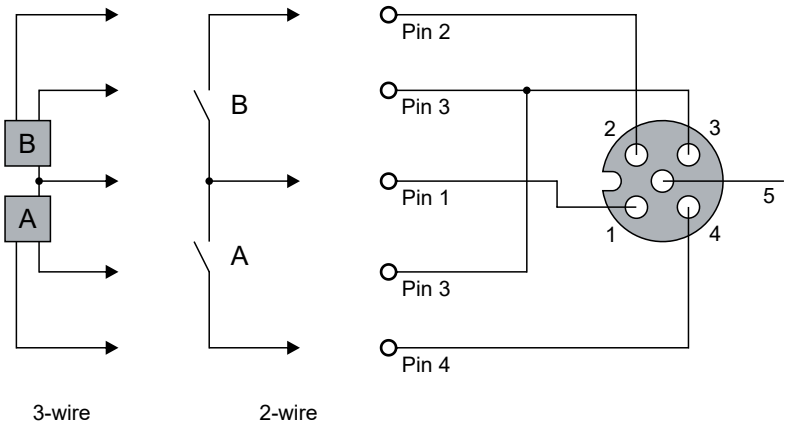
Fig. 30: M12 socket

Pin	Function	Core color [1]
1	U_S	brown
2	Input B	white
3	GND_S	blue
4	Input A	black
5	⏚ [2]	gray

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

[2] EP1819-0022: ⏚ from hardware 08. Up to hardware 07: n.c.
ER1819-0022: ⏚ from hardware 01. In hardware 00: n.c.

Connection examples



Status LEDs

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


Input A
Input B

4.2.5.3.6 EP1839-0022, EP1839-0042

NOTICE

Incorrect signal levels due to electromagnetic interference

If the input filter is disabled or the filter time is low, the inputs can be susceptible to electromagnetic interference.

Under the influence of electromagnetic interference, a false signal level can be detected.

- If necessary, use shielded signal lines.

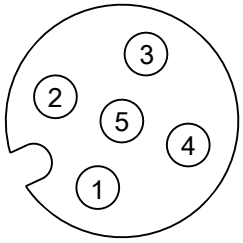


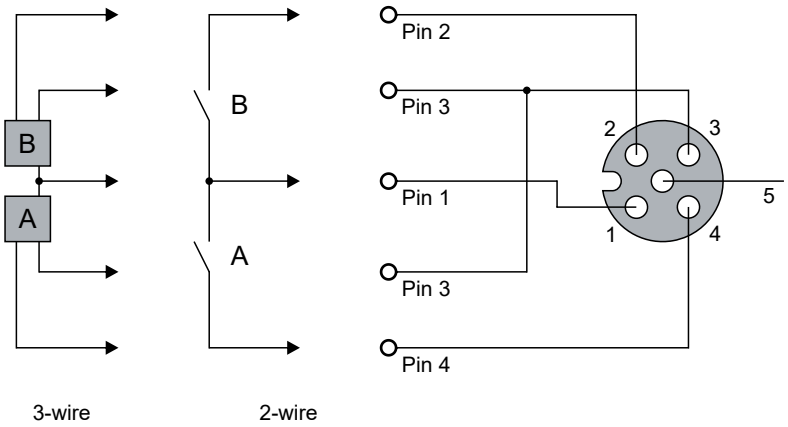
Fig. 31: M12 socket

Pin	Function	Core color [1]
1	U_{S1} … U_{S8} [2]	brown
2	Input B	white
3	GND_S	blue
4	Input A	black
5	⏚	gray

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

[2] Sensor supply: The output voltages U_{S1} … U_{S8} are branched off from the supply voltage U_S. Each output is independently short-circuit proof.

Connection examples



Status LEDs

Each M12 socket has two status LEDs.



Light signal of a status LED	Meaning
green illuminated	The input signal is logical high.
red illuminated	Wire breakage. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].
both LEDs light up red	Two possibilities: • Sensor supply error. See chapter Configuring sensor power supply (EP1839-0022, EP1839-0042) [▶ 127]. • Wire break at both inputs. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].

4.2.5.3.7 EP1859-0042

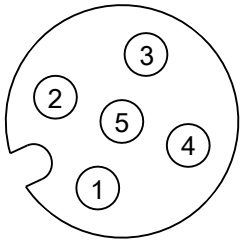
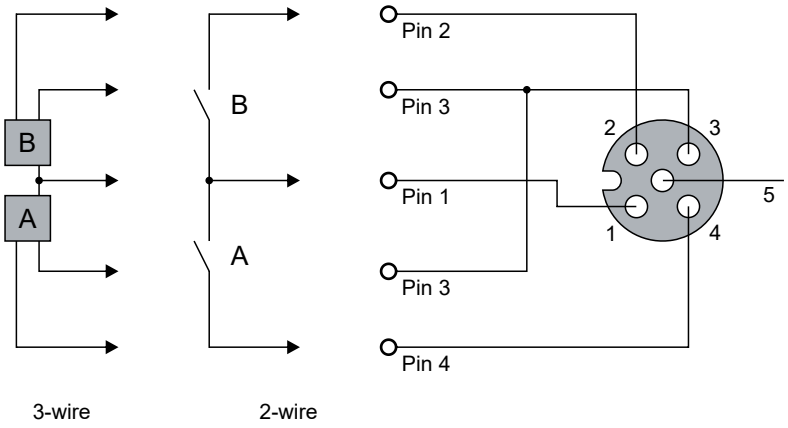


Fig. 32: M12 socket

Pin	Function	Core color [1)]
1	U_S	brown
2	Input B	white
3	GND_S	blue
4	Input A	black
5	⏚	gray

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

Connection examples



Status LEDs

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



4.2.5.4 ZS2001: pluggable spring-loaded terminals

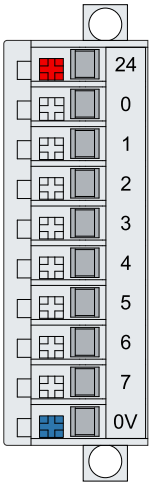
NOTICE

Incorrect signal levels due to electromagnetic interference

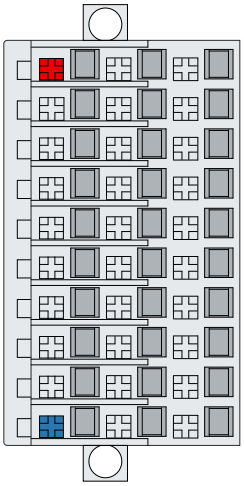
Digital inputs with a 10 µs input filter are optimized for fast signal transmission and are therefore susceptible to electromagnetic interference.

Under the influence of electromagnetic interference, a false signal level can be detected.

- If necessary, use shielded signal lines.



ZS2001-0001
ZS2001-0002



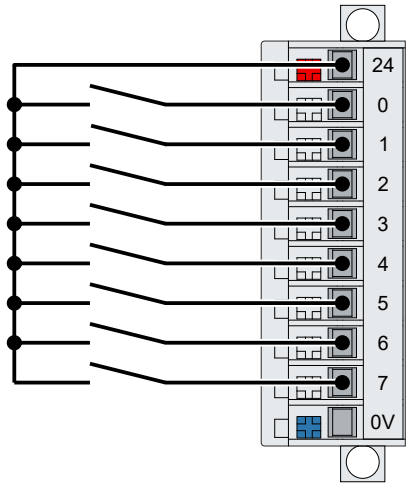
ZS2001-0004

Pin assignment

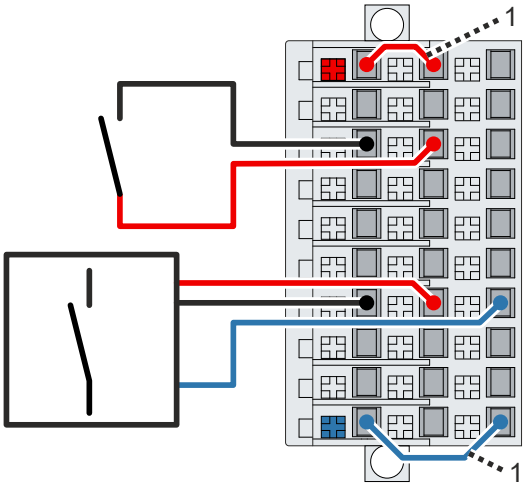
Contact	Function
0	Input 1
1	Input 2
2	Input 3
3	Input 4
4	Input 5
5	Input 6
6	Input 7
7	Input 8
"24"	U_S
"0V"	GND_S

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

Connection examples



ZS2001-0001
ZS2002-0002



ZS2001-0004

The diagram shows the connection of 8 sensors in single-wire technology as well as one sensor in two-wire and one sensor in three-wire technology.

Note for ZS2001-0004 connector: Two jumpers [1] are required to distribute the supply voltage and GND.

Status LEDs

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

4.2.5.5 D-sub sockets, 25-pin

NOTICE

Incorrect signal levels due to electromagnetic interference

Digital inputs with a 10 µs input filter are optimized for fast signal transmission and are therefore susceptible to electromagnetic interference.

Under the influence of electromagnetic interference, a false signal level can be detected.

- If necessary, use shielded signal lines.

Pin assignment

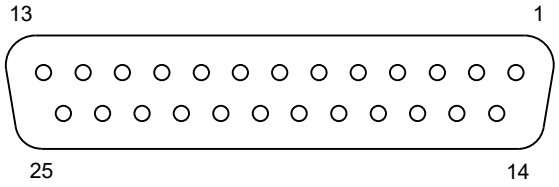


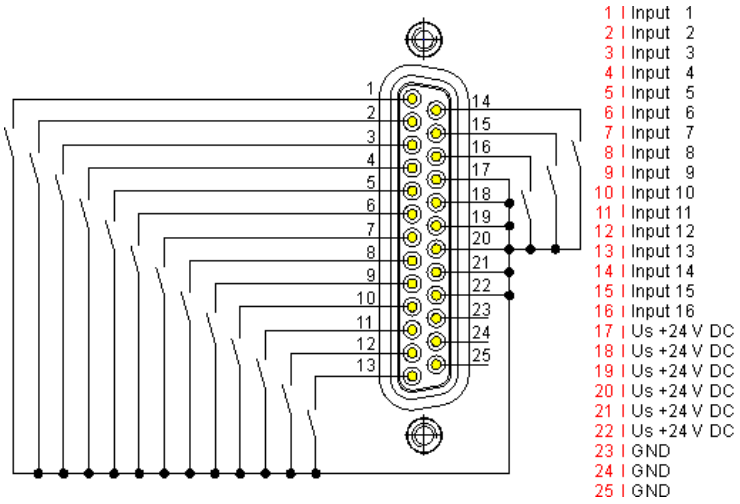
Fig. 33: D-sub socket, 25-pin

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

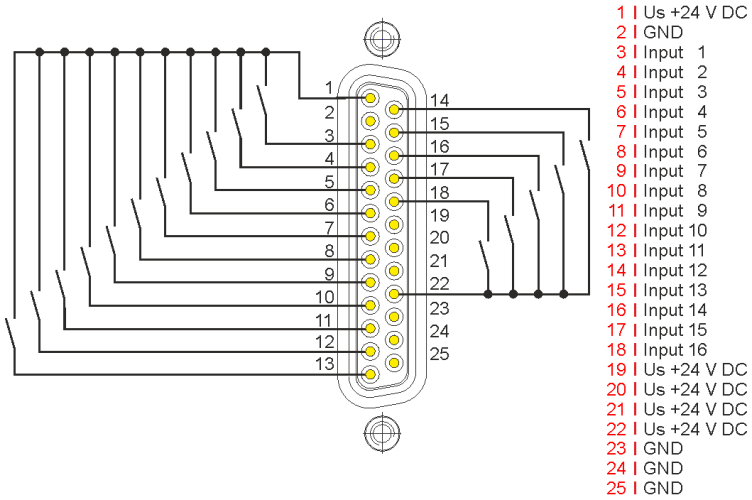
[1] U_{S1} serves as sensor supply voltage. It is branched off from the U_S supply voltage.

Connection examples

EP1816-0008



EP1816-1008



EP1816-3008

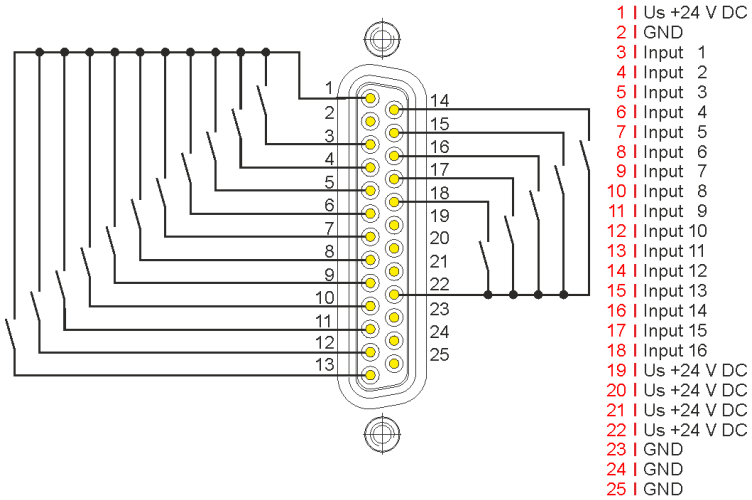


Fig. 34: Digital inputs D-sub, connection examples

Status LEDs

The D-sub socket has two green status LEDs.



Fig. 35: D-sub 25 status LEDs

4.2.6 Digital outputs (EP1859-0042 only)

4.2.6.1 M12 sockets

Pin assignment

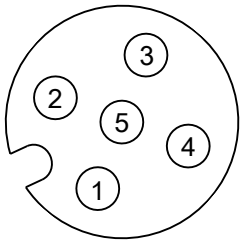
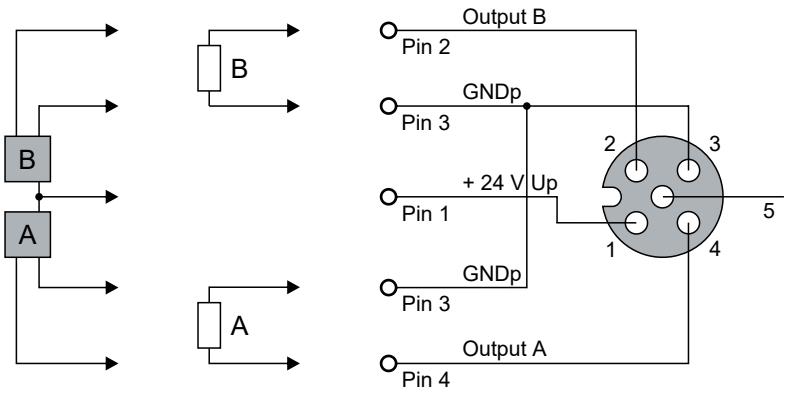


Fig. 36: M12 socket

Pin	Function	Core color [1)]
1	+24 V U_P	brown
2	Output B	white
3	GND_P	blue
4	Output A	black
5	⏚	gray

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

Connection examples



Status LEDs

LEDs indicate the signal state of the outputs.



4.3 UL Requirements

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

Supply voltage

⚠ CAUTION

CAUTION!

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

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

⚠ CAUTION

CAUTION!

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

Networks

⚠ CAUTION

CAUTION!

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

Ambient temperature range

⚠ CAUTION

CAUTION!

To meet the UL requirements, EtherCAT Box Modules has to be operated only at an ambient temperature range of -25 °C to +55 °C!

Marking for UL

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



Fig. 37: UL label

4.4 Explosion protection

4.4.1 ATEX/UKEX - Special conditions

⚠ WARNING

Observe the special conditions for the intended use of EtherCAT Box modules in potentially explosive areas!

- The certified components are to be installed in a BG2000-0000 [▶ 113] protection enclosure that guarantees a protection against mechanical hazards!
- Provisions shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 119 V!
- If the temperatures during rated operation are higher than 70°C at the feed-in points of cables, lines or pipes, or higher than 80°C at the wire branching points, then cables must be selected whose temperature data correspond to the actual measured temperature values!
- Observe the permissible ambient temperature range of 0 … +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 individual components may only be unplugged or removed from the bus system if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!
- 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!
- Address selectors and ID switches may only be adjusted if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!
- Only for connection to connection sets providing a degree of protection not less than IP54 in accordance with IEC 60079-0!
- To avoid an electrostatic charge, wipe the enclosure surface with a damp cloth only.
- The equipment shall only be used in an environment where it is protected against exposure to UV light.
- For use in Zone 2/22 the equipment shall be installed in a suitable protective housing that meets the requirements of the impact resistance test according to EN IEC 60079-0.
- When used in an area requiring the use of equipment with EPL Gc, the following additional conditions apply:

  ⇨ The equipment shall only be used in an area of not more than pollution degree 2, as defined in EN 60664-1.

  ⇨ Provisions shall be made to prevent the rated voltages from being exceeded by transient disturbances of more than 40%.

  ⇨ Fieldbus connectors may only be disconnected or connected when the system supply is switched off, or when the location is known to be non-hazardous.

  ⇨ Address selectors and ID switches may only be adjusted when the system supply is switched off, or when the location is known to be non-hazardous.

Standards

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

- **EN 60079-7:2015+A1:2018**
- **EN IEC 60079-0:2018**
- **EN IEC 60079-31:2024**

Marking

The Beckhoff EtherCAT Box modules certified according to regulations for potentially explosive areas bear the following marking:



II 3G Ex ec IIC T4 Gc
II 3D Ex tc IIIC T135°C Dc
DEKRA 11ATEX0080 X
DEKRA 22UKEX6019 X
Ta: 0 ... +55°C

4.4.2 IECEx - Special conditions

⚠ WARNING

Observe the special conditions for the intended use of EtherCAT Box modules in potentially explosive areas!

- The certified components are to be installed in a BG2000-0000 [▶ 113] protection enclosure that guarantees a protection against mechanical hazards!
- Provisions shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 119 V!
- If the temperatures during rated operation are higher than 70°C at the feed-in points of cables, lines or pipes, or higher than 80°C at the wire branching points, then cables must be selected whose temperature data correspond to the actual measured temperature values!
- Observe the permissible ambient temperature range of 0 … +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 individual components may only be unplugged or removed from the bus system if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!
- 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!
- Address selectors and ID switches may only be adjusted if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!
- Only for connection to connection sets providing a degree of protection not less than IP54 in accordance with IEC 60079-0!
- To avoid an electrostatic charge, wipe the enclosure surface with a damp cloth only.
- The equipment shall only be used in an environment where it is protected against exposure to UV light.
- For use in Zone 2/22 the equipment shall be installed in a suitable protective housing that meets the requirements of the impact resistance test according to EN IEC 60079-0.
- When used in an area requiring the use of equipment with EPL Gc, the following additional conditions apply:

  ⇨ The equipment shall only be used in an area of not more than pollution degree 2, as defined in IEC 60664-1.

  ⇨ Provisions shall be made to prevent the rated voltages from being exceeded by transient disturbances of more than 40%.

  ⇨ Fieldbus connectors may only be disconnected or connected when the system supply is switched off, or when the location is known to be non-hazardous.

  ⇨ Address selectors and ID switches may only be adjusted when the system supply is switched off, or when the location is known to be non-hazardous.

Standards

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

- **IEC 60079-0:2017 (Edition 7.0)**
- **IEC 60079-7:2017 (Edition 5.1)**
- **IEC 60079-31:2022 (Edition 3.0)**

Marking

EtherCAT Box modules that are certified in accordance with IECEx for use in areas subject to an explosion hazard bear the following markings:

IECEx DEK 23.0017 X
Ex ec IIC T4 Gc
Ex tc IIIC T135°C Dc

4.4.3 BG2000-0000 - Protection enclosure for EtherCAT Box

⚠ WARNING

Risk of injury through electric shock and damage to the device!

Bring the EtherCAT system into a safe, de-energized state before starting mounting, disassembly or wiring of the modules.

Usage

The BG2000-0000 protection enclosure is mounted over a single EtherCAT Box in order to comply with the special ATEX requirements.

Installation

Push the connecting cables for EtherCAT, power supply and the sensors/actuators through the opening of the BG2000-0000 protection enclosure.

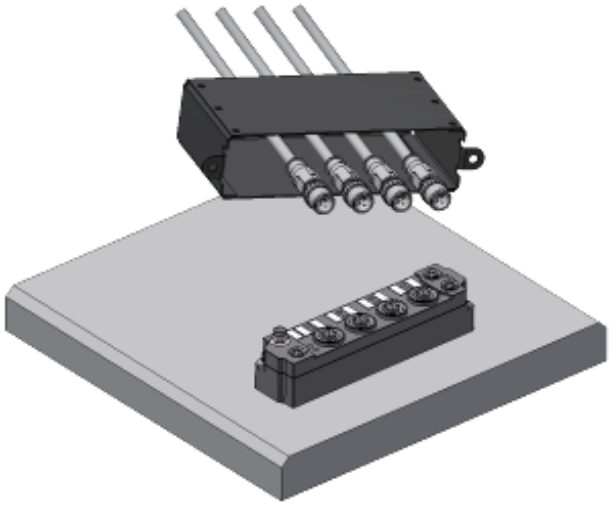


Fig. 38: BG2000-0000 - push the connecting cables through

Screw the connecting cables for EtherCAT, the power supply and the sensors/actuators to the EtherCAT Box. Also seal unused connectors with protective caps!

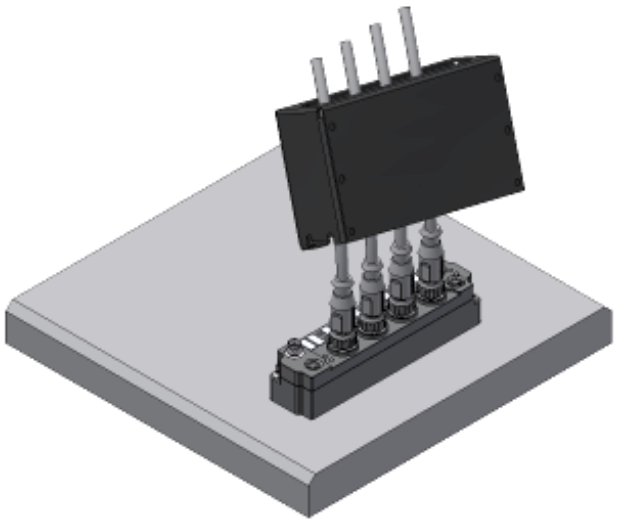


Fig. 39: BG2000-0000 - tighten the connecting cables

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

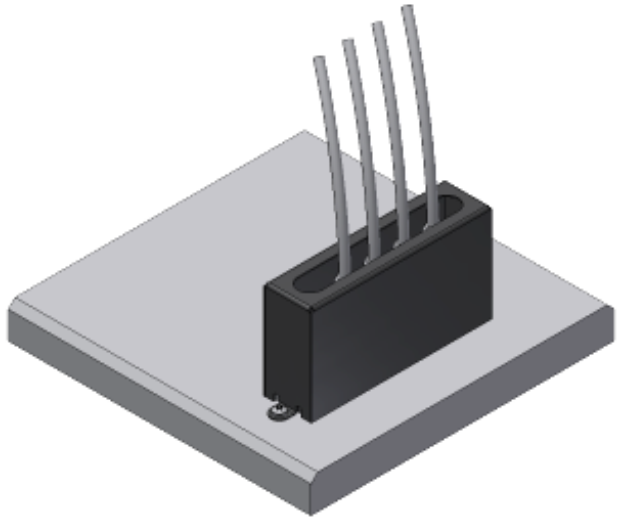


Fig. 40: BG2000-0000 - mount the protection enclosure

4.4.4 Continuative documentation

NOTICE	
	**Continuative documentation** Pay also attention to the continuative documentation: Notes on the use of the EtherCAT Box Modules in hazardous areas according to ATEX, UKEX and IECEx

4.5 Disposal



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

5 Commissioning and configuration

5.1 Integrating into a TwinCAT project

The procedure for integration in a TwinCAT project is described in these Quick start guide.

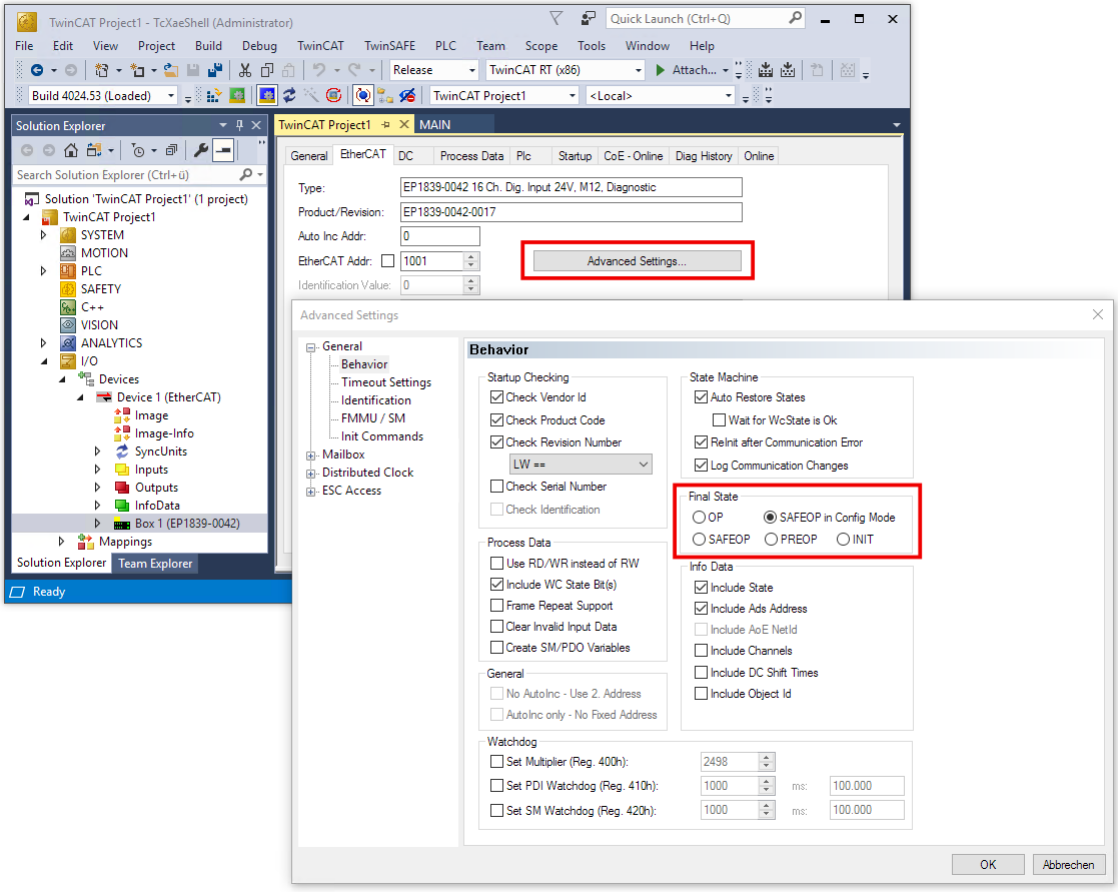
5.2 EtherCAT status in Config Mode (EP1839-0022, EP1839-0042)

(only applies to EP1839-0042 with firmware 02 and higher)

Ex factory, the box is configured so that it automatically switches to "Safe-Operational" status when operating in Config Mode. In this state, all switchable outputs are in the safe state, i.e. switched off.

You can set the box to automatically switch to "Operational" state in Config Mode:

1. Click on the box in Solution Explorer.
2. Open the "EtherCAT" tab.
3. Click the "Advanced Settings …" button.
4. In the "Final State" field, select the "OP" option.
5. Confirm with "OK".



5.3 Adapt process image (EP1819-0005, EP1839-0022, EP1839-0042)

You can set which process data objects are transferred in the process image of an EtherCAT device. This can be useful for the following reasons:

- Activate additional process data objects to control sub-functions that are not activated in the factory setting.
- Remove unused process data objects from the process image.

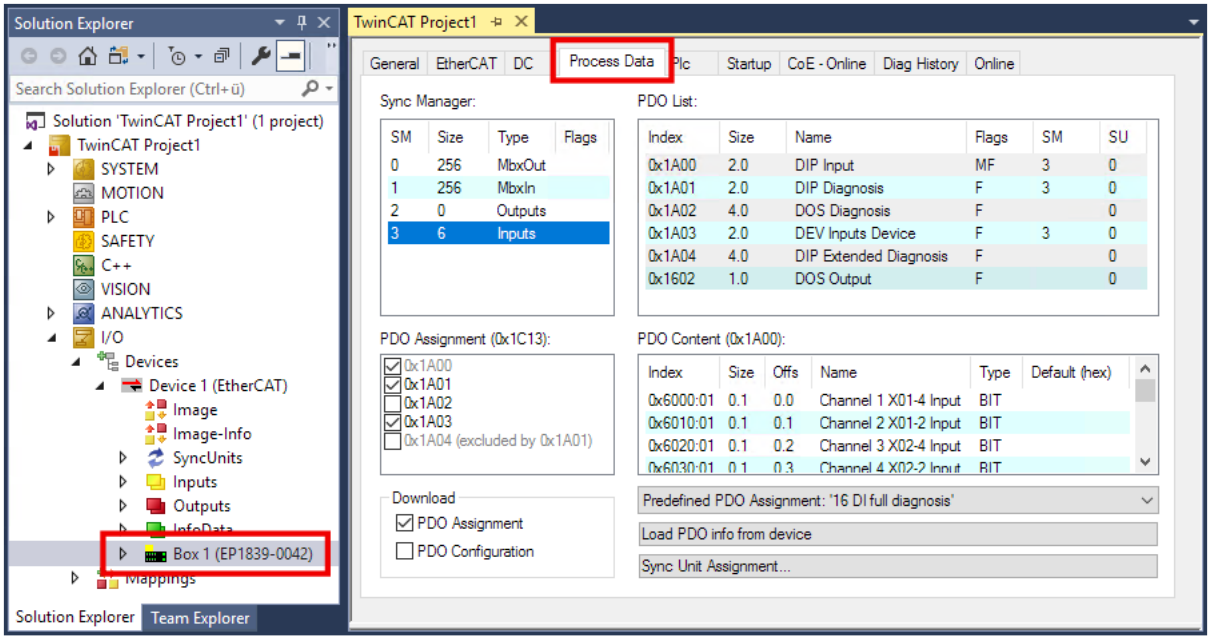
There are two ways to adapt the process image:

- (recommended) Select an existing "Predefined PDO Assignment".
  "Predefined PDO Assignments" are useful predefined combinations of process data objects. See chapter Setting a Predefined PDO Assignment [▶ 118].
- Enable or disable individual process data objects.
  See chapter Enabling individual process data objects [▶ 119].

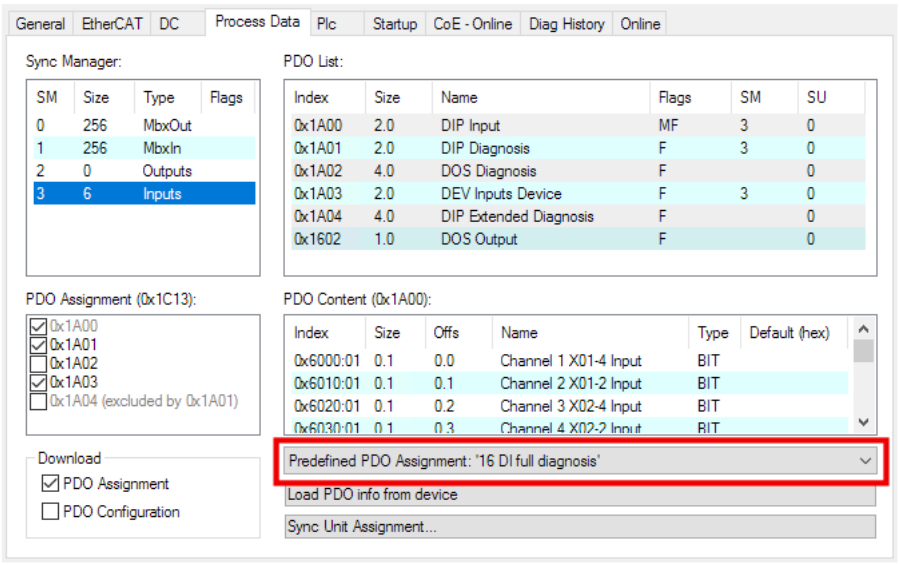
An overview of the Predefined PDO Assignments and process data objects can be found in chapter Process image - EP1839-0022, EP1839-0042 [▶ 59].

5.3.1 Setting a Predefined PDO Assignment

1. In Solution Explorer, select the relevant EtherCAT device and click on the "Process Data" tab.



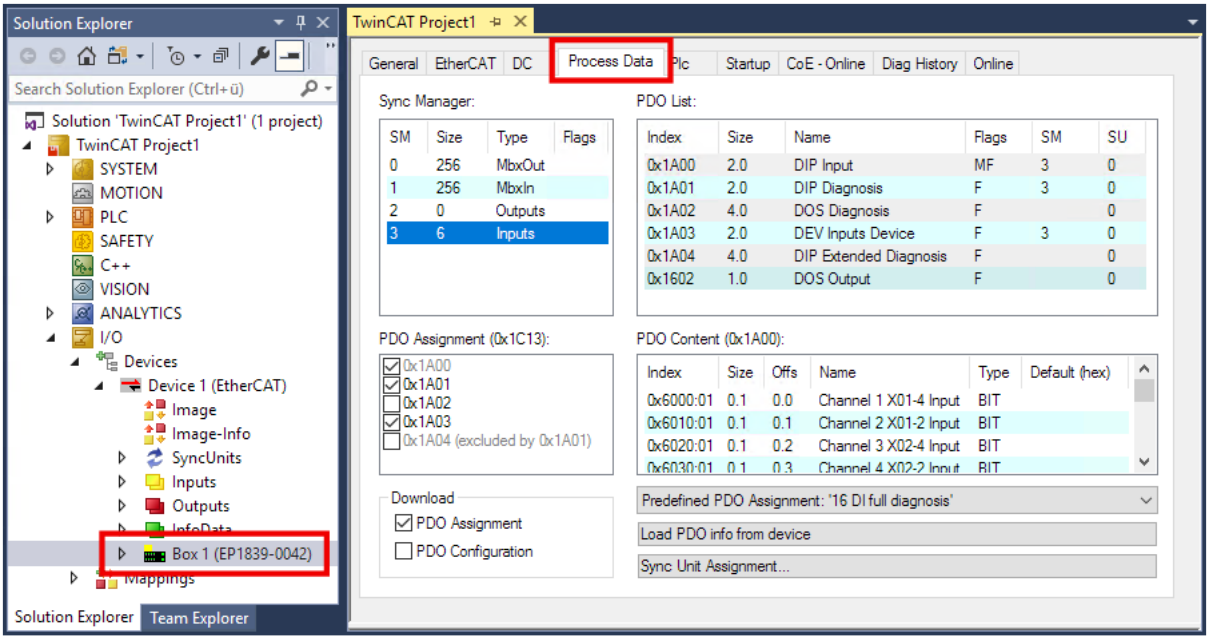
2. Select the desired entry from the "Predefined PDO Assignment" drop-down menu.



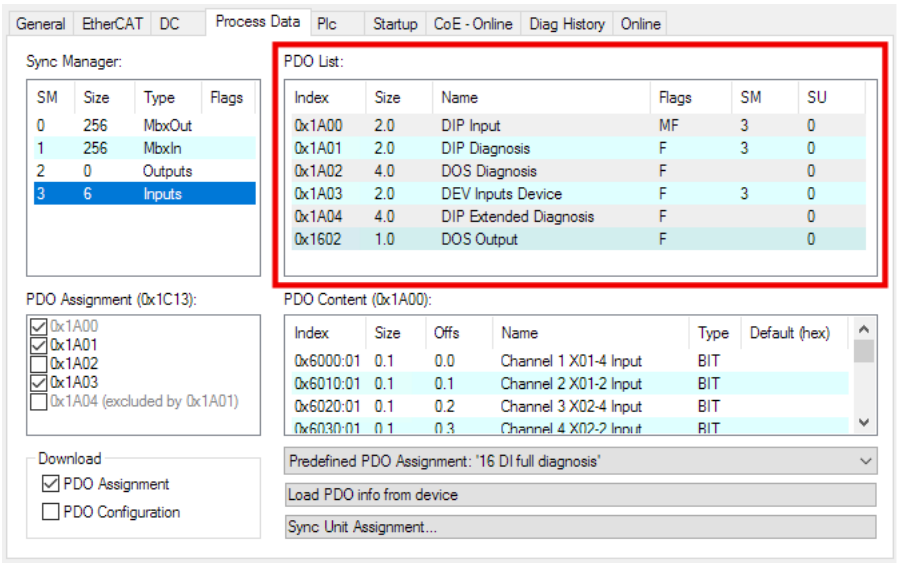
5.3.2 Enabling individual process data objects

Proceed as follows to enable a process data object:

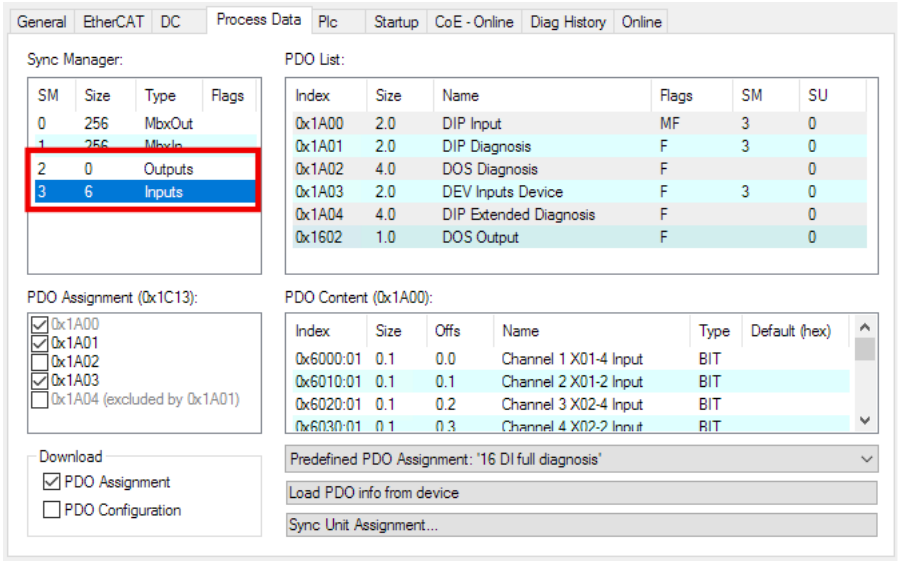
1. In Solution Explorer, select the relevant EtherCAT device and click on the "Process Data" tab. Using an EP1839-0042 as an example:



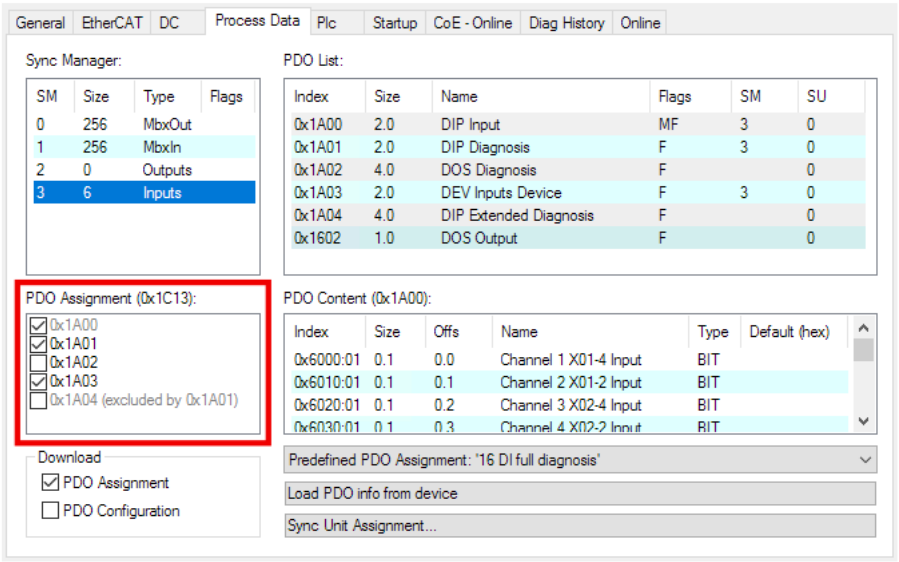
⇨ In the "PDO List" field, you can see the available process data objects and their indices.



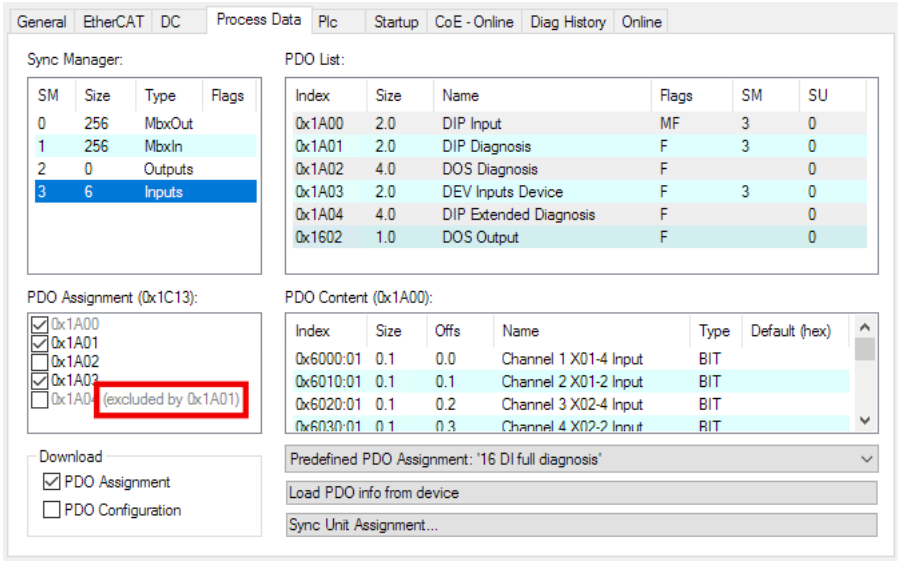
2. Select the category "Outputs" or "Inputs" in the "Sync Manager" field:
   Process data objects with index 0x1A00...0x1AFF are "Inputs", index 0x1600...0x16FF are "Outputs".



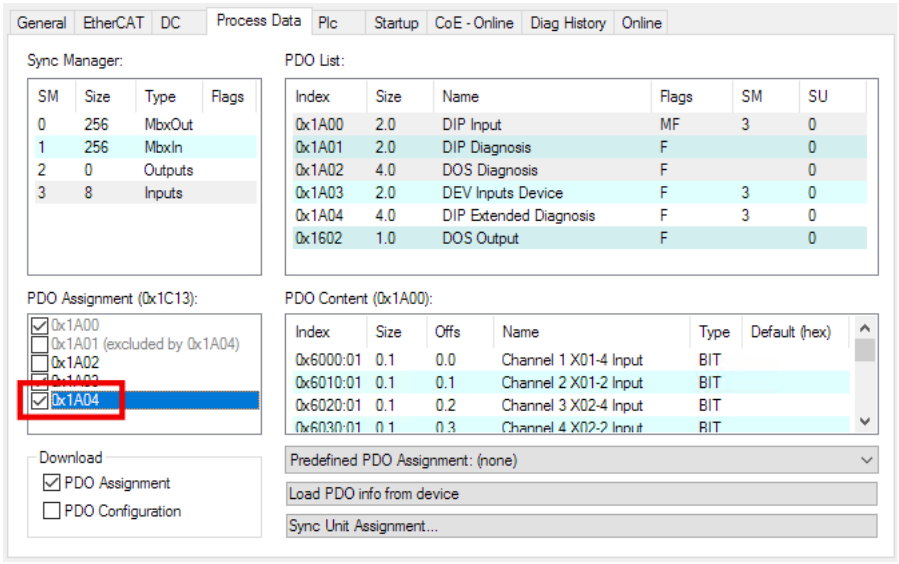
3. Find the index of the desired process data object in the field "PDO Assignment".



4. If necessary, disable a process data object that prevents the desired process data object from being enabled ("excluded by …"). Using 0x1A04 "DIP Extended Diagnosis" as an example:

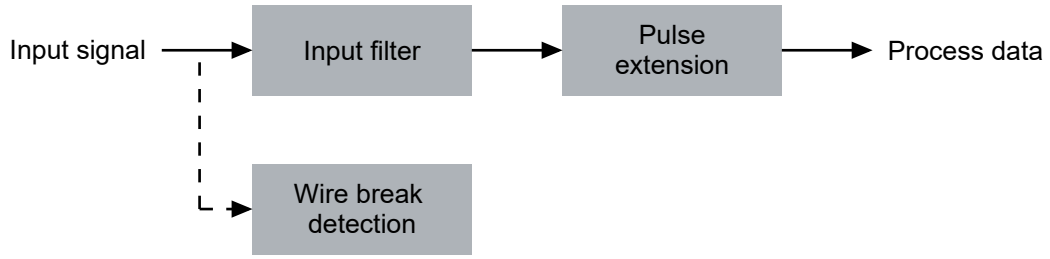


5. Check the box next to the index of the desired process data object.



5.4 Configuring inputs (EP1839-0022, EP1839-0042)

The input signal is digitally preprocessed. The following figure shows the signal flow of a digital input:



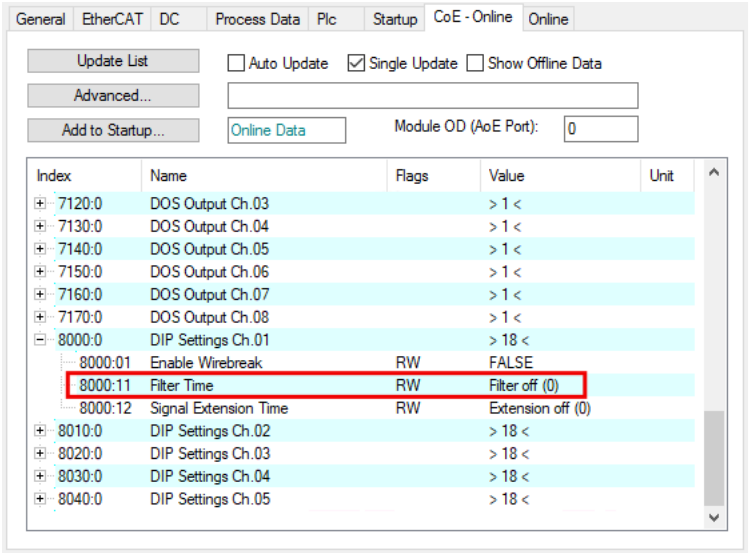
You can configure the sub-functions:

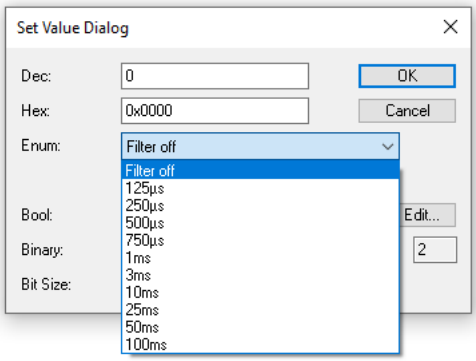
- Input filter [▶ 122]
- Pulse extension [▶ 124]
- Wire break detection (EP1839-0022, EP1839-0042) [▶ 144]

5.4.1 Input filter

The input filter is a digital filter. Pulses shorter than the filter time are filtered out. The input signal is passed on delayed by the filter time. See Examples [▶ 123].

You can set the filter time for each input individually in the CoE parameters 80x00:11$_{hex}$ "Filter time".

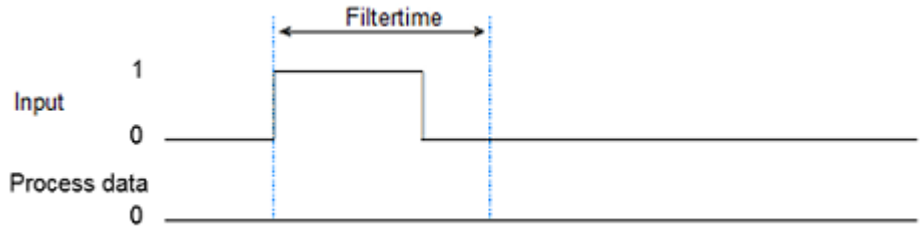




The assignment of the CoE parameters to the connection designations can be found in the chapter Assignment of the connections [▶ 126].

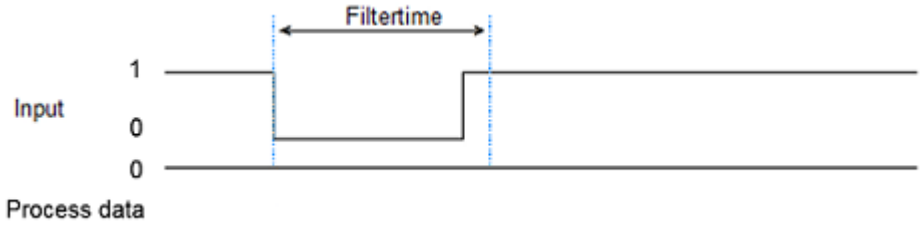
Example 1

A positive pulse shorter than the filter time is filtered out.



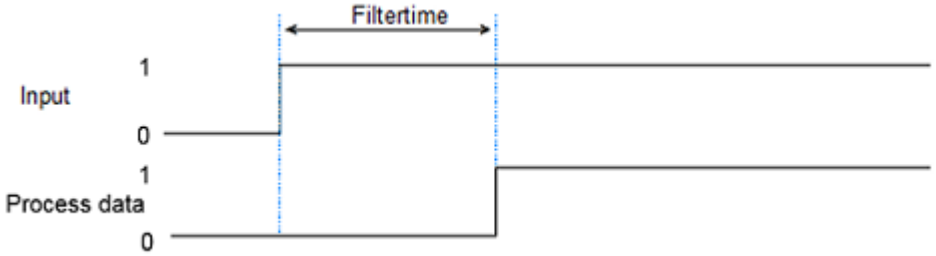
Example 2

A negative pulse shorter than the filter time is filtered out.



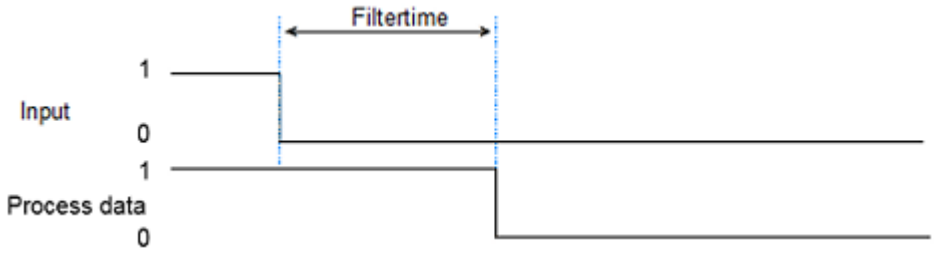
Example 3

A positive signal edge is delayed by the filter time.



Example 4

A negative signal edge is delayed by the filter time.

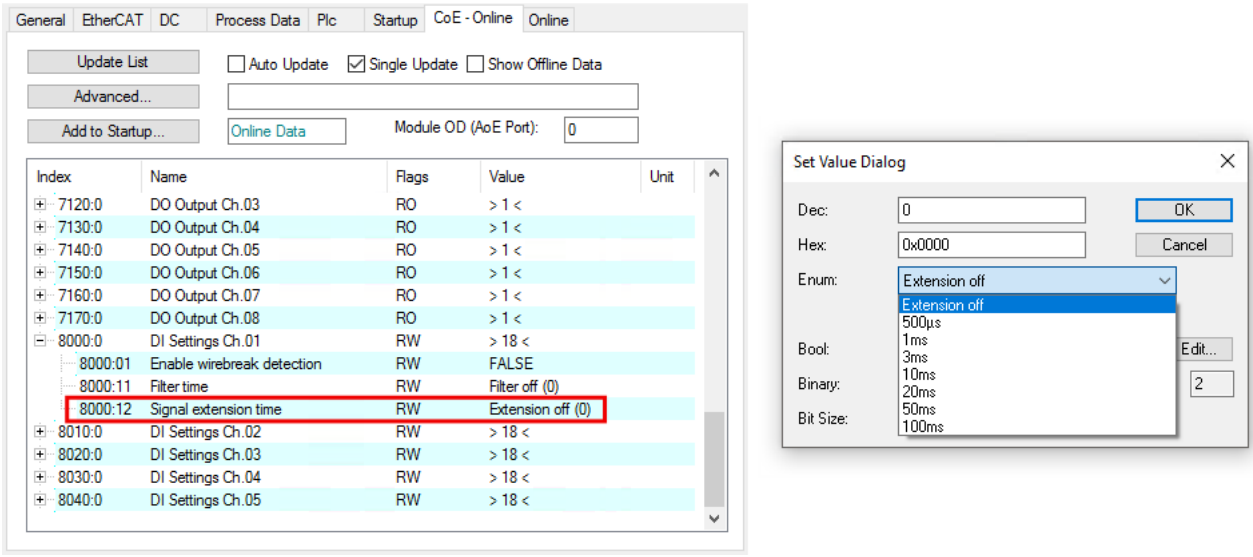


5.4.2 Pulse extension

The pulse extension extends short pulses to a minimum length. Pulses that occur while a previous pulse is being extended are ignored. Pulses can be positive or negative, i.e. jumps from 0 to 1 or from 1 to 0.

Pulse extension is located downstream of the input filter in the signal flow. Pulses shorter than the input filter time are therefore filtered out before they reach the pulse extension.

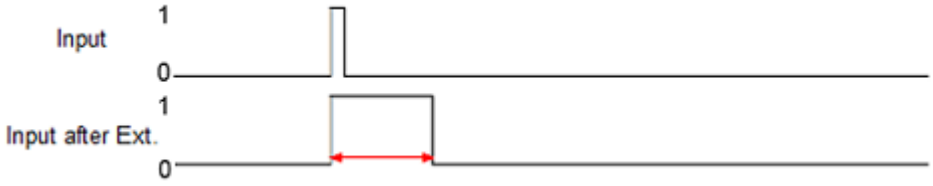
You can set the pulse extension time for each input individually in the CoE parameters 80x00:12$_{hex}$ "Signal extension time".



The assignment of the CoE parameters to the connection designations can be found in the chapter Assignment of the connections [▶ 126].

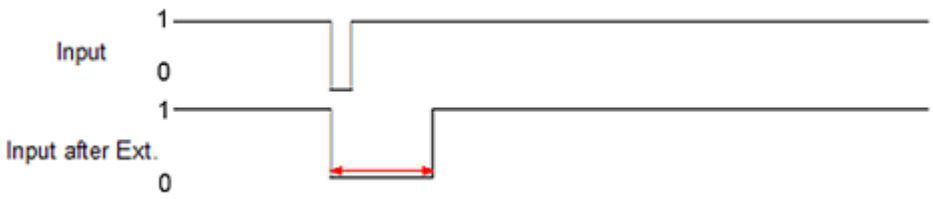
Example 1

A short positive pulse is extended to the pulse extension time.



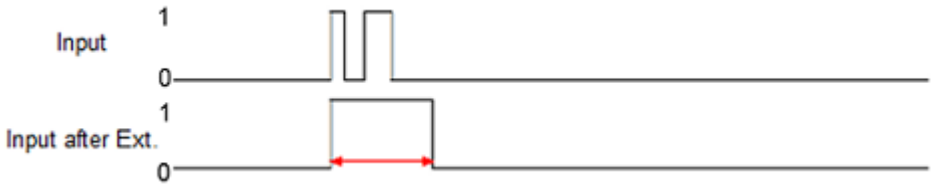
Example 2

A short negative pulse is extended to the pulse extension time.



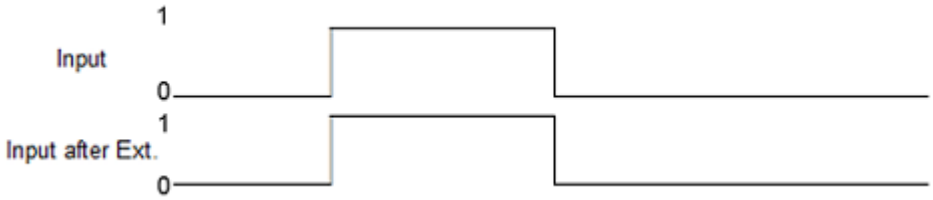
Example 3

A short pulse is extended to the pulse extension time. The second pulse is within the pulse extension time and is ignored.



Example 4

A pulse that is longer than the pulse extension time is passed on unchanged.



5.4.3 Assignment of the connections

The following table shows the assignment of the digital inputs to the CoE objects with which they are configured.

Connection	Channel No.	CoE object for configuration
X01, pin 4	1	8000_{hex}
X01, pin 2	2	8010_{hex}
X02, pin 4	3	8020_{hex}
X02, pin 2	4	8030_{hex}
X03, pin 4	5	8040_{hex}
X03, pin 2	6	8050_{hex}
X04, pin 4	7	8060_{hex}
X04, pin 2	8	8070_{hex}
X05, pin 4	9	8080_{hex}
X05, pin 2	10	8090_{hex}
X06, pin 4	11	$80A0_{hex}$
X06, pin 2	12	$80B0_{hex}$
X07, pin 4	13	$80C0_{hex}$
X07, pin 2	14	$80D0_{hex}$
X08, pin 4	15	$80E0_{hex}$
X08, pin 2	16	$80F0_{hex}$

5.5 Configuring sensor power supply (EP1839-0022, EP1839-0042)

In the factory setting, the sensor power supply outputs behave like ordinary supply voltage outputs. They are switched on by default and output the supply voltage U_S to connected sensors.

5.5.1 Switching outputs

You can switch the sensor power supply outputs like digital outputs.

Preparation

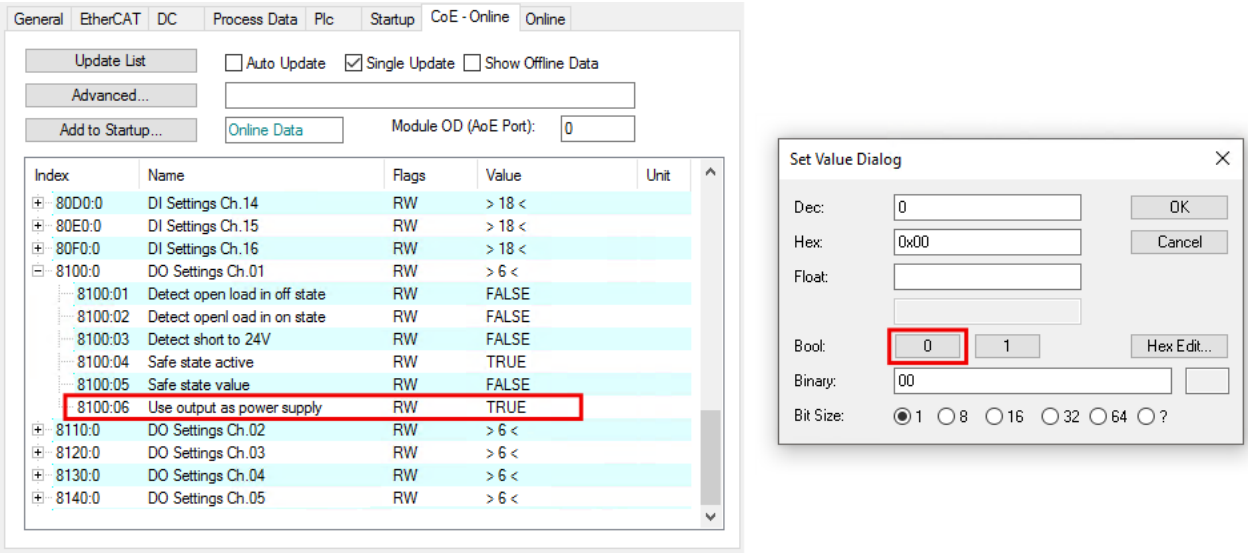
Switchable outputs are switched off in Config Mode

If you make a sensor power supply output switchable, it is automatically switched off in Config Mode.

Further information can be found in chapter EtherCAT status in Config Mode (EP1839-0022, EP1839-0042) [▶ 116].

To be able to switch an output, set the corresponding CoE parameter 81n0:06 "Use output as power supply" to FALSE.

Connection	CoE parameters
X01	8100:06
X02	8110:06
X03	8120:06
X04	8130:06
X05	8140:06
X06	8150:06
X07	8160:06
X08	8170:06



Process data

The variables for switching the outputs are located in the process data object DOS Output [▶ 65].

This process data object is disabled in the factory settings. You can enable it by setting the Predefined PDO Assignment "16 DI full diagnosis 8 DO sensor supply". The procedure for setting a Predefined PDO Assignment can be found in chapter Adapt process image (EP1819-0005, EP1839-0022, EP1839-0042) [▶ 117].

5.5.2 Behavior on EtherCAT failure

You can define which switching state an output is to assume in the event of an EtherCAT failure. However, this only affects outputs that you have configured for switching, see chapter Switching outputs [▶ 127].

If the EtherCAT status is not OP , the box switches all outputs to the respective predefined switching state. This happens not only in the event of an EtherCAT failure, but also in the following cases, for example:

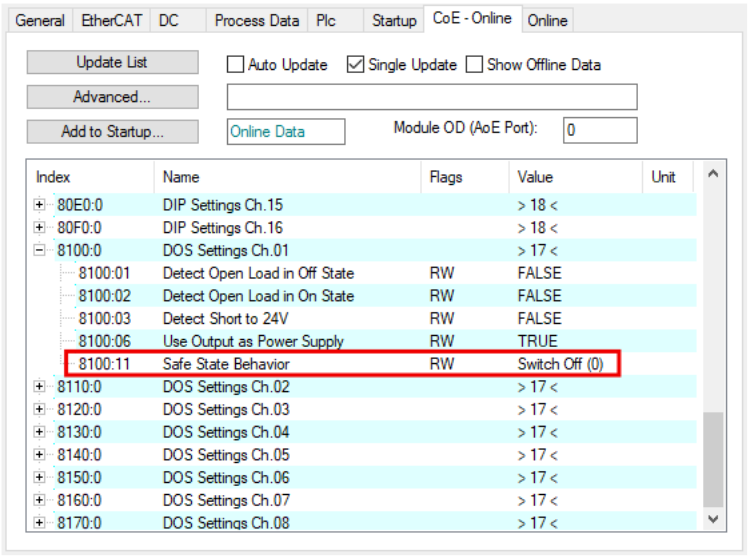
- EtherCAT start-up phase, e.g. shortly after switching on the supply voltage.
- Manual change of the EtherCAT status by the EtherCAT master.
- In Config Mode. See chapter EtherCAT status in Config Mode (EP1839-0022, EP1839-0042) [▶ 116].

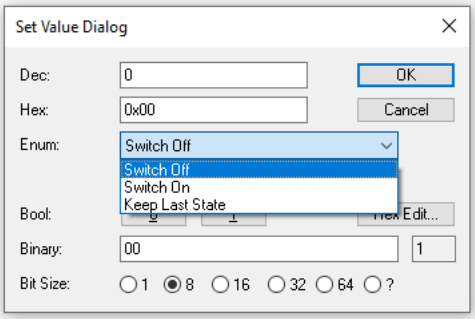
5.5.2.1 Configuration

For an EP1839-0042 with firmware 01, the configuration differs from the procedure described here. See chapter Configuration (EP1839-0042 with firmware 01) [▶ 129].

In the factory setting, the box switches off all outputs in the event of an EtherCAT failure.

You can set the behavior for each channel individually in the parameters 81n0:11 "Safe State Behavior".





Possible values

Value	Enum	Behavior on EtherCAT failure
0	Switch Off	Switch off the output.
1	Switch On	Switch on the output.
16_{dec}	Keep Last State	Retain the current switching status.

5.5.2.2 Configuration (EP1839-0042 with firmware 01)

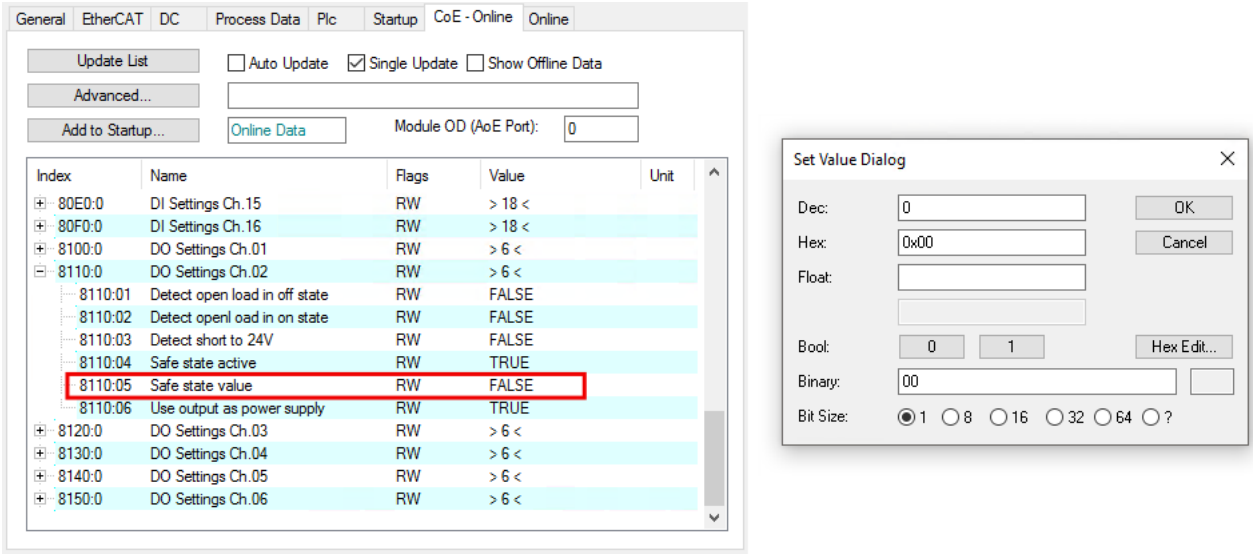
The CoE parameters listed below are only visible with firmware 01 in the CoE directory. In firmware 02 and higher, they are replaced by the parameter 81n0:11 "Safe State Behavior".

Write access to these parameters from a PLC is also possible in firmware 02 and higher to ensure backward compatibility with existing applications. The firmware converts the write access values into the corresponding option of parameter 81n0:11 "Safe State Behavior", see chapter Configuration [▶ 128].

Configure

In the factory setting the "Safe state value" of all outputs is the value FALSE. The outputs are therefore switched off if the EtherCAT communication fails.

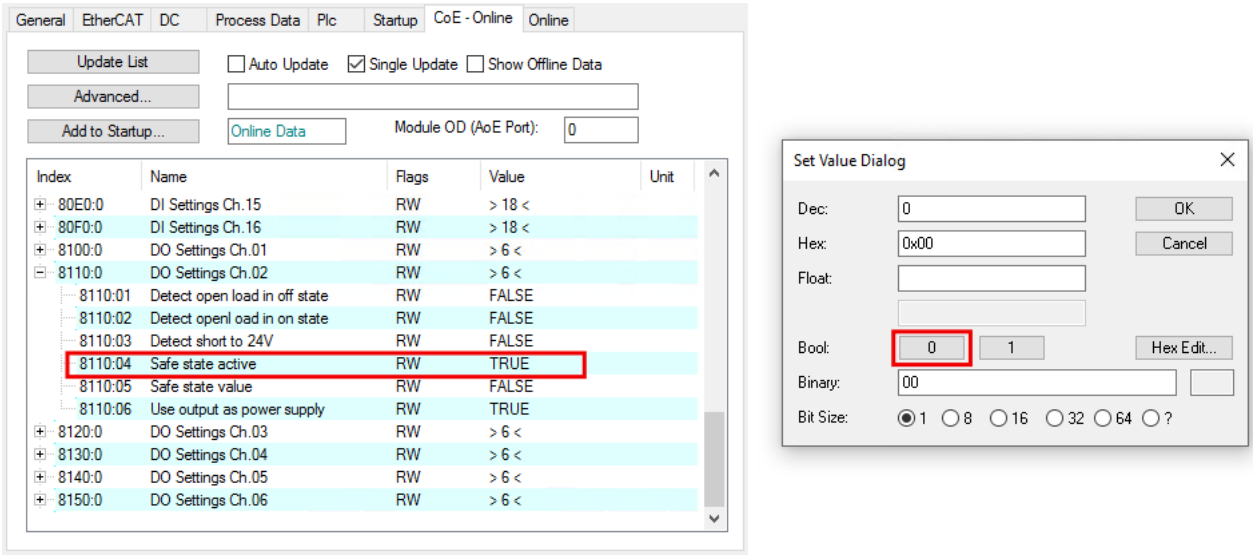
You can set the value for each output individually in the CoE parameters 80*n*00:05$_{hex}$ "Safe state value".



Deactivate

If you deactivate the function "Safe state", the respective channel retains the switching state it had before the communication failure after an EtherCAT failure

In the factory setting, the function "Safe state" is activated for all outputs. You can deactivate them individually for each output. To do this, set the CoE parameter 80*n*00:04$_{hex}$ "Safe state active" to FALSE.



5.6 Acceleration measurement (EP1816-3008)

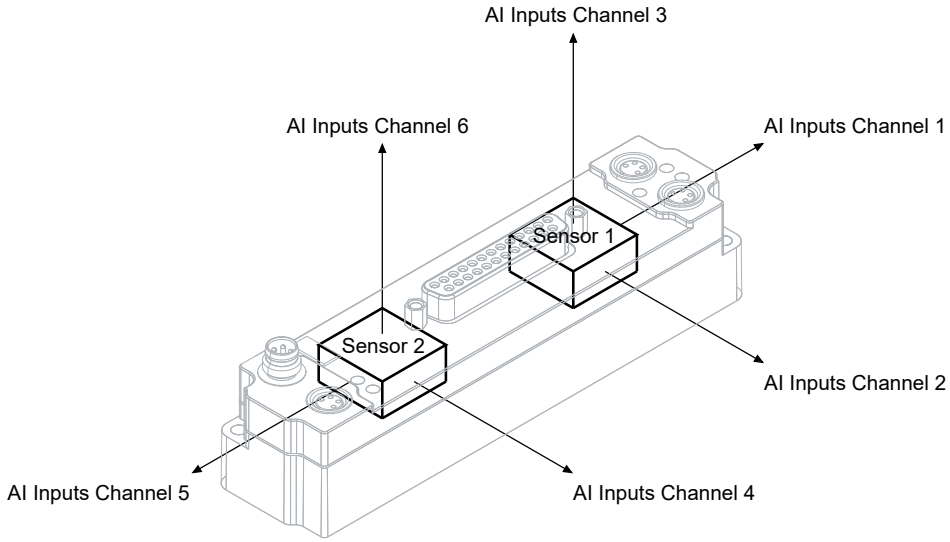
The EP1816-3008 has two accelerometers. Each accelerometer measures the acceleration in all three spatial directions.

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

By converting the measured acceleration values, it is also possible to measure the inclination. See chapter: Inclination measurement [▶ 134]

5.6.1 Acceleration axes

The following diagram shows the directions of the acceleration axes:



"AI Inputs Channel 1" to "AI Inputs Channel 6" are the process data objects that contain the measured values.
See chapter: "Process Image", section "AI Inputs Channel 1 to 6" [▶ 49].

5.6.2 Configuration

This chapter describes the parameters for acceleration measurement.

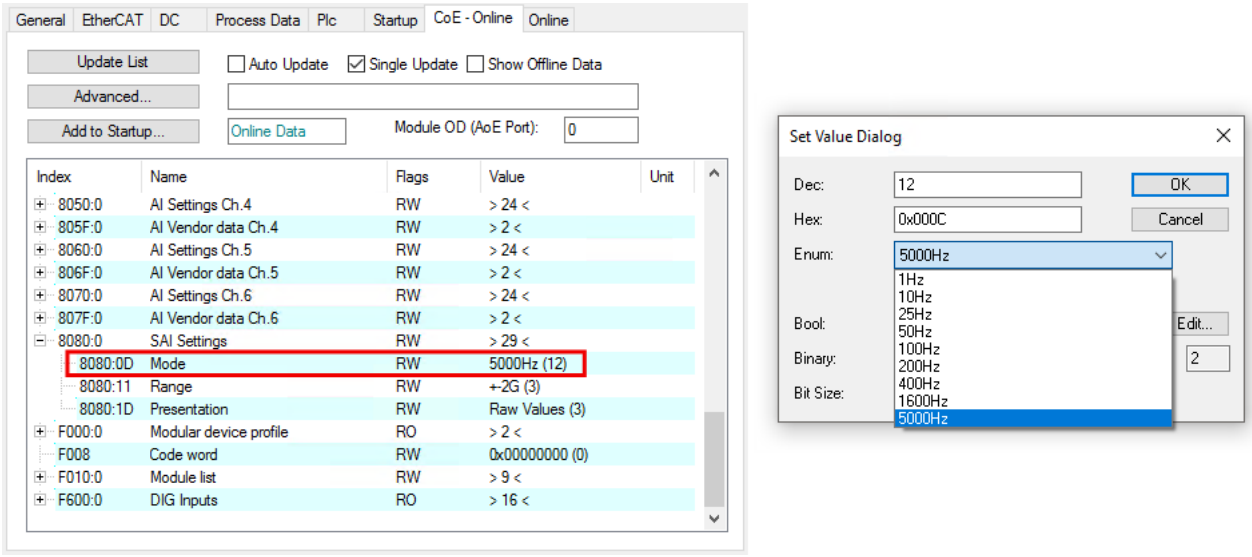
You can find the parameters in CoE object 8080_{hex} "SAI settings".

5.6.2.1 Sampling rate

In the factory setting the sampling rate is set to 5 kHz. 5 kHz is the highest possible sampling rate.

You can change the sampling rate in parameter $8080:0D_{hex}$ "Mode".

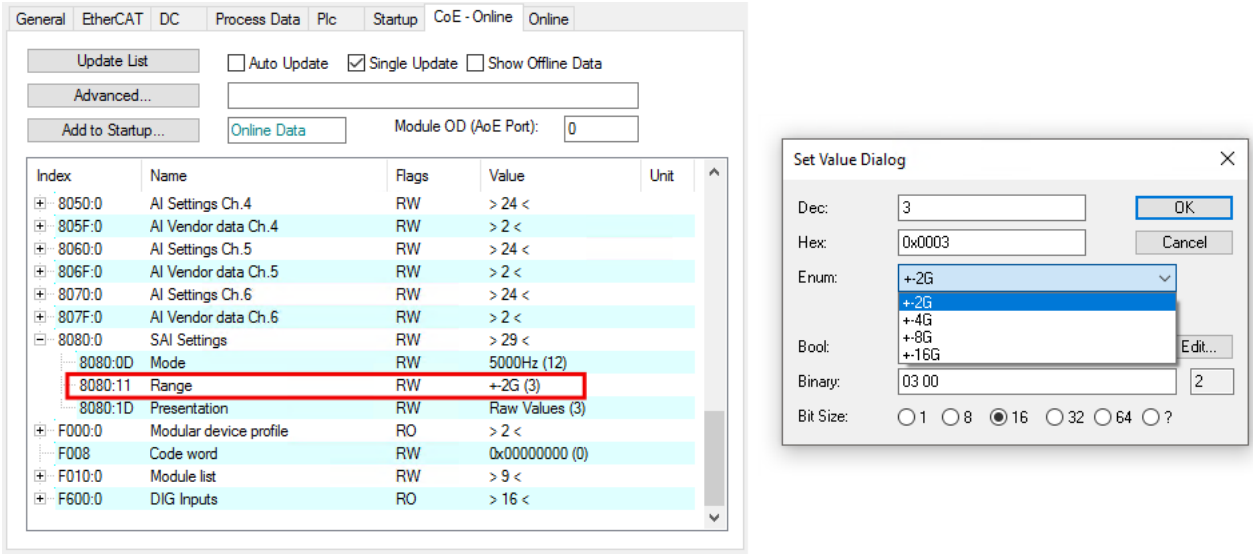
Recommendation: Leave the sampling rate at 5 kHz. A lower sampling rate has no advantages.



5.6.2.2 Measuring range

In the factory setting the measuring range is ±2 g.

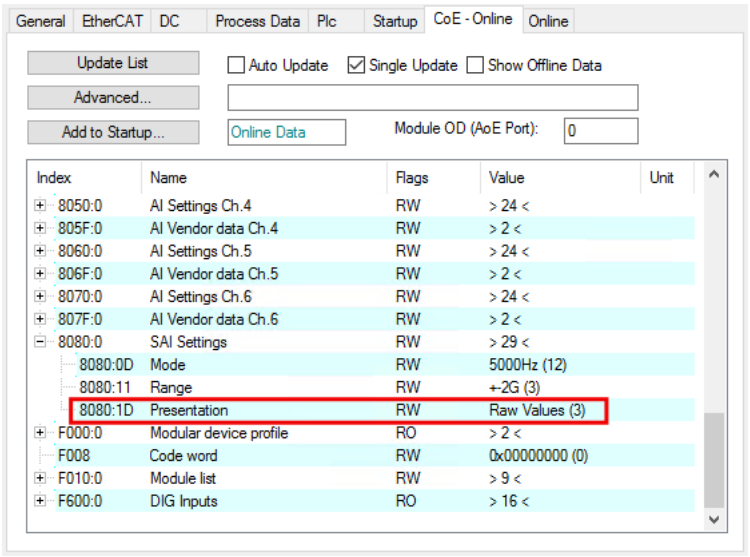
You can change the measuring range in parameter $8080:11_{hex}$ "Range".

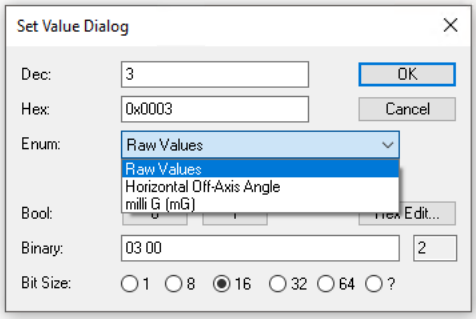


5.6.2.3 Display of the measured values

In the factory setting the measured values are displayed as raw values.

You can change the display in parameter 8080:1D$_{hex}$ "Presentation".





Select one of the following display types:

- "Raw Values": display as raw values
- "milli G": display as physical values with the unit mg.

The option "Horizontal Off-Axis Angle" does not apply for the display of the measured acceleration values. "Horizontal Off-Axis Angle" activates the inclination measurement [▶ 134].

Evaluate the measured values according to the selected display type. See chapter: Interpretation of the measured values [▶ 133]

The raw values have a higher resolution than the physical values.

5.6.3 Interpretation of the measured values

The measured acceleration values can be displayed in two different ways. See chapter Display of the measured values [▶ 132].

The interpretation of the measured values depends on the display type.

Interpretation of the raw values

The raw values are arranged in the most significant 10 bits of the variable "Value", which is 16 bits long:

Bit:	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Contents:	Raw value										0	0	0	0	0	0

Recommendation: in the PLC program use the function `SHR()` to shift a raw value to the least significant 10 bits: `SHR(<measured value>,6)`. After shifting the raw value is easier to process.

The raw values can range between -510 and +510:

- -510 is the lowest value of the measuring range.
  In the +/-2 g measuring range, the lowest value is -2 g.
- +510 corresponds to the full scale value.
  In the +/-2 g measuring range, the full scale value is +2 g.

Between -510 and +510 the raw values are linear. Use the following formula to convert a raw value to a physical quantity:

$$a = MBE \times \frac{n}{510}$$

a: Acceleration. Unit: g.
1 g = 9.81 m/s²

MBE: full scale value

n: raw value

Interpretation of the physical values

The physical values have the unit mg.
1 mg = 0.001 x 9.81 m/s²

5.7 Inclination measurement (EP1816-3008)

The inclination measurement determines the inclination of the Box in relation to the gravity. The angles of inclination are calculated from the measured acceleration values [▶ 130].

The EP1816-3008 can calculate two angles of inclination with a resolution of 1°.
See chapter Calculation in the Box [▶ 134].

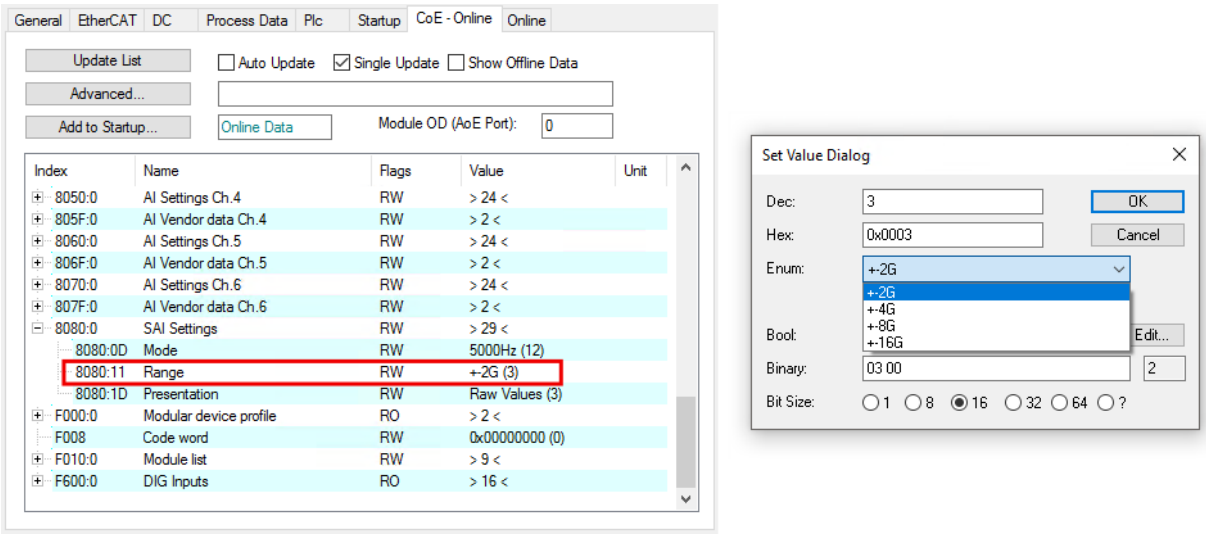
If a higher resolution is required, the calculation has to be implemented in the PLC program on the controller. Reason: calculation of the angles of inclination with higher resolutions is very computationally intensive.
See chapter Calculation in the controller [▶ 136]

5.7.1 Calculation in the Box

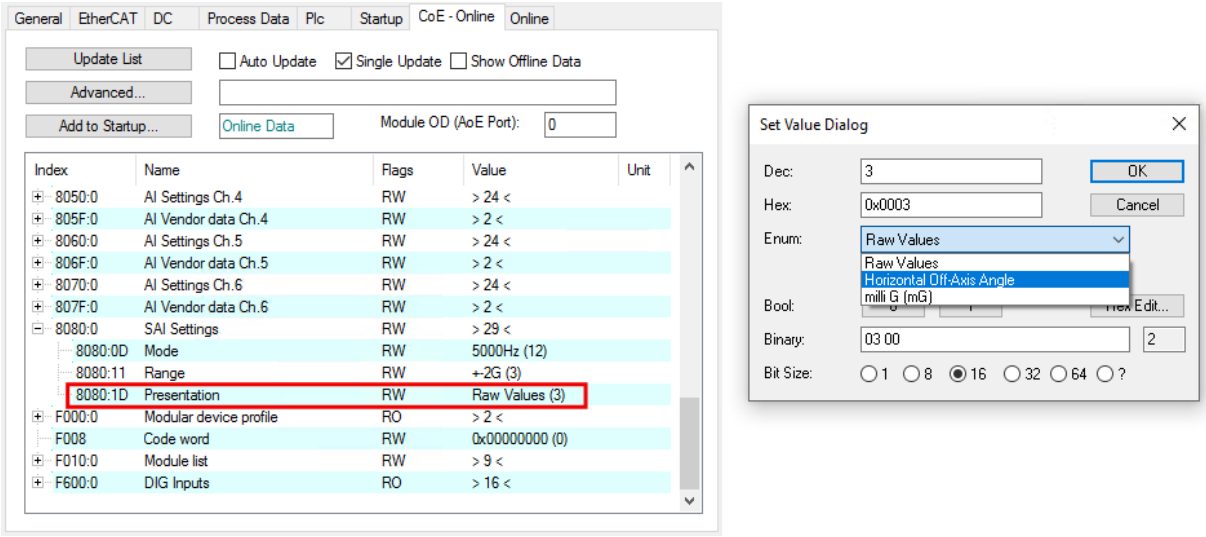
This chapter describes how to configure the EP1816-3008 to calculate angles of inclination internally.

Configuration

1. Set the parameter 8080:11$_{hex}$ "Range" to any value except "+-16G".
   Recommended: "+-2G" (factory setting)



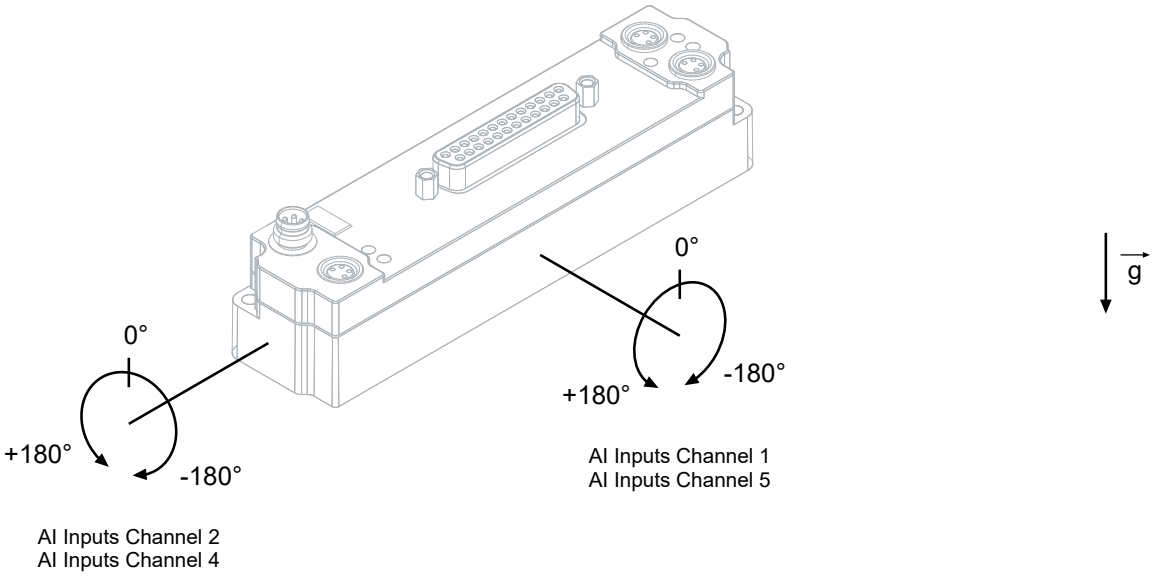
2. Set the parameter 8080:1D$_{hex}$ "Presentation" to the value "Horizontal Off-Axis Angle".



⇨ Internal calculation of the angles of inclination is activated.

Evaluation

Evaluate the variables in the process image according to the following diagram:



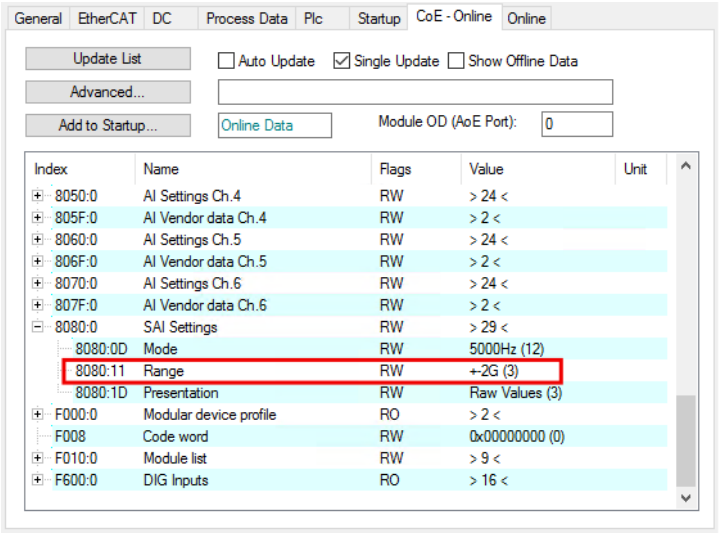
"AI Inputs Channel 1" to "AI Inputs Channel 5" are the process data objects that contain the calculated angles of inclination.
See chapter: "Process Image", section "AI Inputs Channel 1 to 6" [▶ 49].

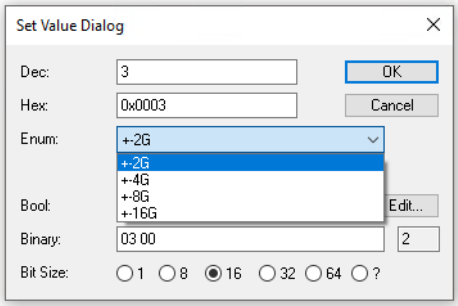
The angles of inclination are output in the unit "1 degree per LSB".

5.7.2 Calculation in the controller

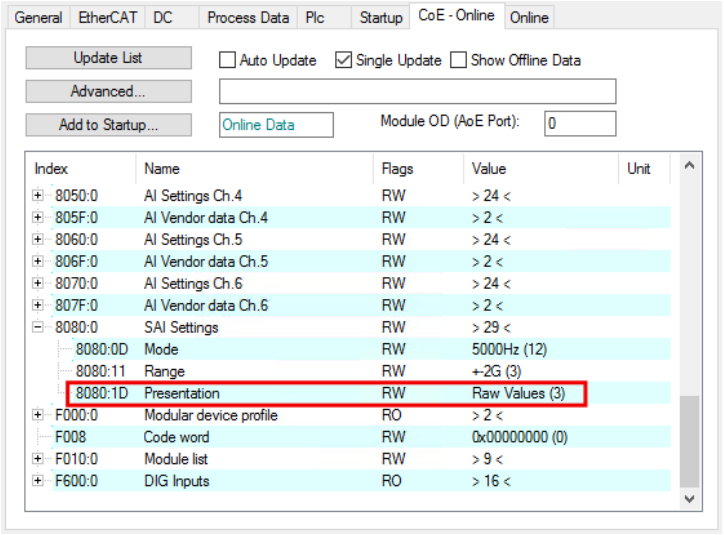
Configuration

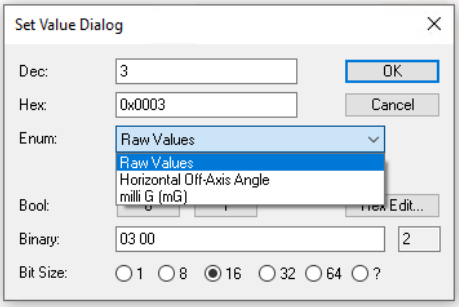
1. Set the parameter 8080:11$_{hex}$ "Range" to the value "+-2G".
   Explanation: this is the measuring range with the highest resolution.





2. Set the parameter 8080:1D$_{hex}$ to the value "Raw Values".





Evaluation

You can calculate the angles of inclination using the following formulas:

$$\theta = \tan^{-1}\left(\frac{a_X}{\sqrt{a_Y^2 + a_Z^2}}\right) \times \frac{360°}{2\pi}$$

θ: angle of inclination around the y-axis
a_x, a_y, a_z: measured acceleration values
$\tan^{-1}$: arc tangent

$$\Psi = \tan^{-1}\left(\frac{a_Y}{\sqrt{a_X^2 + a_Z^2}}\right) \times \frac{360°}{2\pi}$$

Ψ: angle of inclination around the x-axis
a_x, a_y, a_z: measured acceleration values
$\tan^{-1}$: arc tangent

The chapter "Example" [▶ 138] shows an example for the implementation of these formulas in TwinCAT.

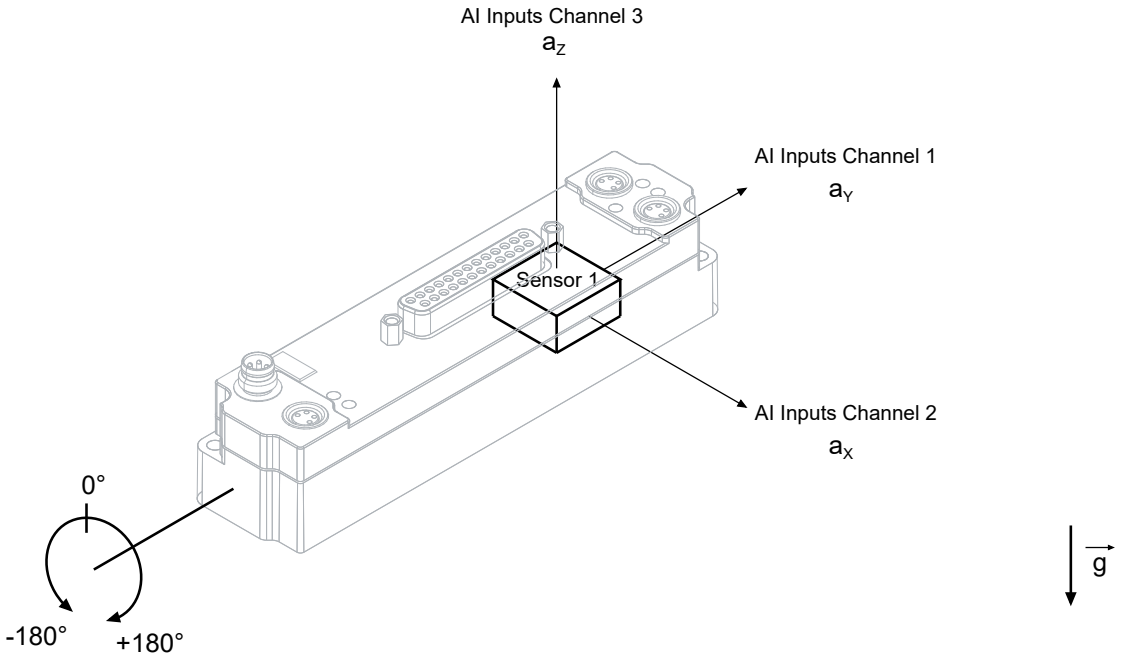
- In the program code, make sure that the denominator never becomes zero.

- Use a software filter for smoothing the calculated angles of inclination. See chapter: Smoothing of measured values [▶ 139].

5.7.2.1 Example

This chapter shows an example for calculating an angle of inclination in a PLC program.

Requirement: the inclination measurement was configured as described in chapter Calculation in the controller [▶ 136].



Variable links in TwinCAT

- "AI Inputs Channel 1" > "Value" is linked to `ay`
- "AI Inputs Channel 2" > "Value" is linked to `ax`
- "AI Inputs Channel 3" > "Value" is linked to `az`

Program code

```
PROGRAM MAIN
VAR
  ax AT %I*     : INT;
  ay AT %I*     : INT;
  az AT %I*     : INT;
  Inclincation  : LREAL;
END_VAR


IF (ay <> 0 OR az <> 0) THEN (* Prevent division by 0 *)
  Inclincation := ATAN( ax / SQRT( ay * ay + az * az ) ) * 360 / ( 2 * 3.14 );
END_IF

(* Compensate zero crossing of az *)
IF az > 0 THEN
  Inclincation := 180 - Inclincation;
END_IF

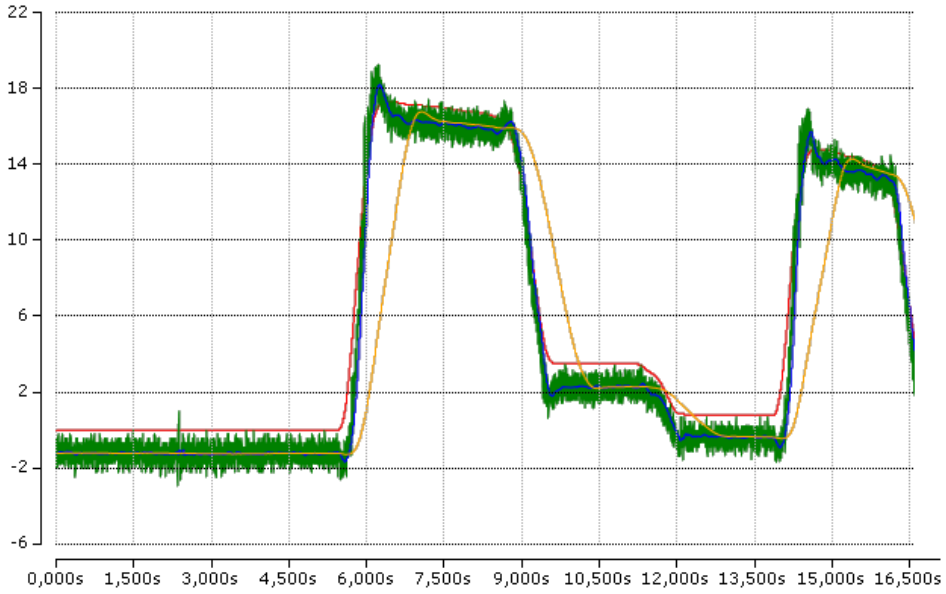
(* Insert offset to shift the measuring range from -90...270 to -180...+180 *)
IF Inclincation > 180 THEN
  Inclincation := Inclincation - 360;
END_IF
```

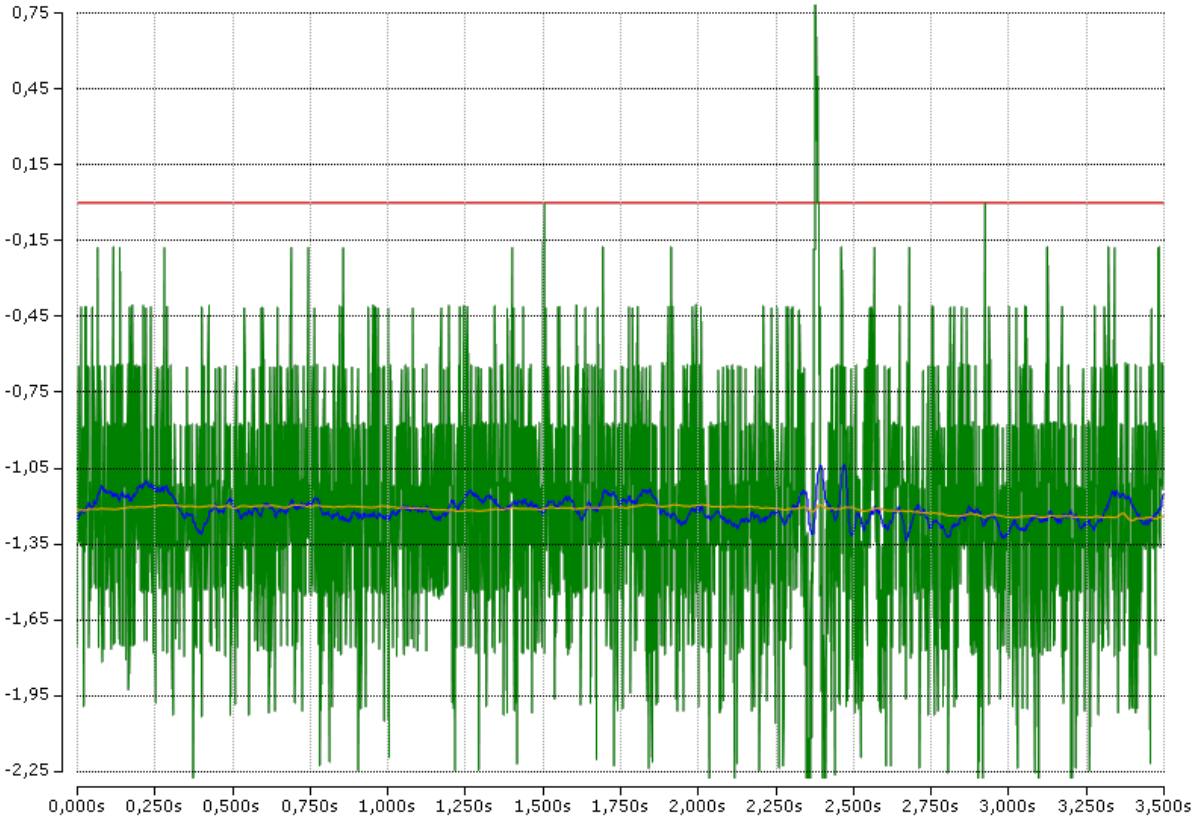
5.7.3 Smoothing of measured values

The measured inclination angles are subject to significant noise.

Use software filters for smoothing the measured values. In the simplest case, use a sliding average filter.

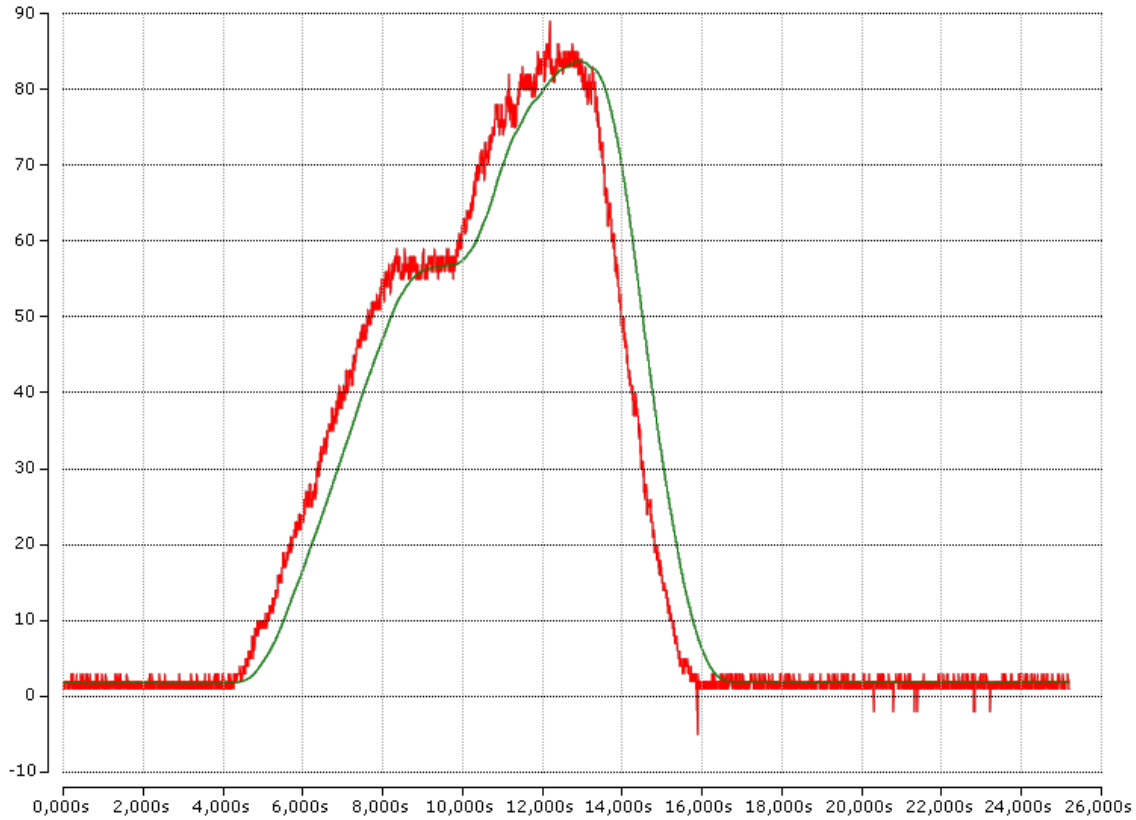
Example 1





Line color	Meaning
red	Reference angle of inclination measured with an incremental encoder.
green	Measured angle of inclination, unfiltered.
blue	Measured angle of inclination filtered with a fast filter.
yellow	Measured angle of inclination filtered with a sliding average value over 1000 values.

Example 2



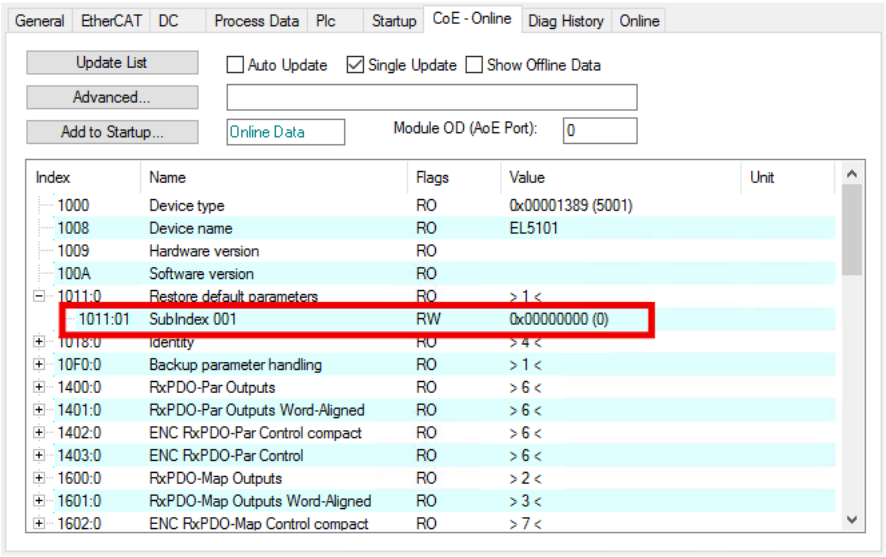
Red: measured angle of inclination, unfiltered.

Green: measured angle of inclination filtered with a sliding average value.

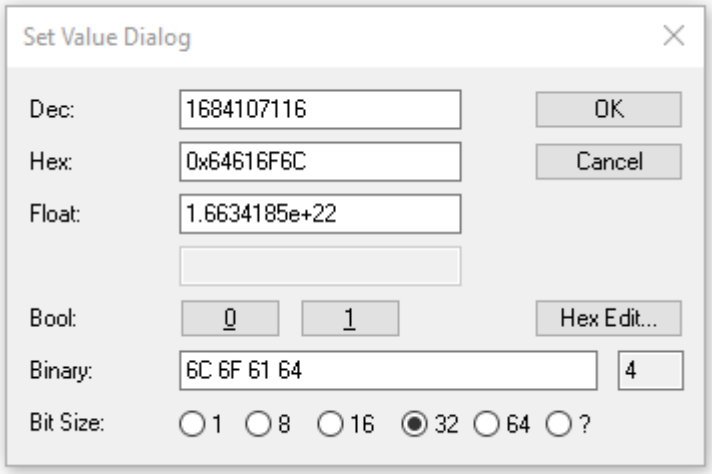
5.8 Restore the delivery state

You can restore the delivery state of the backup objects as follows:

1. Ensure that TwinCAT is running in Config mode.
2. In CoE object 1011:0 "Restore default parameters" select parameter 1011:01 "Subindex 001".



3. Double-click on "Subindex 001".
   ⇨ The "Set Value Dialog" dialog box opens.
4. Enter the value 1684107116 in the "Dec" field.
   Alternatively: enter the value 0x64616F6C in the "Hex" field.



5. Confirm with "OK".

⇨ All backup objects are reset to the delivery state.

Alternative restore value

With some older modules the backup objects can be changed with an alternative restore value:
Decimal value: 1819238756
Hexadecimal value: 0x6C6F6164

An incorrect entry for the restore value has no effect.

5.9 Decommissioning

⚠ WARNING

Risk of electric shock!

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

6 Diagnosis

6.1 Antivalent sensors (EP1819-0005)

The EP1819-0005 has a diagnostic function for antivalent sensors.

The diagnostic function is disabled in the factory setting.

Enabling diagnostics

1. Connect antivalent sensors as shown in the connection example in chapter M8 sockets, 4-pin [▶ 90].
2. Set the Predefined PDO Assignment "16DI with diagnostic".
   See chapter Adapt process image (EP1819-0005, EP1839-0022, EP1839-0042) [▶ 117].
   ⇨ The process data object "DIP Diagnosis" is enabled.
3. Set the CoE parameters 81n0:03 "Enable antivalent input diagnostic" of the corresponding connections to TRUE. See the following table.

Connection	CoE parameters „Enable antivalent input diagnostic“
X01	8100:03
X02	8110:03
X03	8120:03
X04	8130:03
X05	8140:03
X06	8150:03
X07	8160:03
X08	8170:03

Evaluation

In error-free operation, the outputs of an antivalent sensor provide inverted signals. If both outputs of the sensor deliver the same value, this is interpreted as an error. An error is signaled in two ways:

- Status LEDs. See chapter M8 sockets, 4-pin [▶ 90], section "Status LEDs".
- Status bits in the process data. See chapter Process image - EP1819-0005 [▶ 53].

6.2 Wire break detection (EP1839-0022, EP1839-0042)

Requirements

Wire break detection only works reliably with certain sensor types. Below you will find an overview of the sensor types for which wire break detection works:

Wire break detection works:

- Sensors with PNP output

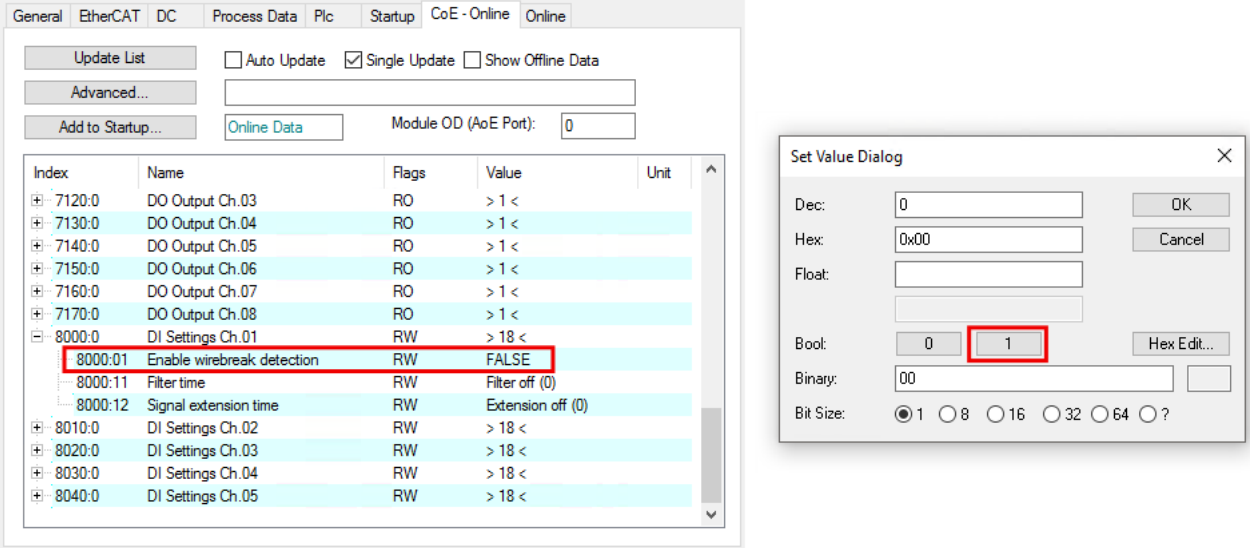
Wire break detection does not work:

- Sensors with push-pull output
- Sensors with relay output
- Mechanical switches

Under certain circumstances, you can expand relay outputs and mechanical switches with additional components so that wire break detection also works with them. See section "Mechanical switches".

Enable

Wire break detection is disabled in the factory setting. You can enable it individually for each channel using the CoE parameters 80x0:01$_{hex}$ "Enable wire break detection".



The assignment of the CoE parameters to the connection designations can be found in the chapter Assignment of the connections [▶ 126].

Wire break message

When wire break detection is enabled, a wire break is reported in two ways:

- In the process data object DI Diagnosis [▶ 61] the corresponding bit is set to TRUE.
- The status LED of the affected channel lights up red. See chapter EP1839-0022, EP1839-0042 [▶ 99].

Operating principle

The wire break detection monitors the input current of the respective digital input. If the input current falls below the threshold value of approx. 110 µA, this is interpreted as a wire break.

The box can detect a wire break even in the "off" state because the threshold value is so low that it is exceeded by the leakage current of usual sensors.

Troubleshooting

Ideally, a wire break is only reported if there is actually a wire break in the sensor cable. However, there are other reasons for reporting wire break:

- The sensor cable is short-circuited to GND.
- No sensor is connected.
- The sensor is one of the unsuitable types mentioned above.

Mechanical switches

A mechanical switch has no significant leakage current when it is open. If you use a mechanical switch as a sensor, a wire break is reported when the switch is open.

You have two options to solve this problem:

- Disable the wire break detection for the affected channel.
- Connect a resistance in parallel with the mechanical switch.
  The resistance must be dimensioned so that the current through the resistance exceeds the wire break detection threshold.

6.3 Diag Messages (EP1839-0022, EP1839-0042)

Diag messages are predefined diagnosis messages that the box transmits to the EtherCAT master, e.g. to report errors.

You can call up a list of the Diag Messages received in TwinCAT 3 at the following locations, for example:

- In the EventLogger.
  (enable the EventLogger via the menu item "View“ > „Other Windows“ > „TwinCAT Logged Events“)
- In the "Diag History" tab of the box.
- CoE directory of the box in object 10F3:0 "Diagnosis History".

The following list shows all Diag Messages that can be sent from the box:

ID	Text in German	Text in English
0x1101	Ausgang %d wieder im normalen Arbeitsbereich	Output %d back in normal operating range
0x1581	Eingang %d wieder im normalen Arbeitsbereich	Input %d back in normal operating range
0x4103	Unterspannung Warnung Us	Undervoltage Us
0x8104	Übertemperatur Fehler. Ausgänge abgeschaltet	Overtemperatur error. Outputs are switched off
0x8106	Eingang %d Drahtbruch erkannt	Input %d wirebreak detected
0x8107	Eingang %d Versorgungsspannung fehlt	Input %d has no sensor supply
0x8622	Ausgang %d ist kurzgeschlossen auf Up	Output %d is shortet to Up
0x8623	Ausgang %d ist kurzgeschlossen auf Gnd	Output %d is shorted to Gnd
0x8624	Ausgang %d ist überlastet	Outout %d overload
0x8627	Ausgang %d Mindestlast nicht vorhanden	Output %d minimum load not detected

7 CoE parameters

7.1 EP1816-0008 - Object Overview

EtherCAT XML Device Description

The presentation matches that of the EtherCAT XML Device Description.
Recommendation: download the latest XML file from https://www.beckhoff.com and install it according to the installation instructions.

Index		Name	Flags	Default value
1000 [▶ 149]		Device type	RO	0x01181389 (18355081$_{dec}$)
1008 [▶ 149]		Device name	RO	EP1816-0008
1009 [▶ 149]		Hardware version	RO	00
100A [▶ 150]		Software version	RO	01
1011 [▶ 149]:0	**Subindex**	Restore default parameters	RO	0x01 (1$_{dec}$)
	1011:01	SubIndex 001	RW	0x00000000 (0$_{dec}$)
1018 [▶ 150]:0	**Subindex**	Identity	RO	0x04 (4$_{dec}$)
	1018:01	Vendor ID	RO	0x00000002 (2$_{dec}$)
	1018:02	Product code	RO	0x07184052 (119029842$_{dec}$)
	1018:03	Revision	RO	0x00100008 (1048584$_{dec}$)
	1018:04	Serial number	RO	0x00000000 (0$_{dec}$)
10F0 [▶ 150]:0	**Subindex**	Backup parameter handling	RO	0x01 (1$_{dec}$)
	10F0:01	Checksum	RO	0x00000000 (0$_{dec}$)
1A00 [▶ 150]:0	**Subindex**	DO TxPDO-Map Inputs Ch.1	RO	0x0B (11$_{dec}$)
	1A00:01	SubIndex 001	RO	0x6000:01, 1
	1A00:02	SubIndex 002	RO	0x6000:02, 1
	1A00:03	SubIndex 003	RO	0x6000:03, 1
	1A00:04	SubIndex 004	RO	0x6000:04, 1
	1A00:05	SubIndex 005	RO	0x6000:05, 1
	1A00:06	SubIndex 006	RO	0x6000:06, 1
	1A00:07	SubIndex 007	RO	0x6000:07, 1
	1A00:08	SubIndex 008	RO	0x6000:08, 1
	1A00:09	SubIndex 009	RO	0x0000:00, 5
	1A00:0A	SubIndex 010	RO	0x1C32:20, 1
	1A00:0B	SubIndex 011	RO	0x0000:00, 2
1A01 [▶ 151]:0	**Subindex**	DO TxPDO-Map Inputs Ch.2	RO	0x0B (11$_{dec}$)
	1A01:01	SubIndex 001	RO	0x6010:01, 1
	1A01:02	SubIndex 002	RO	0x6010:02, 1
	1A01:03	SubIndex 003	RO	0x6010:03, 1
	1A01:04	SubIndex 004	RO	0x6010:04, 1
	1A01:05	SubIndex 005	RO	0x6010:05, 1
	1A01:06	SubIndex 006	RO	0x6010:06, 1
	1A01:07	SubIndex 007	RO	0x6010:07, 1
	1A01:08	SubIndex 008	RO	0x6010:08, 1
	1A01:09	SubIndex 009	RO	0x0000:00, 5
	1A01:0A	SubIndex 010	RO	0x1C32:20, 1
	1A01:0B	SubIndex 011	RO	0x0000:00, 2
1C00 [▶ 151]:0	**Subindex**	Sync manager type	RO	0x04 (4$_{dec}$)
	1C00:01	SubIndex 001	RO	0x01 (1$_{dec}$)
	1C00:02	SubIndex 002	RO	0x02 (2$_{dec}$)
	1C00:03	SubIndex 003	RO	0x03 (3$_{dec}$)
	1C00:04	SubIndex 004	RO	0x04 (4$_{dec}$)
1C12 [▶ 151]:0	**Subindex**	RxPDO assign	RO	0x00 (0$_{dec}$)

Index		Name	Flags	Default value
1C13	**Subindex**	TxPDO assign	RO	0x02 (2_{dec})
[▶ 151]:0	1C13:01	SubIndex 001	RO	0x1A00 (6656_{dec})
	1C13:02	SubIndex 002	RO	0x1A01 (6657_{dec})
1C33	**Subindex**	SM input parameter	RO	0x20 (32_{dec})
[▶ 152]:0	1C33:01	Sync mode	RW	0x0022 (34_{dec})
	1C33:02	Cycle time	RW	0x000186A0 (100000_{dec})
	1C33:03	Shift time	RO	0x00000000 (0_{dec})
	1C33:04	Sync modes supported	RO	0xC007 (49159_{dec})
	1C33:05	Minimum cycle time	RO	0x000124F8 (75000_{dec})
	1C33:06	Calc and copy time	RO	0x00000000 (0_{dec})
	1C33:08	Command	RW	0x0000 (0_{dec})
	1C33:09	Delay time	RO	0x00000000 (0_{dec})
	1C33:0B	SM event missed counter	RO	0x0000 (0_{dec})
	1C33:0C	Cycle exceeded counter	RO	0x0000 (0_{dec})
	1C33:0D	Shift too short counter	RO	0x0000 (0_{dec})
	1C33:20	Sync error	RO	0x00 (0_{dec})
6000	**Subindex**	DO Inputs Ch.1	RO	0x0E (14_{dec})
[▶ 153]:0	6000:01	Input 1	RO	0x00 (0_{dec})
	6000:02	Input 2	RO	0x00 (0_{dec})
	6000:03	Input 3	RO	0x00 (0_{dec})
	6000:04	Input 4	RO	0x00 (0_{dec})
	6000:05	Input 5	RO	0x00 (0_{dec})
	6000:06	Input 6	RO	0x00 (0_{dec})
	6000:07	Input 7	RO	0x00 (0_{dec})
	6000:08	Input 8	RO	0x00 (0_{dec})
	6000:0E	Sync Error	RO	0x00 (0_{dec})
6010	**Subindex**	DO Inputs Ch.2	RO	0x0E (14_{dec})
[▶ 153]:0	6010:01	Input 1	RO	0x00 (0_{dec})
	6010:02	Input 2	RO	0x00 (0_{dec})
	6010:03	Input 3	RO	0x00 (0_{dec})
	6010:04	Input 4	RO	0x00 (0_{dec})
	6010:05	Input 5	RO	0x00 (0_{dec})
	6010:06	Input 6	RO	0x00 (0_{dec})
	6010:07	Input 7	RO	0x00 (0_{dec})
	6010:08	Input 8	RO	0x00 (0_{dec})
	6010:0E	Sync Error	RO	0x00 (0_{dec})
F000	**Subindex**	Modular device profile	RO	0x02 (2_{dec})
[▶ 153]:0	F000:01	Module index distance	RO	0x0010 (16_{dec})
	F000:02	Maximum number of modules	RO	0x0002 (2_{dec})
F008 [▶ 153]		Code word	RW	0x00000000 (0_{dec})
F010	**Subindex**	Module list	RW	0x02 (2_{dec})
[▶ 153]:0	F010:01	SubIndex 001	RW	0x00000118 (280_{dec})
	F010:02	SubIndex 002	RW	0x00000118 (280_{dec})

Legend

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

7.2 EP1816-0008 - Object description and parameterization

Parameterization

You can parameterize the box via the "CoE - Online" tab in TwinCAT.

EtherCAT XML Device Description

The presentation matches that of the EtherCAT XML Device Description.
Recommendation: download the latest XML file from https://www.beckhoff.com and install it according to the installation instructions.

Introduction

The CoE overview contains objects for different intended applications:

- Objects required for parameterization [▶ 149] during commissioning
- Objects intended for regular operation [▶ 149], e.g. through ADS access
- Objects for indicating internal settings [▶ 149] (may be fixed)

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

Objects to be parameterized during commissioning

Objects to be parameterized during commissioning

Index 1011 Restore default parameters

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

Objects for regular operation

The EP1816 has no such objects.

Additional objects

Standard objects (0x1000-0x1FFF)

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

Index 1000 Device type

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

Index 1008 Device name

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

Index 1009 Hardware version

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

Index 100A Software version

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

Index 1018 Identity

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

Index 10F0 Backup parameter handling

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

Index 1A00 DO TxPDO-Map Inputs Ch.1

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

Index 1A01 DO TxPDO-Map Inputs Ch.2

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

Index 1C00 Sync manager type

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

Index 1C12 RxPDO assign

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

Index 1C13 TxPDO assign

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

Index 1C33 SM input parameter

Index	Name	Meaning	Data type	Flags	Default
1C33:0	SM input parameter	Synchronization parameters for the inputs	UINT8	RO	0x20 (32_{dec})
1C33:01	Sync mode	Current synchronization mode: • 0: Free Run • 1: 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	Cycle time (in ns): • Synchronous with SM 2 Event: cycle time of the master • DC-Mode: SYNC0/SYNC1 Cycle Time	UINT32	RW	0x000186A0 (100000_{dec})
1C33:03	Shift time	Time between SYNC0 event and reading of the inputs (in ns, DC mode only)	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 through local event (outputs available) • Bit 4-5 = 10: Input Shift with SYNC1 event (no outputs available) • Bit 14 = 1: dynamic times (measurement through writing of 1C33:08 [▶ 152])	UINT16	RO	0xC007 (49159_{dec})
1C33:05	Minimum cycle time	Minimum cycle time (in ns)	UINT32	RO	0x000124F8 (75000_{dec})
1C33:06	Calc and copy time	Time between reading of the inputs and availability of the inputs for the master (in ns, only DC mode)	UINT32	RO	0x00000000 (0_{dec})
1C33:08	Command	• 0: Measurement of the local cycle time is stopped • 1: Measurement of the local cycle time is started The entries 1C33:03 [▶ 152], 1C33:06 [▶ 152], 1C33:07, 1C33:09 [▶ 152] are updated with the maximum measured values. For a subsequent measurement the measured values are reset	UINT16	RW	0x0000 (0_{dec})
1C33:09	Delay time	Time between SYNC1 event and reading of the inputs (in ns, only DC mode)	UINT32	RO	0x00000000 (0_{dec})
1C33:0B	SM event missed counter	Number of missed SM events in OPERATIONAL (DC mode only)	UINT16	RO	0x0000 (0_{dec})
1C33:0C	Cycle exceeded counter	Number of occasions the cycle time was exceeded in OPERATIONAL (cycle was not completed in time or the next cycle began too early)	UINT16	RO	0x0000 (0_{dec})
1C33:0D	Shift too short counter	Number of occasions that the interval between SYNC0 and SYNC1 event was too short (DC mode only)	UINT16	RO	0x0000 (0_{dec})
1C33:20	Sync error	The synchronization was not correct in the last cycle (outputs were output too late; DC mode only)	boolean	RO	0x00 (0_{dec})

Profile-specific objects (0x6000-0xFFFF)

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

Index 6000 DO Inputs Ch.1

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

Index 6010 DO Inputs Ch.2

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

Index F000 Modular device profile

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

Index F008 Code word

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

Index F010 Module list

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

7.3 EP1816-3008 - Object overview

EtherCAT XML Device Description

The presentation matches that of the EtherCAT XML Device Description.
Recommendation: download the latest XML file from https://www.beckhoff.com and install it according to the installation instructions.

Index (hex)		Name	Flags	Default value
1000 [▶ 162]		Device type	RO	0x00001389 (5001_{dec})
1008 [▶ 162]		Device name	RO	EP1816-3008
1009 [▶ 162]		Hardware version	RO	
100A [▶ 162]		Software version	RO	03
1011:0 [▶ 162]	**Subindex**	Restore default parameters	RO	0x01 (1_{dec})
	0x1011:01	SubIndex 001	RW	0x00000000 (0_{dec})
1018:0 [▶ 162]	**Subindex**	Identity	RO	0x04 (4_{dec})
	0x1018:01	Vendor ID	RO	0x00000002 (2_{dec})
	0x1018:02	Product code	RO	0x05E44052 (98844754_{dec})
	01018:03	Revision	RO	0x00000000 (0_{dec})
	0x1018:04	Serial number	RO	0x00000000 (0_{dec})
10F0:0 [▶ 162]	**Subindex**	Backup parameter handling	RO	0x01 (1_{dec})
	0x10F00:01	Checksum	RO	0x00000000 (0_{dec})
1A00:0 [▶ 163]	**Subindex**	DIG TxPDO-Map Inputs Ch.1	RO	0x09 (9_{dec})
	0x1A00:01	SubIndex 001	RO	0x6000:01, 1
	0x1A00:02	SubIndex 002	RO	0x6000:02, 1
	0x1A00:03	SubIndex 003	RO	0x6000:03, 1
	0x1A00:04	SubIndex 004	RO	0x6000:04, 1
	0x1A00:05	SubIndex 005	RO	0x6000:05, 1
	0x1A00:06	SubIndex 006	RO	0x6000:06, 1
	0x1A00:07	SubIndex 007	RO	0x6000:07, 1
	0x1A00:08	SubIndex 008	RO	0x6000:08, 1
	0x1A00:09	SubIndex 009	RO	0x0000:00, 8
1A01:0 [▶ 163]	**Subindex**	DIG TxPDO-Map Inputs Ch.2	RO	0x09 (9_{dec})
	0x1A01:01	SubIndex 001	RO	0x6010:01, 1
	0x1A01:02	SubIndex 002	RO	0x6010:02, 1
	0x1A01:03	SubIndex 003	RO	0x6010:03, 1
	0x1A01:04	SubIndex 004	RO	0x6010:04, 1
	0x1A01:05	SubIndex 005	RO	0x6010:05, 1
	0x1A01:06	SubIndex 006	RO	0x6010:06, 1
	0x1A01:07	SubIndex 007	RO	0x6010:07, 1
	0x1A01:08	SubIndex 008	RO	0x6010:08, 1
	0x1A01:09	SubIndex 009	RO	0x0000:00, 8
1A02:0 [▶ 163]	**Subindex**	AI TxPDO-Map Inputs Ch.1	RO	0x05 (5_{dec})
	0x1A02:01	SubIndex 001	RO	0x0000:00, 6
	0x1A02:02	SubIndex 002	RO	0x6020:07, 1
	0x1A02:03	SubIndex 003	RO	0x0000:00, 8
	0x1A02:04	SubIndex 004	RO	0x6020:10, 1
	0x1A02:05	SubIndex 005	RO	0x6020:11, 16
1A03:0 [▶ 164]	**Subindex**	AI TxPDO-Map Inputs Ch.2	RO	0x05 (5_{dec})
	0x1A03:01	SubIndex 001	RO	0x0000:00, 6
	0x1A03:02	SubIndex 002	RO	0x6030:07, 1
	0x1A03:03	SubIndex 003	RO	0x0000:00, 8
	0x1A03:04	SubIndex 004	RO	0x6030:10, 1
	0x1A03:05	SubIndex 005	RO	0x6030:11, 16

Index (hex)		Name	Flags	Default value
1A04:0 [▶ 164]	**Subindex**	AI TxPDO-Map Inputs Ch.3	RO	0x05 (5_{dec})
	0x1A04:01	SubIndex 001	RO	0x0000:00, 6
	0x1A04:02	SubIndex 002	RO	0x6040:07, 1
	0x1A04:03	SubIndex 003	RO	0x0000:00, 8
	0x1A04:04	SubIndex 004	RO	0x6040:10, 1
	0x1A04:05	SubIndex 005	RO	0x6040:11, 16
1A05:0 [▶ 164]	**Subindex**	AI TxPDO-Map Inputs Ch.4	RO	0x05 (5_{dec})
	0x1A05:01	SubIndex 001	RO	0x0000:00, 6
	0x1A05:02	SubIndex 002	RO	0x6050:07, 1
	0x1A05:03	SubIndex 003	RO	0x0000:00, 8
	0x1A05:04	SubIndex 004	RO	0x6050:10, 1
	0x1A05:05	SubIndex 005	RO	0x6050:11, 16
1A06:0 [▶ 164]	**Subindex**	AI TxPDO-Map Inputs Ch.5	RO	0x05 (5_{dec})
	0x1A06:01	SubIndex 001	RO	0x0000:00, 6
	0x1A06:02	SubIndex 002	RO	0x6060:07, 1
	0x1A06:03	SubIndex 003	RO	0x0000:00, 8
	0x1A06:04	SubIndex 004	RO	0x6060:10, 1
	0x1A06:05	SubIndex 005	RO	0x6060:11, 16
1A07:0 [▶ 165]	**Subindex**	AI TxPDO-Map Inputs Ch.6	RO	0x05 (5_{dec})
	0x1A07:01	SubIndex 001	RO	0x0000:00, 6
	0x1A07:02	SubIndex 002	RO	0x6070:07, 1
	0x1A07:03	SubIndex 003	RO	0x0000:00, 8
	0x1A07:04	SubIndex 004	RO	0x6070:10, 1
	0x1A07:05	SubIndex 005	RO	0x6070:11, 16
1A08:0 [▶ 165]	**Subindex**	DIG TxPDO-Map Inputs Device	RO	0x04 (4_{dec})
	0x1A08:01	SubIndex 001	RO	0xF600:01, 1
	0x1A08:02	SubIndex 002	RO	0xF600:02, 1
	0x1A08:03	SubIndex 003	RO	0x0000:00, 13
	0x1A08:04	SubIndex 004	RO	0xF600:10, 1
1C00:0 [▶ 165]	**Subindex**	Sync manager type	RO	0x04 (4_{dec})
	0x1C00:01	SubIndex 001	RO	0x01 (1_{dec})
	0x1C00:02	SubIndex 002	RO	0x02 (2_{dec})
	0x1C00:03	SubIndex 003	RO	0x03 (3_{dec})
	0x1C00:04	SubIndex 004	RO	0x04 (4_{dec})
1C12:0 [▶ 165]	**Subindex**	RxPDO assign	RO	0x00 (0_{dec})
1C13:0 [▶ 165]	**Subindex**	TxPDO assign	RO	0x09 (9_{dec})
	0x1C13:01	SubIndex 001	RO	0x1A00 (6656_{dec})
	0x1C13:02	SubIndex 002	RO	0x1A01 (6657_{dec})
	0x1C13:03	SubIndex 003	RO	0x1A02 (6658_{dec})
	0x1C13:04	SubIndex 004	RO	0x1A03 (6659_{dec})
	0x1C13:05	SubIndex 005	RO	0x1A04 (6660_{dec})
	0x1C13:06	SubIndex 006	RO	0x1A05 (6661_{dec})
	0x1C13:07	SubIndex 007	RO	0x1A06 (6662_{dec})
	0x1C13:08	SubIndex 008	RO	0x1A07 (6663_{dec})
	0x1C13:09	SubIndex 009	RO	0x1A08 (6664_{dec})
1C33:0 [▶ 166]	**Subindex**	SM input parameter	RO	0x20 (32_{dec})
	0x1C33:01	Sync mode	RW	0x0022 (34_{dec})
	0x1C33:02	Cycle time	RW	0x003D0900 (4000000_{dec})
	0x1C33:03	Shift time	RO	0x00000000 (0_{dec})
	0x1C33:04	Sync modes supported	RO	0xC007 (49159_{dec})
	0x1C33:05	Minimum cycle time	RO	0x00030D40 (200000_{dec})
	0x1C33:06	Calc and copy time	RO	0x00000000 (0_{dec})
	0x1C33:07	Minimum delay time	RO	0x00000000 (0_{dec})
	0x1C33:08	Command	RW	0x0000 (0_{dec})
	0x1C33:09	Maximum delay time	RO	0x00000000 (0_{dec})
	0x1C33:0B	SM event missed counter	RO	0x0000 (0_{dec})
	0x1C33:0C	Cycle exceeded counter	RO	0x0000 (0_{dec})

Index (hex)		Name	Flags	Default value
	0x1C33:0D	Shift too short counter	RO	0x0000 (0_{dec})
	0x1C33:20	Sync error	RO	0x00 (0_{dec})
6000:0 [▶ 167]	**Subindex**	DIG Inputs Ch.1	RO	0x08 (8_{dec})
	0x6000:01	Input 1	RO	0x00 (0_{dec})
	0x6000:02	Input 2	RO	0x00 (0_{dec})
	0x6000:03	Input 3	RO	0x00 (0_{dec})
	0x6000:04	Input 4	RO	0x00 (0_{dec})
	0x6000:05	Input 5	RO	0x00 (0_{dec})
	0x6000:06	Input 6	RO	0x00 (0_{dec})
	0x6000:07	Input 7	RO	0x00 (0_{dec})
	0x6000:08	Input 8	RO	0x00 (0_{dec})
6010:0 [▶ 167]	**Subindex**	DIG Inputs Ch.2	RO	0x08 (8_{dec})
	0x6010:01	Input 1	RO	0x00 (0_{dec})
	0x6010:02	Input 2	RO	0x00 (0_{dec})
	0x6010:03	Input 3	RO	0x00 (0_{dec})
	0x6010:04	Input 4	RO	0x00 (0_{dec})
	0x6010:05	Input 5	RO	0x00 (0_{dec})
	0x6010:06	Input 6	RO	0x00 (0_{dec})
	0x6010:07	Input 7	RO	0x00 (0_{dec})
	0x6010:08	Input 8	RO	0x00 (0_{dec})
6020:0 [▶ 167]	**Subindex**	AI Inputs Ch.1	RO	0x11 (17_{dec})
	0x6020:07	Error	RO	0x00 (0_{dec})
	0x6020:10	TxPDO Toggle	RO	0x00 (0_{dec})
	0x6020:11	Value	RO	0x0000 (0_{dec})
6030:0 [▶ 167]	**Subindex**	AI Inputs Ch.2	RO	0x11 (17_{dec})
	0x6030:07	Error	RO	0x00 (0_{dec})
	0x6030:10	TxPDO Toggle	RO	0x00 (0_{dec})
	0x6030:11	Value	RO	0x0000 (0_{dec})
6040:0 [▶ 167]	**Subindex**	AI Inputs Ch.3	RO	0x11 (17_{dec})
	0x6040:07	Error	RO	0x00 (0_{dec})
	0x6040:10	TxPDO Toggle	RO	0x00 (0_{dec})
	0x6040:11	Value	RO	0x0000 (0_{dec})
6050:0 [▶ 167]	**Subindex**	AI Inputs Ch.4	RO	0x11 (17_{dec})
	0x6050:07	Error	RO	0x00 (0_{dec})
	0x6050:10	TxPDO Toggle	RO	0x00 (0_{dec})
	0x6050:11	Value	RO	0x0000 (0_{dec})
6060:0 [▶ 168]	**Subindex**	AI Inputs Ch.5	RO	0x11 (17_{dec})
	0x6060:07	Error	RO	0x00 (0_{dec})
	0x6060:10	TxPDO Toggle	RO	0x00 (0_{dec})
	0x6060:11	Value	RO	0x0000 (0_{dec})
6070:0 [▶ 168]	**Subindex**	AI Inputs Ch.6	RO	0x11 (17_{dec})
	0x6070:07	Error	RO	0x00 (0_{dec})
	0x6070:10	TxPDO Toggle	RO	0x00 (0_{dec})
	0x6070:11	Value	RO	0x0000 (0_{dec})
8020:0 [▶ 159]	**Subindex**	AI Settings Ch.1	RW	0x18 (24_{dec})
	0x8020:01	Enable user scale	RW	0x00 (0_{dec})
	0x8020:0A	Enable user calibration	RW	0x00 (0_{dec})
	0x8020:0B	Enable vendor calibration	RW	0x00 (0_{dec})
	0x8020:11	User scale offset	RW	0x0000 (0_{dec})
	0x8020:12	User scale gain	RW	0x02A00000 (44040192_{dec})
	0x8020:17	User calibration offset	RW	0x0000 (0_{dec})
	0x8020:18	User calibration gain	RW	0x0000 (0_{dec})
802F:0 [▶ 159]	**Subindex**	AI Vendor data Ch.1	RW	0x02 (2_{dec})
	0x802F:01	Calibration Offset	RW	0x0000 (0_{dec})
	0x802F:02	Calibration Gain	RW	0x0000 (0_{dec})
8030:0 [▶ 159]	**Subindex**	AI Settings Ch.2	RW	0x18 (24_{dec})
	0x8030:01	Enable user scale	RW	0x00 (0_{dec})
	0x8030:0A	Enable user calibration	RW	0x00 (0_{dec})

Index (hex)		Name	Flags	Default value
	0x8030:0B	Enable vendor calibration	RW	0x00 (0_{dec})
	0x8030:11	User scale offset	RW	0x0000 (0_{dec})
	0x8030:12	User scale gain	RW	0x02A00000 (44040192_{dec})
	0x8030:17	User calibration offset	RW	0x0000 (0_{dec})
	0x8030:18	User calibration gain	RW	0x0000 (0_{dec})
803F:0 [▶ 160]	**Subindex**	AI Vendor data Ch.2	RW	0x02 (2_{dec})
	0x803F:01	Calibration Offset	RW	0x0000 (0_{dec})
	0x803F:02	Calibration Gain	RW	0x0000 (0_{dec})
8040:0 [▶ 160]	**Subindex**	AI Settings Ch.3	RW	0x18 (24_{dec})
	0x8040:01	Enable user scale	RW	0x00 (0_{dec})
	0x8040:0A	Enable user calibration	RW	0x00 (0_{dec})
	0x8040:0B	Enable vendor calibration	RW	0x00 (0_{dec})
	0x8040:11	User scale offset	RW	0x0000 (0_{dec})
	0x8040:12	User scale gain	RW	0x02A00000 (44040192_{dec})
	0x8040:17	User calibration offset	RW	0x0000 (0_{dec})
	0x8040:18	User calibration gain	RW	0x0000 (0_{dec})
804F:0 [▶ 160]	**Subindex**	AI Vendor data Ch.3	RW	0x02 (2_{dec})
	0x804F:01	Calibration Offset	RW	0x0000 (0_{dec})
	0x804F:02	Calibration Gain	RW	0x0000 (0_{dec})
8050:0 [▶ 160]	**Subindex**	AI Settings Ch.4	RW	0x18 (24_{dec})
	0x8050:01	Enable user scale	RW	0x00 (0_{dec})
	0x8050:0A	Enable user calibration	RW	0x00 (0_{dec})
	0x8050:0B	Enable vendor calibration	RW	0x00 (0_{dec})
	0x8050:11	User scale offset	RW	0x0000 (0_{dec})
	0x8050:12	User scale gain	RW	0x02A00000 (44040192_{dec})
	0x8050:17	User calibration offset	RW	0x0000 (0_{dec})
	0x8050:18	User calibration gain	RW	0x0000 (0_{dec})
805F:0 [▶ 160]	**Subindex**	AI Vendor data Ch.4	RW	0x02 (2_{dec})
	0x805F:01	Calibration Offset	RW	0x0000 (0_{dec})
	0x805F:02	Calibration Gain	RW	0x0000 (0_{dec})
8060:0 [▶ 161]	**Subindex**	AI Settings Ch.5	RW	0x18 (24_{dec})
	0x8060:01	Enable user scale	RW	0x00 (0_{dec})
	0x8060:0A	Enable user calibration	RW	0x00 (0_{dec})
	0x8060:0B	Enable vendor calibration	RW	0x00 (0_{dec})
	0x8060:11	User scale offset	RW	0x0000 (0_{dec})
	0x8060:12	User scale gain	RW	0x02A00000 (44040192_{dec})
	0x8060:17	User calibration offset	RW	0x0000 (0_{dec})
	0x8060:18	User calibration gain	RW	0x0000 (0_{dec})
806F:0 [▶ 161]	**Subindex**	AI Vendor data Ch.5	RW	0x02 (2_{dec})
	0x806F:01	Calibration Offset	RW	0x0000 (0_{dec})
	0x806F:02	Calibration Gain	RW	0x0000 (0_{dec})
8070:0 [▶ 161]	**Subindex**	AI Settings Ch.6	RW	0x18 (24_{dec})
	0x8070:01	Enable user scale	RW	0x00 (0_{dec})
	0x8070:0A	Enable user calibration	RW	0x00 (0_{dec})
	0x8070:0B	Enable vendor calibration	RW	0x00 (0_{dec})
	0x8070:11	User scale offset	RW	0x0000 (0_{dec})
	0x8070:12	User scale gain	RW	0x02A00000 (44040192_{dec})
	0x8070:17	User calibration offset	RW	0x0000 (0_{dec})
	0x8070:18	User calibration gain	RW	0x0000 (0_{dec})
807F:0 [▶ 161]	**Subindex**	AI Vendor data Ch.6	RW	0x02 (2_{dec})
	0x807F:01	Calibration Offset	RW	0x0000 (0_{dec})
	0x807F:02	Calibration Gain	RW	0x0000 (0_{dec})
8080:0 [▶ 161]	**Subindex**	SAI Settings	RW	0x11 (17_{dec})
	0x8080:0D	Mode	RW	0x0000 (0_{dec})
	0x8080:11	Range	RW	0x0000 (0_{dec})
F000:0 [▶ 168]	**Subindex**	Modular device profile	RO	0x02 (2_{dec})
	0xF000:01	Module index distance	RO	0x0010 (16_{dec})
	0xF000:02	Maximum number of modules	RO	0x0009 (9_{dec})

Index (hex)		Name	Flags	Default value
F008 [▶ 168]		Code word	RW	0x00000000 (0_{dec})
F010:0 [▶ 168]	**Subindex**	Module list	RW	0x09 (9_{dec})
	0xF010:01	SubIndex 001	RW	0x00000118 (280_{dec})
	0xF010:02	SubIndex 002	RW	0x00000118 (280_{dec})
	0xF010:03	SubIndex 003	RW	0x0000012C (300_{dec})
	0xF010:04	SubIndex 004	RW	0x0000012C (300_{dec})
	0xF010:05	SubIndex 005	RW	0x0000012C (300_{dec})
	0xF010:06	SubIndex 006	RW	0x0000012C (300_{dec})
	0xF010:07	SubIndex 007	RW	0x0000012C (300_{dec})
	0xF010:08	SubIndex 008	RW	0x0000012C (300_{dec})
	0xF010:09	SubIndex 009	RW	0x00000168 (360_{dec})
F600:0 [▶ 168]	**Subindex**	DIG Inputs	RO	0x10 (16_{dec})
	0xF600:01	Us Undervoltage	RO	0x00 (0_{dec})
	0xF600:02	Up Undervoltage	RO	0x00 (0_{dec})
	0xF600:10	TxPDO Toggle	RO	0x00 (0_{dec})

Legend

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

7.4 EP1816-3008 - Object description and parameterization

Parameterization

You can parameterize the box via the "CoE - Online" tab in TwinCAT.

EtherCAT XML Device Description

The presentation matches that of the EtherCAT XML Device Description.
Recommendation: download the latest XML file from https://www.beckhoff.com and install it according to the installation instructions.

Introduction

The CoE overview contains objects for different intended applications:

- Objects required for parameterization during [▶ 159] commissioning
- Objects for indicating internal settings [▶ 162] (may be fixed)
- Further profile-specific objects [▶ 167]indicating inputs, outputs and status information

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

7.4.1 Objects to be parameterized during commissioning

Index 8020 AI Settings Ch.1

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

Index 802F AI Vendor data Ch.1

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

Index 8030 AI Settings Ch.2

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

Index 803F AI Vendor data Ch.2

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

Index 8040 AI Settings Ch.3

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

Index 804F AI Vendor data Ch.3

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

Index 8050 AI Settings Ch.4

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

Index 805F AI Vendor data Ch.4

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

Index 8060 AI Settings Ch.5

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

Index 806F AI Vendor data Ch.5

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

Index 8070 AI Settings Ch.6

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

Index 807F AI Vendor data Ch.6

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

Index 8080 SAI Settings

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

7.4.2 Standard objects (0x1000-0x1FFF)

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

Index 1000Device type

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

Index 1008Device name

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

Index 1009Hardware version

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

Index 100ASoftware version

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

Index 1011 Restore default parameters

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

Index 1018Identity

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

Index 10F0 Backup parameter handling

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

Index 1A00 DIG TxPDO-Map Inputs Ch.1

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

Index 1A01 DIG TxPDO-Map Inputs Ch.2

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

Index 1A02 AI TxPDO-Map Inputs Ch.1

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

Index 1A03 AI TxPDO-Map Inputs Ch.2

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

Index 1A04 AI TxPDO-Map Inputs Ch.3

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

Index 1A05 AI TxPDO-Map Inputs Ch.4

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

Index 1A06 AI TxPDO-Map Inputs Ch.5

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

Index 1A07 AI TxPDO-Map Inputs Ch.6

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

Index 1A08 DIG TxPDO-Map Inputs Device

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

Index 1C00Sync manager type

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

Index 1C12 RxPDO assign

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

Index 1C13 TxPDO assign

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

Index 1C33SM input parameter

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

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

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

Index 6000 DIG Inputs Ch.1

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

Index 6010 DIG Inputs Ch.2

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

Index 6020 AI Inputs Ch.1

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

Index 6030 AI Inputs Ch.2

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

Index 6040 AI Inputs Ch.3

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

Index 6050 AI Inputs Ch.4

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

Index 6060 AI Inputs Ch.5

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

Index 6070 AI Inputs Ch.6

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

Index F000 Modular device profile

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

Index F008 Code word

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

Index F010 Module list

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

Index F600 DIG Inputs

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

7.5 EP1819-0005 - Object description and parameterization

7.5.1 Objects to be parameterized during commissioning

Index 8100 DIP Settings Ch.17

Index (hex)	Name	Meaning	Data type	Flags	Default
8100:0	DIP Settings Ch.17		UINT8	RO	0x03 (3_{dec})
8100:03	Enable Antivalent Input Diagnostic	Enable antivalent diagnostic on the inputs	BOOLEAN	RW	0x00 (0_{dec})

Index 8110 DIP Settings Ch.18

Index (hex)	Name	Meaning	Data type	Flags	Default
8110:0	DIP Settings Ch.18		UINT8	RO	0x03 (3_{dec})
8110:03	Enable Antivalent Input Diagnostic	Enable antivalent diagnostic on the inputs	BOOLEAN	RW	0x00 (0_{dec})

Index 8120 DIP Settings Ch.19

Index (hex)	Name	Meaning	Data type	Flags	Default
8120:0	DIP Settings Ch.19		UINT8	RO	0x03 (3_{dec})
8120:03	Enable Antivalent Input Diagnostic	Enable antivalent diagnostic on the inputs	BOOLEAN	RW	0x00 (0_{dec})

Index 8130 DIP Settings Ch.20

Index (hex)	Name	Meaning	Data type	Flags	Default
8130:0	DIP Settings Ch.20		UINT8	RO	0x03 (3_{dec})
8130:03	Enable Antivalent Input Diagnostic	Enable antivalent diagnostic on the inputs	BOOLEAN	RW	0x00 (0_{dec})

Index 8140 DIP Settings Ch.21

Index (hex)	Name	Meaning	Data type	Flags	Default
8140:0	DIP Settings Ch.21		UINT8	RO	0x03 (3_{dec})
8140:03	Enable Antivalent Input Diagnostic	Enable antivalent diagnostic on the inputs	BOOLEAN	RW	0x00 (0_{dec})

Index 8150 DIP Settings Ch.22

Index (hex)	Name	Meaning	Data type	Flags	Default
8150:0	DIP Settings Ch.22		UINT8	RO	0x03 (3_{dec})
8150:03	Enable Antivalent Input Diagnostic	Enable antivalent diagnostic on the inputs	BOOLEAN	RW	0x00 (0_{dec})

Index 8160 DIP Settings Ch.23

Index (hex)	Name	Meaning	Data type	Flags	Default
8160:0	DIP Settings Ch.23		UINT8	RO	0x03 (3_{dec})
8160:03	Enable Antivalent Input Diagnostic	Enable antivalent diagnostic on the inputs	BOOLEAN	RW	0x00 (0_{dec})

Index 8170 DIP Settings Ch.24

Index (hex)	Name	Meaning	Data type	Flags	Default
8170:0	DIP Settings Ch.24		UINT8	RO	0x03 (3_{dec})
8170:03	Enable Antivalent Input Diagnostic	Enable antivalent diagnostic on the inputs	BOOLEAN	RW	0x00 (0_{dec})

7.5.2 Standard objects (0x1000 to 0x1FFF)

Index 1000 Device type

Index (hex)	Name	Meaning	Data type	Flags	Default
1000:0	Device type	Device type of the EtherCAT slave: the Lo-Word contains the used CoE profile (5001). The Hi-Word contains the module profile according to the modular device profile.	UINT32	RO	0x00651389 (6624137_{dec})

Index 1008 Device name

Index (hex)	Name	Meaning	Data type	Flags	Default
1008:0	Device name	Device name of the EtherCAT slave	STRING	RO	EP1819-0005

Index 1009 Hardware version

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

Index 100A Software version

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

Index 100B Bootloader version

Index (hex)	Name	Meaning	Data type	Flags	Default
100B:0	Bootloader version		STRING	RO	N/A

Index 1011 Restore default parameters

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

Index 1018 Identity

Index (hex)	Name	Meaning	Data type	Flags	Default
1018:0	Identity	Information for identifying the slave	UINT8	RO	0x04 (4_{dec})
1018:01	Vendor ID	Vendor ID of the EtherCAT slave	UINT32	RO	0x00000002 (2_{dec})
1018:02	Product code	Product code of the EtherCAT slave	UINT32	RO	0x071B4052 (119226450_{dec})
1018:03	Revision	Revision number of the EtherCAT slave; the Low Word (bit 0-15) indicates the special terminal number, the High Word (bit 16-31) refers to the device description	UINT32	RO	0x00000000 (0_{dec})
1018:04	Serial number	Serial number of the EtherCAT slave; the Low Byte (bit 0-7) of the Low Word contains the year of production, the High Byte (bit 8-15) of the Low Word contains the week of production, the High Word (bit 16-31) is 0	UINT32	RO	0x00000000 (0_{dec})

Index 10E2 Manufacturer-specific Identification Code

Index (hex)	Name	Meaning	Data type	Flags	Default
10E2:0	Manufacturer-specific Identification Code		UINT8	RO	0x01 (1_{dec})
10E2:01	SubIndex 001		STRING	RO	

Index 10F0 Backup parameter handling

Index (hex)	Name	Meaning	Data type	Flags	Default
10F0:01	Checksum	Checksum across all backup entries of the EtherCAT slave	UINT32	RO	0x00000000 (0_{dec})

Index 1A00 DIP TxPDO-Map Input

Index (hex)	Name	Meaning	Data type	Flags	Default
1A00:0	DIP TxPDO-Map Input	PDO Mapping TxPDO 1	UINT8	RO	0x10 (16_{dec})
1A00:01	SubIndex 001	1. PDO Mapping entry (object 0x6000 (DIS Input Ch.1), entry 0x01 (Input))	UINT32	RO	0x6000:01, 1
1A00:02	SubIndex 002	2. PDO Mapping entry (object 0x6010 (DIS Input Ch.2), entry 0x01 (Input))	UINT32	RO	0x6010:01, 1
1A00:03	SubIndex 003	3. PDO Mapping entry (object 0x6020 (DIS Input Ch.3), entry 0x01 (Input))	UINT32	RO	0x6020:01, 1
1A00:04	SubIndex 004	4. PDO Mapping entry (object 0x6030 (DIS Input Ch.4), entry 0x01 (Input))	UINT32	RO	0x6030:01, 1
1A00:05	SubIndex 005	5. PDO Mapping entry (object 0x6040 (DIS Input Ch.5), entry 0x01 (Input))	UINT32	RO	0x6040:01, 1
1A00:06	SubIndex 006	6. PDO Mapping entry (object 0x6050 (DIS Input Ch.6), entry 0x01 (Input))	UINT32	RO	0x6050:01, 1
1A00:07	SubIndex 007	7. PDO Mapping entry (object 0x6060 (DIS Input Ch.7), entry 0x01 (Input))	UINT32	RO	0x6060:01, 1
1A00:08	SubIndex 008	8. PDO Mapping entry (object 0x6070 (DIS Input Ch.8), entry 0x01 (Input))	UINT32	RO	0x6070:01, 1
1A00:09	SubIndex 009	9. PDO Mapping entry (object 0x6080 (DIP Input Ch.09), entry 0x01 (Input))	UINT32	RO	0x6080:01, 1
1A00:0A	SubIndex 010	10. PDO Mapping entry (object 0x6090 (DIP Input Ch.10), entry 0x01 (Input))	UINT32	RO	0x6090:01, 1
1A00:0B	SubIndex 011	11. PDO Mapping entry (object 0x60A0 (DIP Input Ch.11), entry 0x01 (Input))	UINT32	RO	0x60A0:01, 1
1A00:0C	SubIndex 012	12. PDO Mapping entry (object 0x60B0 (DIP Input Ch.12), entry 0x01 (Input))	UINT32	RO	0x60B0:01, 1
1A00:0D	SubIndex 013	13. PDO Mapping entry (object 0x60C0 (DIP Input Ch.13), entry 0x01 (Input))	UINT32	RO	0x60C0:01, 1
1A00:0E	SubIndex 014	14. PDO Mapping entry (object 0x60D0 (DIP Input Ch.14), entry 0x01 (Input))	UINT32	RO	0x60D0:01, 1
1A00:0F	SubIndex 015	15. PDO Mapping entry (object 0x60E0 (DIP Input Ch.15), entry 0x01 (Input))	UINT32	RO	0x60E0:01, 1
1A00:10	SubIndex 016	16. PDO Mapping entry (object 0x60F0 (DIP Input Ch.16), entry 0x01 (Input))	UINT32	RO	0x60F0:01, 1

Index 1A01 DIP TxPDO-Map Diagnosis

Index (hex)	Name	Meaning	Data type	Flags	Default
1A01:0	DIP TxPDO-Map Diagnosis	PDO Mapping TxPDO 2	UINT8	RO	0x08 (8_{dec})
1A01:01	SubIndex 001	1. PDO Mapping entry (object 0x6000 (DIP Input Ch.1), entry 0x01 (Input))	UINT32	RO	0x6101:02, 1
1A01:02	SubIndex 002	2. PDO Mapping entry (object 0x6000 (DIP Input Ch.1), entry 0x02 (Input 2))	UINT32	RO	0x6111:02, 1
1A01:03	SubIndex 003	3. PDO Mapping entry (object 0x6010 (DIP Input Ch.2), entry 0x01 (Input))	UINT32	RO	0x6121:02, 1
1A01:04	SubIndex 004	4. PDO Mapping entry (object 0x6010 (DIP Input Ch.2), entry 0x02 (Input 2))	UINT32	RO	0x6131:02, 1
1A01:05	SubIndex 005	5. PDO Mapping entry (object 0x6020 (DIP Input Ch.3), entry 0x01 (Input))	UINT32	RO	0x6141:02, 1
1A01:06	SubIndex 006	6. PDO Mapping entry (object 0x6020 (DIP Input Ch.3), entry 0x02 (Input 2))	UINT32	RO	0x6151:02, 1
1A01:07	SubIndex 007	7. PDO Mapping entry (object 0x6030 (DIP Input Ch.4), entry 0x01 (Input))	UINT32	RO	0x6161:02, 1
1A01:08	SubIndex 008	8. PDO Mapping entry (object 0x6030 (DIP Input Ch.4), entry 0x02 (Input 2))	UINT32	RO	0x6171:02, 1

Index 1C00 Sync manager type

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

Index 1C12 RxPDO assign

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

Index 1C13 TxPDO assign

Index (hex)	Name	Meaning	Data type	Flags	Default
1C13:0	TxPDO assign	PDO Assign Inputs	UINT8	RW	0x01 (1_{dec})
1C13:01	Subindex 001	1. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x1A00 (6656_{dec})
1C13:02	Subindex 002	2. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x0000 (0_{dec})

Index 1C33 SM input parameter

Index (hex)	Name	Meaning	Data type	Flags	Default
1C33:0	SM input parameter	Synchronization parameters for the inputs	UINT8	RO	0x20 (32_{dec})
1C33:01	Sync mode	Current synchronization mode: • 0: Free Run • 1: 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	0x0001 (1_{dec})
1C33:02	Cycle time	as 1C32:02	UINT32	RW	0x000F4240 (1000000_{dec})
1C33:03	Shift time	Time between SYNC0 event and reading of the inputs (in ns, DC mode only)	UINT32	RO	0x000249F0 (150000_{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 through local event (outputs available) • Bit 4-5 = 10: Input Shift with SYNC1 Event (no outputs available) • Bit 14 = 1: dynamic times (measurement through writing of 1C32:08 or 1C33:08)	UINT16	RO	0x440B (17419_{dec})
1C33:05	Minimum cycle time	as 1C32:05	UINT32	RO	0x000249F0 (150000_{dec})
1C33:06	Calc and copy time	Time between reading of the inputs and availability of the inputs for the master (in ns, only DC mode)	UINT32	RO	0x00000000 (0_{dec})
1C33:07	Minimum delay time		UINT32	RO	0x00000000 (0_{dec})
1C33:08	Get Cycle Time	as 1C32:08	UINT16	RW	0x0000 (0_{dec})
1C33:09	Maximum delay time	Time between SYNC1 event and reading of the inputs (in ns, only DC mode)	UINT32	RO	0x00000000 (0_{dec})
1C33:0B	SM event missed counter	as 1C32:11	UINT16	RO	0x0000 (0_{dec})
1C33:0C	Cycle exceeded counter	as 1C32:12	UINT16	RO	0x0000 (0_{dec})
1C33:0D	Shift too short counter	as 1C32:13	UINT16	RO	0x0000 (0_{dec})
1C33:20	Sync error	as 1C32:32	BOOLEAN	RO	0x00 (0_{dec})

7.5.3 Profile-specific objects (0x6000 to 0xFFFF)

Index 6000 DIP Input Ch.01

Index (hex)	Name	Meaning	Data type	Flags	Default
6000:0	DIP Input Ch.01		UINT8	RO	0x01 (1_{dec})
6000:01	Input	Input value	BOOLEAN	RO	0x00 (0_{dec})

Index 6010 DIP Input Ch.02

Index (hex)	Name	Meaning	Data type	Flags	Default
6010:0	DIP Input Ch.02		UINT8	RO	0x01 (1_{dec})
6010:01	Input	Input value	BOOLEAN	RO	0x00 (0_{dec})

Index 6020 DIP Input Ch.03

Index (hex)	Name	Meaning	Data type	Flags	Default
6020:0	DIP Input Ch.03		UINT8	RO	0x01 (1_{dec})
6020:01	Input	Input value	BOOLEAN	RO	0x00 (0_{dec})

Index 6030 DIP Input Ch.04

Index (hex)	Name	Meaning	Data type	Flags	Default
6030:0	DIP Input Ch.04		UINT8	RO	0x01 (1_{dec})
6030:01	Input	Input value	BOOLEAN	RO	0x00 (0_{dec})

Index 6040 DIP Input Ch.05

Index (hex)	Name	Meaning	Data type	Flags	Default
6040:0	DIP Input Ch.05		UINT8	RO	0x01 (1_{dec})
6040:01	Input	Input value	BOOLEAN	RO	0x00 (0_{dec})

Index 6050 DIP Input Ch.06

Index (hex)	Name	Meaning	Data type	Flags	Default
6050:0	DIP Input Ch.06		UINT8	RO	0x01 (1_{dec})
6050:01	Input	Input value	BOOLEAN	RO	0x00 (0_{dec})

Index 6060 DIP Input Ch.07

Index (hex)	Name	Meaning	Data type	Flags	Default
6060:0	DIP Input Ch.07		UINT8	RO	0x01 (1_{dec})
6060:01	Input	Input value	BOOLEAN	RO	0x00 (0_{dec})

Index 6070 DIP Input Ch.08

Index (hex)	Name	Meaning	Data type	Flags	Default
6070:0	DIP Input Ch.08		UINT8	RO	0x01 (1_{dec})
6070:01	Input	Input value	BOOLEAN	RO	0x00 (0_{dec})

Index 6080 DIP Input Ch.09

Index (hex)	Name	Meaning	Data type	Flags	Default
6080:0	DIP Input Ch.09		UINT8	RO	0x01 (1_{dec})
6080:01	Input	Input value	BOOLEAN	RO	0x00 (0_{dec})

Index 6090 DIP Input Ch.10

Index (hex)	Name	Meaning	Data type	Flags	Default
6090:0	DIP Input Ch.10		UINT8	RO	0x01 (1_{dec})
6090:01	Input	Input value	BOOLEAN	RO	0x00 (0_{dec})

Index 60A0 DIP Input Ch.11

Index (hex)	Name	Meaning	Data type	Flags	Default
60A0:0	DIP Input Ch.11		UINT8	RO	0x01 (1_{dec})
60A0:01	Input	Input value	BOOLEAN	RO	0x00 (0_{dec})

Index 60B0 DIP Input Ch.12

Index (hex)	Name	Meaning	Data type	Flags	Default
60B0:0	DIP Input Ch.12		UINT8	RO	0x01 (1_{dec})
60B0:01	Input	Input value	BOOLEAN	RO	0x00 (0_{dec})

Index 60C0 DIP Input Ch.13

Index (hex)	Name	Meaning	Data type	Flags	Default
60C0:0	DIP Input Ch.13		UINT8	RO	0x01 (1_{dec})
60C0:01	Input	Input value	BOOLEAN	RO	0x00 (0_{dec})

Index 60D0 DIP Input Ch.14

Index (hex)	Name	Meaning	Data type	Flags	Default
60D0:0	DIP Input Ch.14		UINT8	RO	0x01 (1_{dec})
60D0:01	Input	Input value	BOOLEAN	RO	0x00 (0_{dec})

Index 60E0 DIP Input Ch.15

Index (hex)	Name	Meaning	Data type	Flags	Default
60E0:0	DIP Input Ch.15		UINT8	RO	0x01 (1_{dec})
60E0:01	Input	Input value	BOOLEAN	RO	0x00 (0_{dec})

Index 60F0 DIP Input Ch.16

Index (hex)	Name	Meaning	Data type	Flags	Default
60F0:0	DIP Input Ch.16		UINT8	RO	0x01 (1_{dec})
60F0:01	Input	Input value	BOOLEAN	RO	0x00 (0_{dec})

Index 6101 DIP Diagnosis Ch.17

Index (hex)	Name	Meaning	Data type	Flags	Default
6101:0	DIP Diagnosis Ch.17		UINT8	RO	0x02 (2_{dec})
6101:02	Input Error	Input validation fails. E.g. antivalent inputs are reading implausible values. Check sensor and wiring.	BOOLEAN	RO	0x00 (0_{dec})

Index 6111 DIP Diagnosis Ch.18

Index (hex)	Name	Meaning	Data type	Flags	Default
6111:0	DIP Diagnosis Ch.18		UINT8	RO	0x02 (2_{dec})
6111:02	Input Error	Input validation fails. E.g. antivalent inputs are reading implausible values. Check sensor and wiring.	BOOLEAN	RO	0x00 (0_{dec})

Index 6121 DIP Diagnosis Ch.19

Index (hex)	Name	Meaning	Data type	Flags	Default
6121:0	DIP Diagnosis Ch.19		UINT8	RO	0x02 (2_{dec})
6121:02	Input Error	Input validation fails. E.g. antivalent inputs are reading implausible values. Check sensor and wiring.	BOOLEAN	RO	0x00 (0_{dec})

Index 6131 DIP Diagnosis Ch.20

Index (hex)	Name	Meaning	Data type	Flags	Default
6131:0	DIP Diagnosis Ch.20		UINT8	RO	0x02 (2_{dec})
6131:02	Input Error	Input validation fails. E.g. antivalent inputs are reading implausible values. Check sensor and wiring.	BOOLEAN	RO	0x00 (0_{dec})

Index 6141 DIP Diagnosis Ch.21

Index (hex)	Name	Meaning	Data type	Flags	Default
6141:0	DIP Diagnosis Ch.21		UINT8	RO	0x02 (2_{dec})
6141:02	Input Error	Input validation fails. E.g. antivalent inputs are reading implausible values. Check sensor and wiring.	BOOLEAN	RO	0x00 (0_{dec})

Index 6151 DIP Diagnosis Ch.22

Index (hex)	Name	Meaning	Data type	Flags	Default
6151:0	DIP Diagnosis Ch.22		UINT8	RO	0x02 (2_{dec})
6151:02	Input Error	Input validation fails. E.g. antivalent inputs are reading implausible values. Check sensor and wiring.	BOOLEAN	RO	0x00 (0_{dec})

Index 6161 DIP Diagnosis Ch.23

Index (hex)	Name	Meaning	Data type	Flags	Default
6161:0	DIP Diagnosis Ch.23		UINT8	RO	0x02 (2_{dec})
6161:02	Input Error	Input validation fails. E.g. antivalent inputs are reading implausible values. Check sensor and wiring.	BOOLEAN	RO	0x00 (0_{dec})

Index 6171 DIP Diagnosis Ch.24

Index (hex)	Name	Meaning	Data type	Flags	Default
6171:0	DIP Diagnosis Ch.24		UINT8	RO	0x02 (2_{dec})
6171:02	Input Error	Input validation fails. E.g. antivalent inputs are reading implausible values. Check sensor and wiring.	BOOLEAN	RO	0x00 (0_{dec})

Index F000 Modular Device Profile

Index (hex)	Name	Meaning	Data type	Flags	Default
F000:0	Modular Device Profile		UINT8	RO	0x02 (2_{dec})
F000:01	Index distance		UINT16	RO	0x0010 (16_{dec})
F000:02	Maximum number of modules		UINT16	RO	0x0018 (24_{dec})

Index F008 Code word

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

Index FB00 DEV Command

Index (hex)	Name	Meaning	Data type	Flags	Default
FB00:0	DEV Command		UINT8	RO	0x03 (3_{dec})
FB00:01	Request		OCTET-STRING[2]	RW	{0}
FB00:02	Status		UINT8	RO	0x00 (0_{dec})
FB00:03	Response		OCTET-STRING[8]	RO	{0}

7.6 EP1839-0022, EP1839-0042 - Object description and parameterization

7.6.1 Objects for parameterization

Parameterization

You can parameterize the box via the "CoE - Online" tab in TwinCAT.

EtherCAT XML Device Description

The presentation matches that of the EtherCAT XML Device Description.
Recommendation: download the latest XML file from https://www.beckhoff.com and install it according to the installation instructions.

Index 8000 DIP Settings Ch.01

Parameters for digital input channel 1: connection X01, pin 4 / input A.

Index (hex)	Name	Meaning	Data type	Flags	Default
8000:0	DIP Settings Ch.01		UINT8	RO	0x12 (18_{dec})
8000:01	Enable Wirebreak	Enable wire break detection. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8000:11	Filter Time	Set input filter time. See chapter Input filter [▶ 122].	UINT16	RW	0x0000 (0_{dec})
8000:12	Signal Extension Time	Set pulse extension. See chapter Pulse extension [▶ 124].	UINT16	RW	0x0000 (0_{dec})

Index 8010 DIP Settings Ch.02

Parameters for digital input channel 2: connection X01, pin 2 / input B.

Index (hex)	Name	Meaning	Data type	Flags	Default
8010:0	DIP Settings Ch.02		UINT8	RO	0x12 (18_{dec})
8010:01	Enable Wirebreak	Enable wire break detection. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8010:11	Filter Time	Set input filter time. See chapter Input filter [▶ 122].	UINT16	RW	0x0000 (0_{dec})
8010:12	Signal Extension Time	Set pulse extension. See chapter Pulse extension [▶ 124].	UINT16	RW	0x0000 (0_{dec})

Index 8020 DIP Settings Ch.03

Parameters for digital input channel 3: connection X02, pin 4 / input A.

Index (hex)	Name	Meaning	Data type	Flags	Default
8020:0	DIP Settings Ch.03		UINT8	RO	0x12 (18_{dec})
8020:01	Enable Wirebreak	Enable wire break detection. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8020:11	Filter Time	Set input filter time. See chapter Input filter [▶ 122].	UINT16	RW	0x0000 (0_{dec})
8020:12	Signal Extension Time	Set pulse extension. See chapter Pulse extension [▶ 124].	UINT16	RW	0x0000 (0_{dec})

Index 8030 DIP Settings Ch.04

Parameters for digital input channel 4: connection X02, pin 2 / input B.

Index (hex)	Name	Meaning	Data type	Flags	Default
8030:0	DIP Settings Ch.04		UINT8	RO	0x12 (18_{dec})
8030:01	Enable Wirebreak	Enable wire break detection. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8030:11	Filter Time	Set input filter time. See chapter Input filter [▶ 122].	UINT16	RW	0x0000 (0_{dec})
8030:12	Signal Extension Time	Set pulse extension. See chapter Pulse extension [▶ 124].	UINT16	RW	0x0000 (0_{dec})

Index 8040 DIP Settings Ch.05

Parameters for digital input channel 5: connection X03, pin 4 / input A.

Index (hex)	Name	Meaning	Data type	Flags	Default
8040:0	DIP Settings Ch.05		UINT8	RO	0x12 (18_{dec})
8040:01	Enable Wirebreak	Enable wire break detection. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8040:11	Filter Time	Set input filter time. See chapter Input filter [▶ 122].	UINT16	RW	0x0000 (0_{dec})
8040:12	Signal Extension Time	Set pulse extension. See chapter Pulse extension [▶ 124].	UINT16	RW	0x0000 (0_{dec})

Index 8050 DIP Settings Ch.06

Parameters for digital input channel 6: connection X03, pin 2 / input B.

Index (hex)	Name	Meaning	Data type	Flags	Default
8050:0	DIP Settings Ch.06		UINT8	RO	0x12 (18_{dec})
8050:01	Enable Wirebreak	Enable wire break detection. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8050:11	Filter Time	Set input filter time. See chapter Input filter [▶ 122].	UINT16	RW	0x0000 (0_{dec})
8050:12	Signal Extension Time	Set pulse extension. See chapter Pulse extension [▶ 124].	UINT16	RW	0x0000 (0_{dec})

Index 8060 DIP Settings Ch.07

Parameters for digital input channel 7: connection X04, pin 4 / input A.

Index (hex)	Name	Meaning	Data type	Flags	Default
8060:0	DIP Settings Ch.07		UINT8	RO	0x12 (18_{dec})
8060:01	Enable Wirebreak	Enable wire break detection. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8060:11	Filter Time	Set input filter time. See chapter Input filter [▶ 122].	UINT16	RW	0x0000 (0_{dec})
8060:12	Signal Extension Time	Set pulse extension. See chapter Pulse extension [▶ 124].	UINT16	RW	0x0000 (0_{dec})

Index 8070 DIP Settings Ch.08

Parameters for digital input channel 8: connection X04, pin 2 / input B.

Index (hex)	Name	Meaning	Data type	Flags	Default
8070:0	DIP Settings Ch.08		UINT8	RO	0x12 (18_{dec})
8070:01	Enable Wirebreak	Enable wire break detection. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8070:11	Filter Time	Set input filter time. See chapter Input filter [▶ 122].	UINT16	RW	0x0000 (0_{dec})
8070:12	Signal Extension Time	Set pulse extension. See chapter Pulse extension [▶ 124].	UINT16	RW	0x0000 (0_{dec})

Index 8080 DIP Settings Ch.09

Parameters for digital input channel 9: connection X05, pin 4 / input A.

Index (hex)	Name	Meaning	Data type	Flags	Default
8080:0	DIP Settings Ch.09		UINT8	RO	0x12 (18_{dec})
8080:01	Enable Wirebreak	Enable wire break detection. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8080:11	Filter Time	Set input filter time. See chapter Input filter [▶ 122].	UINT16	RW	0x0000 (0_{dec})
8080:12	Signal Extension Time	Set pulse extension. See chapter Pulse extension [▶ 124].	UINT16	RW	0x0000 (0_{dec})

Index 8090 DIP Settings Ch.10

Parameters for digital input channel 10: connection X05, pin 2 / input B.

Index (hex)	Name	Meaning	Data type	Flags	Default
8090:0	DIP Settings Ch.10		UINT8	RO	0x12 (18_{dec})
8090:01	Enable Wirebreak	Enable wire break detection. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8090:11	Filter Time	Set input filter time. See chapter Input filter [▶ 122].	UINT16	RW	0x0000 (0_{dec})
8090:12	Signal Extension Time	Set pulse extension. See chapter Pulse extension [▶ 124].	UINT16	RW	0x0000 (0_{dec})

Index 80A0 DIP Settings Ch.11

Parameters for digital input channel 11: connection X06, pin 4 / input A.

Index (hex)	Name	Meaning	Data type	Flags	Default
80A0:0	DIP Settings Ch.11		UINT8	RO	0x12 (18_{dec})
80A0:01	Enable Wirebreak	Enable wire break detection. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
80A0:11	Filter Time	Set input filter time. See chapter Input filter [▶ 122].	UINT16	RW	0x0000 (0_{dec})
80A0:12	Signal Extension Time	Set pulse extension. See chapter Pulse extension [▶ 124].	UINT16	RW	0x0000 (0_{dec})

Index 80B0 DIP Settings Ch.12

Parameters for digital input channel 12: connection X06, pin 2 / input B.

Index (hex)	Name	Meaning	Data type	Flags	Default
80B0:0	DIP Settings Ch.12		UINT8	RO	0x12 (18_{dec})
80B0:01	Enable Wirebreak	Enable wire break detection. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
80B0:11	Filter Time	Set input filter time. See chapter Input filter [▶ 122].	UINT16	RW	0x0000 (0_{dec})
80B0:12	Signal Extension Time	Set pulse extension. See chapter Pulse extension [▶ 124].	UINT16	RW	0x0000 (0_{dec})

Index 80C0 DIP Settings Ch.13

Parameters for digital input channel 13: connection X07, pin 4 / input A.

Index (hex)	Name	Meaning	Data type	Flags	Default
80C0:0	DIP Settings Ch.13		UINT8	RO	0x12 (18_{dec})
80C0:01	Enable Wirebreak	Enable wire break detection. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
80C0:11	Filter Time	Set input filter time. See chapter Input filter [▶ 122].	UINT16	RW	0x0000 (0_{dec})
80C0:12	Signal Extension Time	Set pulse extension. See chapter Pulse extension [▶ 124].	UINT16	RW	0x0000 (0_{dec})

Index 80D0 DIP Settings Ch.14

Parameters for digital input channel 14: connection X07, pin 2 / input B.

Index (hex)	Name	Meaning	Data type	Flags	Default
80D0:0	DIP Settings Ch.14		UINT8	RO	0x12 (18_{dec})
80D0:01	Enable Wirebreak	Enable wire break detection. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
80D0:11	Filter Time	Set input filter time. See chapter Input filter [▶ 122].	UINT16	RW	0x0000 (0_{dec})
80D0:12	Signal Extension Time	Set pulse extension. See chapter Pulse extension [▶ 124].	UINT16	RW	0x0000 (0_{dec})

Index 80E0 DIP Settings Ch.15

Parameters for digital input channel 15: connection X08, pin 4 / input A.

Index (hex)	Name	Meaning	Data type	Flags	Default
80E0:0	DIP Settings Ch.15		UINT8	RO	0x12 (18_{dec})
80E0:01	Enable Wirebreak	Enable wire break detection. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
80E0:11	Filter Time	Set input filter time. See chapter Input filter [▶ 122].	UINT16	RW	0x0000 (0_{dec})
80E0:12	Signal Extension Time	Set pulse extension. See chapter Pulse extension [▶ 124].	UINT16	RW	0x0000 (0_{dec})

Index 80F0 DIP Settings Ch.16

Parameters for digital input channel 16: connection X08, pin 2 / input B.

Index (hex)	Name	Meaning	Data type	Flags	Default
80F0:0	DIP Settings Ch.16		UINT8	RO	0x12 (18_{dec})
80F0:01	Enable Wirebreak	Enable wire break detection. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
80F0:11	Filter Time	Set input filter time. See chapter Input filter [▶ 122].	UINT16	RW	0x0000 (0_{dec})
80F0:12	Signal Extension Time	Set pulse extension. See chapter Pulse extension [▶ 124].	UINT16	RW	0x0000 (0_{dec})

Index 8100 DOS Settings Ch.01

Parameters for the sensor power supply output at connection X01.

Index (hex)	Name	Meaning	Data type	Flags	Default
8100:0	DOS Settings Ch.01		UINT8	RO	0x11 (17_{dec})
8100:01	Detect Open Load in Off State	Enable wire break detection for the "off" state. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8100:02	Detect Open Load in On State	Enable wire break detection for the "on" state. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8100:03	Detect Short to 24V	Enables the detection of a short circuit after 24 V.	BOOLEAN	RW	0x00 (0_{dec})
8100:06	Use Output as Power Supply	Make the output switchable. See chapter Switching outputs [▶ 127].	BOOLEAN	RW	0x01 (1_{dec})
8100:11	Safe State Behavior	Determines the behavior of the output if the EtherCAT status of the device is not "Operational". See chapter Behavior on EtherCAT failure [▶ 128].	UINT8	RW	0x00 (0_{dec})

Index 8110 DOS Settings Ch.02

Parameters for the sensor power supply output at connection X02.

Index (hex)	Name	Meaning	Data type	Flags	Default
8110:0	DOS Settings Ch.02		UINT8	RO	0x11 (17_{dec})
8110:01	Detect Open Load in Off State	Enable wire break detection for the "off" state. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8110:02	Detect Open Load in On State	Enable wire break detection for the "on" state. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8110:03	Detect Short to 24V	Enables the detection of a short circuit after 24 V.	BOOLEAN	RW	0x00 (0_{dec})
8110:06	Use Output as Power Supply	Make the output switchable. See chapter Switching outputs [▶ 127].	BOOLEAN	RW	0x01 (1_{dec})
8110:11	Safe State Behavior	Determines the behavior of the output if the EtherCAT status of the device is not "Operational". See chapter Behavior on EtherCAT failure [▶ 128].	UINT8	RW	0x00 (0_{dec})

Index 8120 DOS Settings Ch.03

Parameters for the sensor power supply output at connection X03.

Index (hex)	Name	Meaning	Data type	Flags	Default
8120:0	DOS Settings Ch.03		UINT8	RO	0x11 (17_{dec})
8120:01	Detect Open Load in Off State	Enable wire break detection for the "off" state. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8120:02	Detect Open Load in On State	Enable wire break detection for the "on" state. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8120:03	Detect Short to 24V	Enables the detection of a short circuit after 24 V.	BOOLEAN	RW	0x00 (0_{dec})
8120:06	Use Output as Power Supply	Make the output switchable. See chapter Switching outputs [▶ 127].	BOOLEAN	RW	0x01 (1_{dec})
8120:11	Safe State Behavior	Determines the behavior of the output if the EtherCAT status of the device is not "Operational". See chapter Behavior on EtherCAT failure [▶ 128].	UINT8	RW	0x00 (0_{dec})

Index 8130 DOS Settings Ch.04

Parameters for the sensor power supply output at connection X04.

Index (hex)	Name	Meaning	Data type	Flags	Default
8130:0	DOS Settings Ch.04		UINT8	RO	0x11 (17_{dec})
8130:01	Detect Open Load in Off State	Enable wire break detection for the "off" state. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8130:02	Detect Open Load in On State	Enable wire break detection for the "on" state. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8130:03	Detect Short to 24V	Enables the detection of a short circuit after 24 V.	BOOLEAN	RW	0x00 (0_{dec})
8130:06	Use Output as Power Supply	Make the output switchable. See chapter Switching outputs [▶ 127].	BOOLEAN	RW	0x01 (1_{dec})
8130:11	Safe State Behavior	Determines the behavior of the output if the EtherCAT status of the device is not "Operational". See chapter Behavior on EtherCAT failure [▶ 128].	UINT8	RW	0x00 (0_{dec})

Index 8140 DOS Settings Ch.05

Parameters for the sensor power supply output at connection X05.

Index (hex)	Name	Meaning	Data type	Flags	Default
8140:0	DOS Settings Ch.05		UINT8	RO	0x11 (17_{dec})
8140:01	Detect Open Load in Off State	Enable wire break detection for the "off" state. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8140:02	Detect Open Load in On State	Enable wire break detection for the "on" state. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8140:03	Detect Short to 24V	Enables the detection of a short circuit after 24 V.	BOOLEAN	RW	0x00 (0_{dec})
8140:06	Use Output as Power Supply	Make the output switchable. See chapter Switching outputs [▶ 127].	BOOLEAN	RW	0x01 (1_{dec})
8140:11	Safe State Behavior	Determines the behavior of the output if the EtherCAT status of the device is not "Operational". See chapter Behavior on EtherCAT failure [▶ 128].	UINT8	RW	0x00 (0_{dec})

Index 8150 DOS Settings Ch.06

Parameters for the sensor power supply output at connection X06.

Index (hex)	Name	Meaning	Data type	Flags	Default
8150:0	DOS Settings Ch.06		UINT8	RO	0x11 (17_{dec})
8150:01	Detect Open Load in Off State	Enable wire break detection for the "off" state. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8150:02	Detect Open Load in On State	Enable wire break detection for the "on" state. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8150:03	Detect Short to 24V	Enables the detection of a short circuit after 24 V.	BOOLEAN	RW	0x00 (0_{dec})
8150:06	Use Output as Power Supply	Make the output switchable. See chapter Switching outputs [▶ 127].	BOOLEAN	RW	0x01 (1_{dec})
8150:11	Safe State Behavior	Determines the behavior of the output if the EtherCAT status of the device is not "Operational". See chapter Behavior on EtherCAT failure [▶ 128].	UINT8	RW	0x00 (0_{dec})

Index 8160 DOS Settings Ch.07

Parameters for the sensor power supply output at connection X07.

Index (hex)	Name	Meaning	Data type	Flags	Default
8160:0	DOS Settings Ch.07		UINT8	RO	0x11 (17_{dec})
8160:01	Detect Open Load in Off State	Enable wire break detection for the "off" state. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8160:02	Detect Open Load in On State	Enable wire break detection for the "on" state. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8160:03	Detect Short to 24V	Enables the detection of a short circuit after 24 V.	BOOLEAN	RW	0x00 (0_{dec})
8160:06	Use Output as Power Supply	Make the output switchable. See chapter Switching outputs [▶ 127].	BOOLEAN	RW	0x01 (1_{dec})
8160:11	Safe State Behavior	Determines the behavior of the output if the EtherCAT status of the device is not "Operational". See chapter Behavior on EtherCAT failure [▶ 128].	UINT8	RW	0x00 (0_{dec})

Index 8170 DOS Settings Ch.08

Parameters for the sensor power supply output at connection X08.

Index (hex)	Name	Meaning	Data type	Flags	Default
8170:0	DOS Settings Ch.08		UINT8	RO	0x11 (17_{dec})
8170:01	Detect Open Load in Off State	Enable wire break detection for the "off" state. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8170:02	Detect Open Load in On State	Enable wire break detection for the "on" state. See chapter Wire break detection (EP1839-0022, EP1839-0042) [▶ 144].	BOOLEAN	RW	0x00 (0_{dec})
8170:03	Detect Short to 24V	Enables the detection of a short circuit after 24 V.	BOOLEAN	RW	0x00 (0_{dec})
8170:06	Use Output as Power Supply	Make the output switchable. See chapter Switching outputs [▶ 127].	BOOLEAN	RW	0x01 (1_{dec})
8170:11	Safe State Behavior	Determines the behavior of the output if the EtherCAT status of the device is not "Operational". See chapter Behavior on EtherCAT failure [▶ 128].	UINT8	RW	0x00 (0_{dec})

7.6.2 Objects for diagnostics

Index F900 DEV Info Data

Index (hex)	Name	Meaning	Data type	Flags	Default
F900:0	DEV Info Data		UINT8	RO	0x04 (4_{dec})
F900:02	Internal Temperature		INT8	RO	0x00 (0_{dec})
F900:04	Voltage Us		UINT16	RO	0x0000 (0_{dec})

7.6.3 Standard objects

Index 1000 Device type

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

Index 1008 Device name

Index (hex)	Name	Meaning	Data type	Flags	Default
1008:0	Device name	Device name of the EtherCAT device.	STRING	RO	EP1839-0022 / EP1839-0042

Index 1009 Hardware version

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

Index 100A Software version

Index (hex)	Name	Meaning	Data type	Flags	Default
100A:0	Software version	Firmware version of the EtherCAT device.	STRING	RO	02

Index 100B Bootloader version

Index (hex)	Name	Meaning	Data type	Flags	Default
100B:0	Bootloader version		STRING	RO	N/A

Index 1011 Restore default parameters

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

Index 1018 Identity

Index (hex)	Name	Meaning	Data type	Flags	Default
1018:0	Identity	Information for identifying the slave	UINT8	RO	0x04 (4_{dec})
1018:01	Vendor ID	Vendor ID of the EtherCAT slave	UINT32	RO	0x00000002 (2_{dec})
1018:02	Product code	Product code of the EtherCAT slave	UINT32	RO	0x072F4052 (120537170_{dec})
1018:03	Revision	Revision number of the EtherCAT slave; the Low Word (bit 0-15) indicates the special terminal number, the High Word (bit 16-31) refers to the device description	UINT32	RO	0x00000000 (0_{dec})
1018:04	Serial number	Serial number of the EtherCAT slave; the Low Byte (bit 0-7) of the Low Word contains the year of production, the High Byte (bit 8-15) of the Low Word contains the week of production, the High Word (bit 16-31) is 0	UINT32	RO	0x00000000 (0_{dec})

Index 10E2 Manufacturer-specific Identification Code

Index (hex)	Name	Meaning	Data type	Flags	Default
10E2:0	Manufacturer-specific Identification Code		UINT8	RO	0x01 (1_{dec})
10E2:01	SubIndex 001	reserved	STRING	RO	

Index 10F0 Backup parameter handling

Index (hex)	Name	Meaning	Data type	Flags	Default
10F0:01	Checksum	Checksum across all backup entries of the EtherCAT slave	UINT32	RO	0x00000000 (0_{dec})

Index 10F3 Diagnosis History

Index (hex)	Name	Meaning	Data type	Flags	Default
10F3:0	Diagnosis History		UINT8	RO	0x15 (21_{dec})
10F3:01	Maximum Messages	Maximum number of stored messages A maximum of 16 messages can be stored.	UINT8	RO	0x00 (0_{dec})
10F3:02	Newest Message	Subindex of the latest message.	UINT8	RO	0x00 (0_{dec})
10F3:03	Newest Acknowledged Message	Subindex of the last confirmed message.	UINT8	RW	0x00 (0_{dec})
10F3:04	New Messages Available	Indicates that a new message is available.	BOOLEAN	RO	0x00 (0_{dec})
10F3:05	Flags		UINT16	RW	0x0000 (0_{dec})
10F3:06	Diagnosis Message 001	Diag Message 1	OCTET-STRING[20]	RO	{0}
…	…	…	…	…	…
10F3:15	Diagnosis Message 016	Diag Message 16	OCTET-STRING[20]	RO	{0}

Index 10F8 Timestamp Object

Index (hex)	Name	Meaning	Data type	Flags	Default
10F8:0	Timestamp Object	Timestamp	UINT64	RO	

Index 10F9 Time Distribution Object

Index (hex)	Name	Meaning	Data type	Flags	Default
10F9:0	Time Distribution Object		UINT8	RO	0x01 (1_{dec})
10F9:01	Distributed Time Value	Object for time distribution by the EtherCAT master.	UINT64	RW	

Index 1602 DOS RxPDO-Map Output

Index (hex)	Name	Meaning	Data type	Flags	Default
1602:0	DOS RxPDO-Map Output	PDO Mapping RxPDO 3	UINT8	RO	0x08 (8_{dec})
1602:01	SubIndex 001	1. PDO Mapping entry (object 0x7100 (DOS Output Ch.01), entry 0x01 (Output))	UINT32	RO	0x7100:01, 1
1602:02	SubIndex 002	2. PDO Mapping entry (object 0x7110 (DOS Output Ch.02), entry 0x01 (Output))	UINT32	RO	0x7110:01, 1
1602:03	SubIndex 003	3. PDO Mapping entry (object 0x7120 (DOS Output Ch.03), entry 0x01 (Output))	UINT32	RO	0x7120:01, 1
1602:04	SubIndex 004	4. PDO Mapping entry (object 0x7130 (DOS Output Ch.04), entry 0x01 (Output))	UINT32	RO	0x7130:01, 1
1602:05	SubIndex 005	5. PDO Mapping entry (object 0x7140 (DOS Output Ch.05), entry 0x01 (Output))	UINT32	RO	0x7140:01, 1
1602:06	SubIndex 006	6. PDO Mapping entry (object 0x7150 (DOS Output Ch.06), entry 0x01 (Output))	UINT32	RO	0x7150:01, 1
1602:07	SubIndex 007	7. PDO Mapping entry (object 0x7160 (DOS Output Ch.07), entry 0x01 (Output))	UINT32	RO	0x7160:01, 1
1602:08	SubIndex 008	8. PDO Mapping entry (object 0x7170 (DOS Output Ch.08), entry 0x01 (Output))	UINT32	RO	0x7170:01, 1

Index 1801 DIP TxPDO-Par Diagnosis

Index (hex)	Name	Meaning	Data type	Flags	Default
1801:0	DIP TxPDO-Par Diagnosis	PDO parameter TxPDO 2	UINT8	RO	0x06 (6_{dec})
1801:06	Exclude TxPDOs	Specifies the TxPDOs (index of TxPDO mapping objects) that must not be transferred together with TxPDO 2	OCTET-STRING[2]	RO	04 1A

Index 1804 DIP TxPDO-Par Extended Diagnosis

Index (hex)	Name	Meaning	Data type	Flags	Default
1804:0	DIP TxPDO-Par Extended Diagnosis	PDO parameter TxPDO 5	UINT8	RO	0x06 (6_{dec})
1804:06	Exclude TxPDOs	Specifies the TxPDOs (index of TxPDO mapping objects) that must not be transferred together with TxPDO 5	OCTET-STRING[2]	RO	01 1A

Index 1A00 DIP TxPDO-Map Input

Index (hex)	Name	Meaning	Data type	Flags	Default
1A00:0	DIP TxPDO-Map Input	PDO Mapping TxPDO 1	UINT8	RO	0x10 (16_{dec})
1A00:01	SubIndex 001	1. PDO Mapping entry (object 0x6000 (DIP Input Ch.01), entry 0x01 (Input))	UINT32	RO	0x6000:01, 1
1A00:02	SubIndex 002	2. PDO Mapping entry (object 0x6010 (DIP Input Ch.02), entry 0x01 (Input))	UINT32	RO	0x6010:01, 1
1A00:03	SubIndex 003	3. PDO Mapping entry (object 0x6020 (DIP Input Ch.03), entry 0x01 (Input))	UINT32	RO	0x6020:01, 1
1A00:04	SubIndex 004	4. PDO Mapping entry (object 0x6030 (DIP Input Ch.04), entry 0x01 (Input))	UINT32	RO	0x6030:01, 1
1A00:05	SubIndex 005	5. PDO Mapping entry (object 0x6040 (DIP Input Ch.05), entry 0x01 (Input))	UINT32	RO	0x6040:01, 1
1A00:06	SubIndex 006	6. PDO Mapping entry (object 0x6050 (DIP Input Ch.06), entry 0x01 (Input))	UINT32	RO	0x6050:01, 1
1A00:07	SubIndex 007	7. PDO Mapping entry (object 0x6060 (DIP Input Ch.07), entry 0x01 (Input))	UINT32	RO	0x6060:01, 1
1A00:08	SubIndex 008	8. PDO Mapping entry (object 0x6070 (DIP Input Ch.08), entry 0x01 (Input))	UINT32	RO	0x6070:01, 1
1A00:09	SubIndex 009	9. PDO Mapping entry (object 0x6080 (DIP Input Ch.09), entry 0x01 (Input))	UINT32	RO	0x6080:01, 1
1A00:0A	SubIndex 010	10. PDO Mapping entry (object 0x6090 (DIP Input Ch.10), entry 0x01 (Input))	UINT32	RO	0x6090:01, 1
1A00:0B	SubIndex 011	11. PDO Mapping entry (object 0x60A0 (DIP Input Ch.11), entry 0x01 (Input))	UINT32	RO	0x60A0:01, 1
1A00:0C	SubIndex 012	12. PDO Mapping entry (object 0x60B0 (DIP Input Ch.12), entry 0x01 (Input))	UINT32	RO	0x60B0:01, 1
1A00:0D	SubIndex 013	13. PDO Mapping entry (object 0x60C0 (DIP Input Ch.13), entry 0x01 (Input))	UINT32	RO	0x60C0:01, 1
1A00:0E	SubIndex 014	14. PDO Mapping entry (object 0x60D0 (DIP Input Ch.14), entry 0x01 (Input))	UINT32	RO	0x60D0:01, 1
1A00:0F	SubIndex 015	15. PDO Mapping entry (object 0x60E0 (DIP Input Ch.15), entry 0x01 (Input))	UINT32	RO	0x60E0:01, 1
1A00:10	SubIndex 016	16. PDO Mapping entry (object 0x60F0 (DIP Input Ch.16), entry 0x01 (Input))	UINT32	RO	0x60F0:01, 1

Index 1A01 DIP TxPDO-Map Diagnosis

Index (hex)	Name	Meaning	Data type	Flags	Default
1A01:0	DIP TxPDO-Map Diagnosis	PDO Mapping TxPDO 2	UINT8	RO	0x10 (16_{dec})
1A01:01	SubIndex 001	1. PDO Mapping entry (object 0x6001 (DIP Diagnosis Ch.01), entry 0x01 (Wirebreak))	UINT32	RO	0x6001:01, 1
1A01:02	SubIndex 002	2. PDO Mapping entry (object 0x6011 (DIP Diagnosis Ch.02), entry 0x01 (Wirebreak))	UINT32	RO	0x6011:01, 1
1A01:03	SubIndex 003	3. PDO Mapping entry (object 0x6021 (DIP Diagnosis Ch.03), entry 0x01 (Wirebreak))	UINT32	RO	0x6021:01, 1
1A01:04	SubIndex 004	4. PDO Mapping entry (object 0x6031 (DIP Diagnosis Ch.04), entry 0x01 (Wirebreak))	UINT32	RO	0x6031:01, 1
1A01:05	SubIndex 005	5. PDO Mapping entry (object 0x6041 (DIP Diagnosis Ch.05), entry 0x01 (Wirebreak))	UINT32	RO	0x6041:01, 1
1A01:06	SubIndex 006	6. PDO Mapping entry (object 0x6051 (DIP Diagnosis Ch.06), entry 0x01 (Wirebreak))	UINT32	RO	0x6051:01, 1
1A01:07	SubIndex 007	7. PDO Mapping entry (object 0x6061 (DIP Diagnosis Ch.07), entry 0x01 (Wirebreak))	UINT32	RO	0x6061:01, 1
1A01:08	SubIndex 008	8. PDO Mapping entry (object 0x6071 (DIP Diagnosis Ch.08), entry 0x01 (Wirebreak))	UINT32	RO	0x6071:01, 1
1A01:09	SubIndex 009	9. PDO Mapping entry (object 0x6081 (DIP Diagnosis Ch.09), entry 0x01 (Wirebreak))	UINT32	RO	0x6081:01, 1
1A01:0A	SubIndex 010	10. PDO Mapping entry (object 0x6091 (DIP Diagnosis Ch.10), entry 0x01 (Wirebreak))	UINT32	RO	0x6091:01, 1
1A01:0B	SubIndex 011	11. PDO Mapping entry (object 0x60A1 (DIP Diagnosis Ch.11), entry 0x01 (Wirebreak))	UINT32	RO	0x60A1:01, 1
1A01:0C	SubIndex 012	12. PDO Mapping entry (object 0x60B1 (DIP Diagnosis Ch.12), entry 0x01 (Wirebreak))	UINT32	RO	0x60B1:01, 1
1A01:0D	SubIndex 013	13. PDO Mapping entry (object 0x60C1 (DIP Diagnosis Ch.13), entry 0x01 (Wirebreak))	UINT32	RO	0x60C1:01, 1
1A01:0E	SubIndex 014	14. PDO Mapping entry (object 0x60D1 (DIP Diagnosis Ch.14), entry 0x01 (Wirebreak))	UINT32	RO	0x60D1:01, 1
1A01:0F	SubIndex 015	15. PDO Mapping entry (object 0x60E1 (DIP Diagnosis Ch.15), entry 0x01 (Wirebreak))	UINT32	RO	0x60E1:01, 1
1A01:10	SubIndex 016	16. PDO Mapping entry (object 0x60F1 (DIP Diagnosis Ch.16), entry 0x01 (Wirebreak))	UINT32	RO	0x60F1:01, 1

Index 1A02 DOS TxPDO-Map Diagnosis

Index (hex)	Name	Meaning	Data type	Flags	Default
1A02:0	DOS TxPDO-Map Diagnosis	PDO Mapping TxPDO 3	UINT8	RO	0x20 (32_{dec})
1A02:01	SubIndex 001	1. PDO Mapping entry (object 0x6100 (DOS Diagnosis Ch.01), entry 0x01 (Overcurrent))	UINT32	RO	0x6100:01, 1
1A02:02	SubIndex 002	2. PDO Mapping entry (object 0x6100 (DOS Diagnosis Ch.01), entry 0x02 (Overload))	UINT32	RO	0x6100:02, 1
1A02:03	SubIndex 003	3. PDO Mapping entry (object 0x6100 (DOS Diagnosis Ch.01), entry 0x03 (Open Load))	UINT32	RO	0x6100:03, 1
1A02:04	SubIndex 004	4. PDO Mapping entry (object 0x6100 (DOS Diagnosis Ch.01), entry 0x04 (Short to 24V))	UINT32	RO	0x6100:04, 1
1A02:05	SubIndex 005	5. PDO Mapping entry (object 0x6110 (DOS Diagnosis Ch.02), entry 0x01 (Overcurrent))	UINT32	RO	0x6110:01, 1
1A02:06	SubIndex 006	6. PDO Mapping entry (object 0x6110 (DOS Diagnosis Ch.02), entry 0x02 (Overload))	UINT32	RO	0x6110:02, 1
1A02:07	SubIndex 007	7. PDO Mapping entry (object 0x6110 (DOS Diagnosis Ch.02), entry 0x03 (Open Load))	UINT32	RO	0x6110:03, 1
1A02:08	SubIndex 008	8. PDO Mapping entry (object 0x6110 (DOS Diagnosis Ch.02), entry 0x04 (Short to 24V))	UINT32	RO	0x6110:04, 1
1A02:09	SubIndex 009	9. PDO Mapping entry (object 0x6120 (DOS Diagnosis Ch.03), entry 0x01 (Overcurrent))	UINT32	RO	0x6120:01, 1
1A02:0A	SubIndex 010	10. PDO Mapping entry (object 0x6120 (DOS Diagnosis Ch.03), entry 0x02 (Overload))	UINT32	RO	0x6120:02, 1
1A02:0B	SubIndex 011	11. PDO Mapping entry (object 0x6120 (DOS Diagnosis Ch.03), entry 0x03 (Open Load))	UINT32	RO	0x6120:03, 1
1A02:0C	SubIndex 012	12. PDO Mapping entry (object 0x6120 (DOS Diagnosis Ch.03), entry 0x04 (Short to 24V))	UINT32	RO	0x6120:04, 1
1A02:0D	SubIndex 013	13. PDO Mapping entry (object 0x6130 (DOS Diagnosis Ch.04), entry 0x01 (Overcurrent))	UINT32	RO	0x6130:01, 1
1A02:0E	SubIndex 014	14. PDO Mapping entry (object 0x6130 (DOS Diagnosis Ch.04), entry 0x02 (Overload))	UINT32	RO	0x6130:02, 1
1A02:0F	SubIndex 015	15. PDO Mapping entry (object 0x6130 (DOS Diagnosis Ch.04), entry 0x03 (Open Load))	UINT32	RO	0x6130:03, 1
1A02:10	SubIndex 016	16. PDO Mapping entry (object 0x6130 (DOS Diagnosis Ch.04), entry 0x04 (Short to 24V))	UINT32	RO	0x6130:04, 1
1A02:11	SubIndex 017	17. PDO Mapping entry (object 0x6140 (DOS Diagnosis Ch.05), entry 0x01 (Overcurrent))	UINT32	RO	0x6140:01, 1
1A02:12	SubIndex 018	18. PDO Mapping entry (object 0x6140 (DOS Diagnosis Ch.05), entry 0x02 (Overload))	UINT32	RO	0x6140:02, 1
1A02:13	SubIndex 019	19. PDO Mapping entry (object 0x6140 (DOS Diagnosis Ch.05), entry 0x03 (Open Load))	UINT32	RO	0x6140:03, 1
1A02:14	SubIndex 020	20. PDO Mapping entry (object 0x6140 (DOS Diagnosis Ch.05), entry 0x04 (Short to 24V))	UINT32	RO	0x6140:04, 1
1A02:15	SubIndex 021	21. PDO Mapping entry (object 0x6150 (DOS Diagnosis Ch.06), entry 0x01 (Overcurrent))	UINT32	RO	0x6150:01, 1
1A02:16	SubIndex 022	22. PDO Mapping entry (object 0x6150 (DOS Diagnosis Ch.06), entry 0x02 (Overload))	UINT32	RO	0x6150:02, 1
1A02:17	SubIndex 023	23. PDO Mapping entry (object 0x6150 (DOS Diagnosis Ch.06), entry 0x03 (Open Load))	UINT32	RO	0x6150:03, 1
1A02:18	SubIndex 024	24. PDO Mapping entry (object 0x6150 (DOS Diagnosis Ch.06), entry 0x04 (Short to 24V))	UINT32	RO	0x6150:04, 1
1A02:19	SubIndex 025	25. PDO Mapping entry (object 0x6160 (DOS Diagnosis Ch.07), entry 0x01 (Overcurrent))	UINT32	RO	0x6160:01, 1
1A02:1A	SubIndex 026	26. PDO Mapping entry (object 0x6160 (DOS Diagnosis Ch.07), entry 0x02 (Overload))	UINT32	RO	0x6160:02, 1
1A02:1B	SubIndex 027	27. PDO Mapping entry (object 0x6160 (DOS Diagnosis Ch.07), entry 0x03 (Open Load))	UINT32	RO	0x6160:03, 1
1A02:1C	SubIndex 028	28. PDO Mapping entry (object 0x6160 (DOS Diagnosis Ch.07), entry 0x04 (Short to 24V))	UINT32	RO	0x6160:04, 1
1A02:1D	SubIndex 029	29. PDO Mapping entry (object 0x6170 (DOS Diagnosis Ch.08), entry 0x01 (Overcurrent))	UINT32	RO	0x6170:01, 1

Index (hex)	Name	Meaning	Data type	Flags	Default
1A02:1E	SubIndex 030	30. PDO Mapping entry (object 0x6170 (DOS Diagnosis Ch.08), entry 0x02 (Overload))	UINT32	RO	0x6170:02, 1
1A02:1F	SubIndex 031	31. PDO Mapping entry (object 0x6170 (DOS Diagnosis Ch.08), entry 0x03 (Open Load))	UINT32	RO	0x6170:03, 1
1A02:20	SubIndex 032	32. PDO Mapping entry (object 0x6170 (DOS Diagnosis Ch.08), entry 0x04 (Short to 24V))	UINT32	RO	0x6170:04, 1

Index 1A03 DEV TxPDO-Map Inputs Device

Index (hex)	Name	Meaning	Data type	Flags	Default
1A03:0	DEV TxPDO-Map Inputs Device	PDO Mapping TxPDO 4	UINT8	RO	0x07 (7_{dec})
1A03:01	SubIndex 001	1. PDO Mapping entry (object 0xF600 (DEV Inputs), entry 0x01 (Undervoltage Us))	UINT32	RO	0xF600:01, 1
1A03:02	SubIndex 002	2. PDO Mapping entry (1 bits align)	UINT32	RO	0x0000:00, 1
1A03:03	SubIndex 003	3. PDO Mapping entry (object 0xF600 (DEV Inputs), entry 0x03 (Overtemperature))	UINT32	RO	0xF600:03, 1
1A03:04	SubIndex 004	4. PDO Mapping entry (9 bits align)	UINT32	RO	0x0000:00, 9
1A03:05	SubIndex 005	5. PDO Mapping entry (object 0xF600 (DEV Inputs), entry 0x0D (Diag))	UINT32	RO	0xF600:0D, 1
1A03:06	SubIndex 006	6. PDO Mapping entry (object 0xF600 (DEV Inputs), entry 0x0E (TxPDO State))	UINT32	RO	0xF600:0E, 1
1A03:07	SubIndex 007	7. PDO Mapping entry (object 0xF600 (DEV Inputs), entry 0x0F (Input cycle counter))	UINT32	RO	0xF600:0F, 2

Index 1A04 DIP TxPDO-Map Extended Diagnosis

Index (hex)	Name	Meaning	Data type	Flags	Default
1A04:0	DIP TxPDO-Map Extended Diagnosis	PDO Mapping TxPDO 5	UINT8	RO	0x20 (32_{dec})
1A04:01	SubIndex 001	1. PDO Mapping entry (object 0x6001 (DIP Diagnosis Ch.01), entry 0x01 (Wirebreak))	UINT32	RO	0x6001:01, 1
1A04:02	SubIndex 002	2. PDO Mapping entry (object 0x6001 (DIP Diagnosis Ch.01), entry 0x03 (Power Supply Missing))	UINT32	RO	0x6001:03, 1
1A04:03	SubIndex 003	3. PDO Mapping entry (object 0x6011 (DIP Diagnosis Ch.02), entry 0x01 (Wirebreak))	UINT32	RO	0x6011:01, 1
1A04:04	SubIndex 004	4. PDO Mapping entry (object 0x6011 (DIP Diagnosis Ch.02), entry 0x03 (Power Supply Missing))	UINT32	RO	0x6011:03, 1
1A04:05	SubIndex 005	5. PDO Mapping entry (object 0x6021 (DIP Diagnosis Ch.03), entry 0x01 (Wirebreak))	UINT32	RO	0x6021:01, 1
1A04:06	SubIndex 006	6. PDO Mapping entry (object 0x6021 (DIP Diagnosis Ch.03), entry 0x03 (Power Supply Missing))	UINT32	RO	0x6021:03, 1
1A04:07	SubIndex 007	7. PDO Mapping entry (object 0x6031 (DIP Diagnosis Ch.04), entry 0x01 (Wirebreak))	UINT32	RO	0x6031:01, 1
1A04:08	SubIndex 008	8. PDO Mapping entry (object 0x6031 (DIP Diagnosis Ch.04), entry 0x03 (Power Supply Missing))	UINT32	RO	0x6031:03, 1
1A04:09	SubIndex 009	9. PDO Mapping entry (object 0x6041 (DIP Diagnosis Ch.05), entry 0x01 (Wirebreak))	UINT32	RO	0x6041:01, 1
1A04:0A	SubIndex 010	10. PDO Mapping entry (object 0x6041 (DIP Diagnosis Ch.05), entry 0x03 (Power Supply Missing))	UINT32	RO	0x6041:03, 1
1A04:0B	SubIndex 011	11. PDO Mapping entry (object 0x6051 (DIP Diagnosis Ch.06), entry 0x01 (Wirebreak))	UINT32	RO	0x6051:01, 1
1A04:0C	SubIndex 012	12. PDO Mapping entry (object 0x6051 (DIP Diagnosis Ch.06), entry 0x03 (Power Supply Missing))	UINT32	RO	0x6051:03, 1
1A04:0D	SubIndex 013	13. PDO Mapping entry (object 0x6061 (DIP Diagnosis Ch.07), entry 0x01 (Wirebreak))	UINT32	RO	0x6061:01, 1
1A04:0E	SubIndex 014	14. PDO Mapping entry (object 0x6061 (DIP Diagnosis Ch.07), entry 0x03 (Power Supply Missing))	UINT32	RO	0x6061:03, 1
1A04:0F	SubIndex 015	15. PDO Mapping entry (object 0x6071 (DIP Diagnosis Ch.08), entry 0x01 (Wirebreak))	UINT32	RO	0x6071:01, 1
1A04:10	SubIndex 016	16. PDO Mapping entry (object 0x6071 (DIP Diagnosis Ch.08), entry 0x03 (Power Supply Missing))	UINT32	RO	0x6071:03, 1
1A04:11	SubIndex 017	17. PDO Mapping entry (object 0x6081 (DIP Diagnosis Ch.09), entry 0x01 (Wirebreak))	UINT32	RO	0x6081:01, 1
1A04:12	SubIndex 018	18. PDO Mapping entry (object 0x6081 (DIP Diagnosis Ch.09), entry 0x03 (Power Supply Missing))	UINT32	RO	0x6081:03, 1
1A04:13	SubIndex 019	19. PDO Mapping entry (object 0x6091 (DIP Diagnosis Ch.10), entry 0x01 (Wirebreak))	UINT32	RO	0x6091:01, 1
1A04:14	SubIndex 020	20. PDO Mapping entry (object 0x6091 (DIP Diagnosis Ch.10), entry 0x03 (Power Supply Missing))	UINT32	RO	0x6091:03, 1
1A04:15	SubIndex 021	21. PDO Mapping entry (object 0x60A1 (DIP Diagnosis Ch.11), entry 0x01 (Wirebreak))	UINT32	RO	0x60A1:01, 1
1A04:16	SubIndex 022	22. PDO Mapping entry (object 0x60A1 (DIP Diagnosis Ch.11), entry 0x03 (Power Supply Missing))	UINT32	RO	0x60A1:03, 1
1A04:17	SubIndex 023	23. PDO Mapping entry (object 0x60B1 (DIP Diagnosis Ch.12), entry 0x01 (Wirebreak))	UINT32	RO	0x60B1:01, 1
1A04:18	SubIndex 024	24. PDO Mapping entry (object 0x60B1 (DIP Diagnosis Ch.12), entry 0x03 (Power Supply Missing))	UINT32	RO	0x60B1:03, 1

Index (hex)	Name	Meaning	Data type	Flags	Default
1A04:19	SubIndex 025	25. PDO Mapping entry (object 0x60C1 (DIP Diagnosis Ch.13), entry 0x01 (Wirebreak))	UINT32	RO	0x60C1:01, 1
1A04:1A	SubIndex 026	26. PDO Mapping entry (object 0x60C1 (DIP Diagnosis Ch.13), entry 0x03 (Power Supply Missing))	UINT32	RO	0x60C1:03, 1
1A04:1B	SubIndex 027	27. PDO Mapping entry (object 0x60D1 (DIP Diagnosis Ch.14), entry 0x01 (Wirebreak))	UINT32	RO	0x60D1:01, 1
1A04:1C	SubIndex 028	28. PDO Mapping entry (object 0x60D1 (DIP Diagnosis Ch.14), entry 0x03 (Power Supply Missing))	UINT32	RO	0x60D1:03, 1
1A04:1D	SubIndex 029	29. PDO Mapping entry (object 0x60E1 (DIP Diagnosis Ch.15), entry 0x01 (Wirebreak))	UINT32	RO	0x60E1:01, 1
1A04:1E	SubIndex 030	30. PDO Mapping entry (object 0x60E1 (DIP Diagnosis Ch.15), entry 0x03 (Power Supply Missing))	UINT32	RO	0x60E1:03, 1
1A04:1F	SubIndex 031	31. PDO Mapping entry (object 0x60F1 (DIP Diagnosis Ch.16), entry 0x01 (Wirebreak))	UINT32	RO	0x60F1:01, 1
1A04:20	SubIndex 032	32. PDO Mapping entry (object 0x60F1 (DIP Diagnosis Ch.16), entry 0x03 (Power Supply Missing))	UINT32	RO	0x60F1:03, 1

Index 1C00 Sync manager type

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

Index 1C12 RxPDO assign

Index (hex)	Name	Meaning	Data type	Flags	Default
1C12:0	RxPDO assign	PDO Assign Outputs	UINT8	RW	0x00 (0_{dec})
1C12:01	Subindex 001	1. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x0000 (0_{dec})

Index 1C13 TxPDO assign

Index (hex)	Name	Meaning	Data type	Flags	Default
1C13:0	TxPDO assign	PDO Assign Inputs	UINT8	RW	0x03 (3_{dec})
1C13:01	Subindex 001	1. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x1A00 (6656_{dec})
1C13:02	Subindex 002	2. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x1A01 (6657_{dec})
1C13:03	Subindex 003	3. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x1A03 (6659_{dec})
1C13:04	Subindex 004	4. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x0000 (0_{dec})

Index 1C32 SM output parameter

Index (hex)	Name	Meaning	Data type	Flags	Default
1C32:0	SM output parameter	Synchronization parameters for the outputs	UINT8	RO	0x20 (32_{dec})
1C32:01	Sync mode	Current 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	0x0000 (0_{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	0x00000000 (0_{dec})
1C32:03	Shift time	Time between SYNC0 event and output of the outputs (in ns, DC mode only)	UINT32	RO	0x00000000 (0_{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 (measurement through writing of 1C32:08)	UINT16	RO	0x440B (17419_{dec})
1C32:05	Minimum cycle time	Minimum cycle time (in ns)	UINT32	RO	0x00000000 (0_{dec})
1C32:06	Calc and copy time	Minimum time between SYNC0 and SYNC1 event (in ns, DC mode only)	UINT32	RO	0x00000000 (0_{dec})
1C32:07	Minimum delay time		UINT32	RO	0x00000000 (0_{dec})
1C32:08	Get Cycle Time	Possible values: • 0: Measurement of the local cycle time is stopped • 1: Measurement of the local cycle time is started The parameters 1C32:03, 1C32:05, 1C32:06, 1C32:09, 1C33:03, 1C33:06, 1C33:09 are updated with the maximum measured values. When measuring again, the measured values will be reset.	UINT16	RW	0x0000 (0_{dec})
1C32:09	Maximum delay time	Time between SYNC1 event and output of the outputs (in ns, DC mode only)	UINT32	RO	0x00000000 (0_{dec})
1C32:0B	SM event missed counter	Number of missed SM events in OPERATIONAL (DC mode only)	UINT16	RO	0x0000 (0_{dec})
1C32:0C	Cycle exceeded counter	Number of occasions the cycle time was exceeded in OPERATIONAL (cycle was not completed in time or the next cycle began too early)	UINT16	RO	0x0000 (0_{dec})
1C32:0D	Shift too short counter	Number of occasions that the interval between SYNC0 and SYNC1 event was too short (DC mode only)	UINT16	RO	0x0000 (0_{dec})
1C32:20	Sync error	The synchronization was not correct in the last cycle (outputs were output too late; DC mode only)	BOOLEAN	RO	0x00 (0_{dec})

Index 1C33 SM input parameter

Index (hex)	Name	Meaning	Data type	Flags	Default
1C33:0	SM input parameter	Synchronization parameters for the inputs	UINT8	RO	0x20 (32_{dec})
1C33:01	Sync mode	Current synchronization mode: • 0: Free Run • 1: 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	0x0001 (1_{dec})
1C33:02	Cycle time	as 1C32:02	UINT32	RW	0x000F4240 (1000000_{dec})
1C33:03	Shift time	Time between SYNC0 event and reading of the inputs (in ns, DC mode only)	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 through local event (outputs available) • Bit 4-5 = 10: Input shift with SYNC1 event (no outputs available) • Bit 14 = 1: dynamic times (measurement through writing of 1C32:08 or 1C33:08)	UINT16	RO	0x440B (17419_{dec})
1C33:05	Minimum cycle time	as 1C32:05	UINT32	RO	0x000249F0 (150000_{dec})
1C33:06	Calc and copy time	Time between reading of the inputs and the inputs being available for the master (in ns, only DC mode)	UINT32	RO	0x00000000 (0_{dec})
1C33:07	Minimum delay time		UINT32	RO	0x00000000 (0_{dec})
1C33:08	Get Cycle Time	as 1C32:08	UINT16	RW	0x0000 (0_{dec})
1C33:09	Maximum delay time	Time between SYNC1 event and reading of the inputs (in ns, DC mode only)	UINT32	RO	0x00000000 (0_{dec})
1C33:0B	SM event missed counter	as 1C32:11	UINT16	RO	0x0000 (0_{dec})
1C33:0C	Cycle exceeded counter	as 1C32:12	UINT16	RO	0x0000 (0_{dec})
1C33:0D	Shift too short counter	as 1C32:13	UINT16	RO	0x0000 (0_{dec})
1C33:20	Sync error	as 1C32:32	BOOLEAN	RO	0x00 (0_{dec})

7.6.4 Profile-specific objects

Index 6000 DIP Input Ch.01

Index (hex)	Name	Meaning	Data type	Flags	Default
6000:0	DIP Input Ch.01		UINT8	RO	0x01 (1_{dec})
6000:01	Input		BOOLEAN	RO	0x00 (0_{dec})

Index 6001 DIP Diagnosis Ch.01

Index (hex)	Name	Meaning	Data type	Flags	Default
6001:0	DIP Diagnosis Ch.01		UINT8	RO	0x03 (3_{dec})
6001:01	Wirebreak		BOOLEAN	RO	0x00 (0_{dec})
6001:03	Power Supply Missing		BOOLEAN	RO	0x00 (0_{dec})

Index 6010 DIP Input Ch.02

Index (hex)	Name	Meaning	Data type	Flags	Default
6010:0	DIP Input Ch.02		UINT8	RO	0x01 (1_{dec})
6010:01	Input		BOOLEAN	RO	0x00 (0_{dec})

Index 6011 DIP Diagnosis Ch.02

Index (hex)	Name	Meaning	Data type	Flags	Default
6011:0	DIP Diagnosis Ch.02		UINT8	RO	0x03 (3_{dec})
6011:01	Wirebreak		BOOLEAN	RO	0x00 (0_{dec})
6011:03	Power Supply Missing		BOOLEAN	RO	0x00 (0_{dec})

Index 6020 DIP Input Ch.03

Index (hex)	Name	Meaning	Data type	Flags	Default
6020:0	DIP Input Ch.03		UINT8	RO	0x01 (1_{dec})
6020:01	Input		BOOLEAN	RO	0x00 (0_{dec})

Index 6021 DIP Diagnosis Ch.03

Index (hex)	Name	Meaning	Data type	Flags	Default
6021:0	DIP Diagnosis Ch.03		UINT8	RO	0x03 (3_{dec})
6021:01	Wirebreak		BOOLEAN	RO	0x00 (0_{dec})
6021:03	Power Supply Missing		BOOLEAN	RO	0x00 (0_{dec})

Index 6030 DIP Input Ch.04

Index (hex)	Name	Meaning	Data type	Flags	Default
6030:0	DIP Input Ch.04		UINT8	RO	0x01 (1_{dec})
6030:01	Input		BOOLEAN	RO	0x00 (0_{dec})

Index 6031 DIP Diagnosis Ch.04

Index (hex)	Name	Meaning	Data type	Flags	Default
6031:0	DIP Diagnosis Ch.04		UINT8	RO	0x03 (3_{dec})
6031:01	Wirebreak		BOOLEAN	RO	0x00 (0_{dec})
6031:03	Power Supply Missing		BOOLEAN	RO	0x00 (0_{dec})

Index 6040 DIP Input Ch.05

Index (hex)	Name	Meaning	Data type	Flags	Default
6040:0	DIP Input Ch.05		UINT8	RO	0x01 (1_{dec})
6040:01	Input		BOOLEAN	RO	0x00 (0_{dec})

Index 6041 DIP Diagnosis Ch.05

Index (hex)	Name	Meaning	Data type	Flags	Default
6041:0	DIP Diagnosis Ch.05		UINT8	RO	0x03 (3_{dec})
6041:01	Wirebreak		BOOLEAN	RO	0x00 (0_{dec})
6041:03	Power Supply Missing		BOOLEAN	RO	0x00 (0_{dec})

Index 6050 DIP Input Ch.06

Index (hex)	Name	Meaning	Data type	Flags	Default
6050:0	DIP Input Ch.06		UINT8	RO	0x01 (1_{dec})
6050:01	Input		BOOLEAN	RO	0x00 (0_{dec})

Index 6051 DIP Diagnosis Ch.06

Index (hex)	Name	Meaning	Data type	Flags	Default
6051:0	DIP Diagnosis Ch.06		UINT8	RO	0x03 (3_{dec})
6051:01	Wirebreak		BOOLEAN	RO	0x00 (0_{dec})
6051:03	Power Supply Missing		BOOLEAN	RO	0x00 (0_{dec})

Index 6060 DIP Input Ch.07

Index (hex)	Name	Meaning	Data type	Flags	Default
6060:0	DIP Input Ch.07		UINT8	RO	0x01 (1_{dec})
6060:01	Input		BOOLEAN	RO	0x00 (0_{dec})

Index 6061 DIP Diagnosis Ch.07

Index (hex)	Name	Meaning	Data type	Flags	Default
6061:0	DIP Diagnosis Ch.07		UINT8	RO	0x03 (3_{dec})
6061:01	Wirebreak		BOOLEAN	RO	0x00 (0_{dec})
6061:03	Power Supply Missing		BOOLEAN	RO	0x00 (0_{dec})

Index 6070 DIP Input Ch.08

Index (hex)	Name	Meaning	Data type	Flags	Default
6070:0	DIP Input Ch.08		UINT8	RO	0x01 (1_{dec})
6070:01	Input		BOOLEAN	RO	0x00 (0_{dec})

Index 6071 DIP Diagnosis Ch.08

Index (hex)	Name	Meaning	Data type	Flags	Default
6071:0	DIP Diagnosis Ch.08		UINT8	RO	0x03 (3_{dec})
6071:01	Wirebreak		BOOLEAN	RO	0x00 (0_{dec})
6071:03	Power Supply Missing		BOOLEAN	RO	0x00 (0_{dec})

Index 6080 DIP Input Ch.09

Index (hex)	Name	Meaning	Data type	Flags	Default
6080:0	DIP Input Ch.09		UINT8	RO	0x01 (1_{dec})
6080:01	Input		BOOLEAN	RO	0x00 (0_{dec})

Index 6081 DIP Diagnosis Ch.09

Index (hex)	Name	Meaning	Data type	Flags	Default
6081:0	DIP Diagnosis Ch.09		UINT8	RO	0x03 (3_{dec})
6081:01	Wirebreak		BOOLEAN	RO	0x00 (0_{dec})
6081:03	Power Supply Missing		BOOLEAN	RO	0x00 (0_{dec})

Index 6090 DIP Input Ch.10

Index (hex)	Name	Meaning	Data type	Flags	Default
6090:0	DIP Input Ch.10		UINT8	RO	0x01 (1_{dec})
6090:01	Input		BOOLEAN	RO	0x00 (0_{dec})

Index 6091 DIP Diagnosis Ch.10

Index (hex)	Name	Meaning	Data type	Flags	Default
6091:0	DIP Diagnosis Ch.10		UINT8	RO	0x03 (3_{dec})
6091:01	Wirebreak		BOOLEAN	RO	0x00 (0_{dec})
6091:03	Power Supply Missing		BOOLEAN	RO	0x00 (0_{dec})

Index 60A0 DIP Input Ch.11

Index (hex)	Name	Meaning	Data type	Flags	Default
60A0:0	DIP Input Ch.11		UINT8	RO	0x01 (1_{dec})
60A0:01	Input		BOOLEAN	RO	0x00 (0_{dec})

Index 60A1 DIP Diagnosis Ch.11

Index (hex)	Name	Meaning	Data type	Flags	Default
60A1:0	DIP Diagnosis Ch.11		UINT8	RO	0x03 (3_{dec})
60A1:01	Wirebreak		BOOLEAN	RO	0x00 (0_{dec})
60A1:03	Power Supply Missing		BOOLEAN	RO	0x00 (0_{dec})

Index 60B0 DIP Input Ch.12

Index (hex)	Name	Meaning	Data type	Flags	Default
60B0:0	DIP Input Ch.12		UINT8	RO	0x01 (1_{dec})
60B0:01	Input		BOOLEAN	RO	0x00 (0_{dec})

Index 60B1 DIP Diagnosis Ch.12

Index (hex)	Name	Meaning	Data type	Flags	Default
60B1:0	DIP Diagnosis Ch.12		UINT8	RO	0x03 (3_{dec})
60B1:01	Wirebreak		BOOLEAN	RO	0x00 (0_{dec})
60B1:03	Power Supply Missing		BOOLEAN	RO	0x00 (0_{dec})

Index 60C0 DIP Input Ch.13

Index (hex)	Name	Meaning	Data type	Flags	Default
60C0:0	DIP Input Ch.13		UINT8	RO	0x01 (1_{dec})
60C0:01	Input		BOOLEAN	RO	0x00 (0_{dec})

Index 60C1 DIP Diagnosis Ch.13

Index (hex)	Name	Meaning	Data type	Flags	Default
60C1:0	DIP Diagnosis Ch.13		UINT8	RO	0x03 (3_{dec})
60C1:01	Wirebreak		BOOLEAN	RO	0x00 (0_{dec})
60C1:03	Power Supply Missing		BOOLEAN	RO	0x00 (0_{dec})

Index 60D0 DIP Input Ch.14

Index (hex)	Name	Meaning	Data type	Flags	Default
60D0:0	DIP Input Ch.14		UINT8	RO	0x01 (1_{dec})
60D0:01	Input		BOOLEAN	RO	0x00 (0_{dec})

Index 60D1 DIP Diagnosis Ch.14

Index (hex)	Name	Meaning	Data type	Flags	Default
60D1:0	DIP Diagnosis Ch.14		UINT8	RO	0x03 (3_{dec})
60D1:01	Wirebreak		BOOLEAN	RO	0x00 (0_{dec})
60D1:03	Power Supply Missing		BOOLEAN	RO	0x00 (0_{dec})

Index 60E0 DIP Input Ch.15

Index (hex)	Name	Meaning	Data type	Flags	Default
60E0:0	DIP Input Ch.15		UINT8	RO	0x01 (1_{dec})
60E0:01	Input		BOOLEAN	RO	0x00 (0_{dec})

Index 60E1 DIP Diagnosis Ch.15

Index (hex)	Name	Meaning	Data type	Flags	Default
60E1:0	DIP Diagnosis Ch.15		UINT8	RO	0x03 (3_{dec})
60E1:01	Wirebreak		BOOLEAN	RO	0x00 (0_{dec})
60E1:03	Power Supply Missing		BOOLEAN	RO	0x00 (0_{dec})

Index 60F0 DIP Input Ch.16

Index (hex)	Name	Meaning	Data type	Flags	Default
60F0:0	DIP Input Ch.16		UINT8	RO	0x01 (1_{dec})
60F0:01	Input		BOOLEAN	RO	0x00 (0_{dec})

Index 60F1 DIP Diagnosis Ch.16

Index (hex)	Name	Meaning	Data type	Flags	Default
60F1:0	DIP Diagnosis Ch.16		UINT8	RO	0x03 (3_{dec})
60F1:01	Wirebreak		BOOLEAN	RO	0x00 (0_{dec})
60F1:03	Power Supply Missing		BOOLEAN	RO	0x00 (0_{dec})

Index 6100 DOS Diagnosis Ch.01

Index (hex)	Name	Meaning	Data type	Flags	Default
6100:0	DOS Diagnosis Ch.01		UINT8	RO	0x04 (4_{dec})
6100:01	Overcurrent		BOOLEAN	RO	0x00 (0_{dec})
6100:02	Overload		BOOLEAN	RO	0x00 (0_{dec})
6100:03	Open Load		BOOLEAN	RO	0x00 (0_{dec})
6100:04	Short to 24V		BOOLEAN	RO	0x00 (0_{dec})

Index 6110 DOS Diagnosis Ch.02

Index (hex)	Name	Meaning	Data type	Flags	Default
6110:0	DOS Diagnosis Ch.02		UINT8	RO	0x04 (4_{dec})
6110:01	Overcurrent		BOOLEAN	RO	0x00 (0_{dec})
6110:02	Overload		BOOLEAN	RO	0x00 (0_{dec})
6110:03	Open Load		BOOLEAN	RO	0x00 (0_{dec})
6110:04	Short to 24V		BOOLEAN	RO	0x00 (0_{dec})

Index 6120 DOS Diagnosis Ch.03

Index (hex)	Name	Meaning	Data type	Flags	Default
6120:0	DOS Diagnosis Ch.03		UINT8	RO	0x04 (4_{dec})
6120:01	Overcurrent		BOOLEAN	RO	0x00 (0_{dec})
6120:02	Overload		BOOLEAN	RO	0x00 (0_{dec})
6120:03	Open Load		BOOLEAN	RO	0x00 (0_{dec})
6120:04	Short to 24V		BOOLEAN	RO	0x00 (0_{dec})

Index 6130 DOS Diagnosis Ch.04

Index (hex)	Name	Meaning	Data type	Flags	Default
6130:0	DOS Diagnosis Ch.04		UINT8	RO	0x04 (4_{dec})
6130:01	Overcurrent		BOOLEAN	RO	0x00 (0_{dec})
6130:02	Overload		BOOLEAN	RO	0x00 (0_{dec})
6130:03	Open Load		BOOLEAN	RO	0x00 (0_{dec})
6130:04	Short to 24V		BOOLEAN	RO	0x00 (0_{dec})

Index 6140 DOS Diagnosis Ch.05

Index (hex)	Name	Meaning	Data type	Flags	Default
6140:0	DOS Diagnosis Ch.05		UINT8	RO	0x04 (4_{dec})
6140:01	Overcurrent		BOOLEAN	RO	0x00 (0_{dec})
6140:02	Overload		BOOLEAN	RO	0x00 (0_{dec})
6140:03	Open Load		BOOLEAN	RO	0x00 (0_{dec})
6140:04	Short to 24V		BOOLEAN	RO	0x00 (0_{dec})

Index 6150 DOS Diagnosis Ch.06

Index (hex)	Name	Meaning	Data type	Flags	Default
6150:0	DOS Diagnosis Ch.06		UINT8	RO	0x04 (4_{dec})
6150:01	Overcurrent		BOOLEAN	RO	0x00 (0_{dec})
6150:02	Overload		BOOLEAN	RO	0x00 (0_{dec})
6150:03	Open Load		BOOLEAN	RO	0x00 (0_{dec})
6150:04	Short to 24V		BOOLEAN	RO	0x00 (0_{dec})

Index 6160 DOS Diagnosis Ch.07

Index (hex)	Name	Meaning	Data type	Flags	Default
6160:0	DOS Diagnosis Ch.07		UINT8	RO	0x04 (4_{dec})
6160:01	Overcurrent		BOOLEAN	RO	0x00 (0_{dec})
6160:02	Overload		BOOLEAN	RO	0x00 (0_{dec})
6160:03	Open Load		BOOLEAN	RO	0x00 (0_{dec})
6160:04	Short to 24V		BOOLEAN	RO	0x00 (0_{dec})

Index 6170 DOS Diagnosis Ch.08

Index (hex)	Name	Meaning	Data type	Flags	Default
6170:0	DOS Diagnosis Ch.08		UINT8	RO	0x04 (4_{dec})
6170:01	Overcurrent		BOOLEAN	RO	0x00 (0_{dec})
6170:02	Overload		BOOLEAN	RO	0x00 (0_{dec})
6170:03	Open Load		BOOLEAN	RO	0x00 (0_{dec})
6170:04	Short to 24V		BOOLEAN	RO	0x00 (0_{dec})

Index 7100 DOS Output Ch.01

Index (hex)	Name	Meaning	Data type	Flags	Default
7100:0	DOS Output Ch.01		UINT8	RO	0x01 (1_{dec})
7100:01	Output		BOOLEAN	RO	0x00 (0_{dec})

Index 7110 DOS Output Ch.02

Index (hex)	Name	Meaning	Data type	Flags	Default
7110:0	DOS Output Ch.02		UINT8	RO	0x01 (1_{dec})
7110:01	Output		BOOLEAN	RO	0x00 (0_{dec})

Index 7120 DOS Output Ch.03

Index (hex)	Name	Meaning	Data type	Flags	Default
7120:0	DOS Output Ch.03		UINT8	RO	0x01 (1_{dec})
7120:01	Output		BOOLEAN	RO	0x00 (0_{dec})

Index 7130 DOS Output Ch.04

Index (hex)	Name	Meaning	Data type	Flags	Default
7130:0	DOS Output Ch.04		UINT8	RO	0x01 (1_{dec})
7130:01	Output		BOOLEAN	RO	0x00 (0_{dec})

Index 7140 DOS Output Ch.05

Index (hex)	Name	Meaning	Data type	Flags	Default
7140:0	DOS Output Ch.05		UINT8	RO	0x01 (1_{dec})
7140:01	Output		BOOLEAN	RO	0x00 (0_{dec})

Index 7150 DOS Output Ch.06

Index (hex)	Name	Meaning	Data type	Flags	Default
7150:0	DOS Output Ch.06		UINT8	RO	0x01 (1_{dec})
7150:01	Output		BOOLEAN	RO	0x00 (0_{dec})

Index 7160 DOS Output Ch.07

Index (hex)	Name	Meaning	Data type	Flags	Default
7160:0	DOS Output Ch.07		UINT8	RO	0x01 (1_{dec})
7160:01	Output		BOOLEAN	RO	0x00 (0_{dec})

Index 7170 DOS Output Ch.08

Index (hex)	Name	Meaning	Data type	Flags	Default
7170:0	DOS Output Ch.08		UINT8	RO	0x01 (1_{dec})
7170:01	Output		BOOLEAN	RO	0x00 (0_{dec})

Index F000 Modular Device Profile

Index (hex)	Name	Meaning	Data type	Flags	Default
F000:0	Modular Device Profile	General information for the Modular Device Profile	UINT8	RO	0x02 (2_{dec})
F000:01	Index distance	Index distance of the objects of the individual channels	UINT16	RO	0x0010 (16_{dec})
F000:02	Maximum number of modules	Number of channels	UINT16	RO	0x0018 (24_{dec})

Index F008 Code word

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

Index F010 Module Profile List

Index (hex)	Name	Meaning	Data type	Flags	Default
F010:0	Module Profile List		UINT8	RO	0x18 (24_{dec})
F010:01	SubIndex 001		UINT32	RO	0x00000065 (101_{dec})
F010:02	SubIndex 002		UINT32	RO	0x00000065 (101_{dec})
F010:03	SubIndex 003		UINT32	RO	0x00000065 (101_{dec})
F010:04	SubIndex 004		UINT32	RO	0x00000065 (101_{dec})
F010:05	SubIndex 005		UINT32	RO	0x00000065 (101_{dec})
F010:06	SubIndex 006		UINT32	RO	0x00000065 (101_{dec})
F010:07	SubIndex 007		UINT32	RO	0x00000065 (101_{dec})
F010:08	SubIndex 008		UINT32	RO	0x00000065 (101_{dec})
F010:09	SubIndex 009		UINT32	RO	0x00000065 (101_{dec})
F010:0A	SubIndex 010		UINT32	RO	0x00000065 (101_{dec})
F010:0B	SubIndex 011		UINT32	RO	0x00000065 (101_{dec})
F010:0C	SubIndex 012		UINT32	RO	0x00000065 (101_{dec})
F010:0D	SubIndex 013		UINT32	RO	0x00000065 (101_{dec})
F010:0E	SubIndex 014		UINT32	RO	0x00000065 (101_{dec})
F010:0F	SubIndex 015		UINT32	RO	0x00000065 (101_{dec})
F010:10	SubIndex 016		UINT32	RO	0x00000065 (101_{dec})
F010:11	SubIndex 017		UINT32	RO	0x000000C9 (201_{dec})
F010:12	SubIndex 018		UINT32	RO	0x000000C9 (201_{dec})
F010:13	SubIndex 019		UINT32	RO	0x000000C9 (201_{dec})
F010:14	SubIndex 020		UINT32	RO	0x000000C9 (201_{dec})
F010:15	SubIndex 021		UINT32	RO	0x000000C9 (201_{dec})
F010:16	SubIndex 022		UINT32	RO	0x000000C9 (201_{dec})
F010:17	SubIndex 023		UINT32	RO	0x000000C9 (201_{dec})
F010:18	SubIndex 024		UINT32	RO	0x000000C9 (201_{dec})

Index F600 DEV Inputs

Index (hex)	Name	Meaning	Data type	Flags	Default
F600:0	DEV Inputs		UINT8	RO	0x0F (15_{dec})
F600:01	Undervoltage Us		BOOLEAN	RO	0x00 (0_{dec})
F600:03	Overtemperature		BOOLEAN	RO	0x00 (0_{dec})
F600:0D	Diag		BOOLEAN	RO	0x00 (0_{dec})
F600:0E	TxPDO State		BOOLEAN	RO	0x00 (0_{dec})
F600:0F	Input cycle counter		BIT2	RO	0x00 (0_{dec})

Index FB00 DEV Command

Index (hex)	Name	Meaning	Data type	Flags	Default
FB00:0	DEV Command		UINT8	RO	0x03 (3_{dec})
FB00:01	Request		OCTET-STRING[2]	RW	{0}
FB00:02	Status		UINT8	RO	0x00 (0_{dec})
FB00:03	Response		OCTET-STRING[8]	RO	{0}

8 Appendix

8.1 General operating conditions

Protection rating according to IP code

The degrees of protection are defined and divided into different classes in the IEC 60529 standard (EN 60529). Degrees of protection are designated by the letters "IP" and two numerals: **IPxy**

- Numeral x: Dust protection and contact protection
- Numeral y: Protection against water

x	Meaning
0	Not protected
1	Protected against access to dangerous parts with the back of the hand. Protected against solid foreign objects of 50 mm Ø
2	Protected against access to dangerous parts with a finger. Protected against solid foreign objects of 12.5 mm Ø
3	Protected against access to dangerous parts with a tool. Protected against solid foreign objects of 2.5 mm Ø
4	Protected against access to dangerous parts with a wire. Protected against solid foreign objects of 1 mm Ø
5	Protection against access to dangerous parts with a wire. Dust-protected. Ingress of dust is not prevented completely, although the quantity of dust able to penetrate is limited to such an extent that the proper function of the device and safety are not impaired
6	Protection against access to dangerous parts with a wire. Dust-tight. No ingress of dust

y	Meaning
0	Not protected
1	Protection against vertically falling water drops
2	Protection against vertically falling water drops when enclosure tilted up to 15°
3	Protection against spraying water. Water sprayed at an angle of up to 60° on either side of the vertical shall have no harmful effects
4	Protection against splashing water. Water splashed against the enclosure from any direction shall have no harmful effects
5	Protection against water jets.
6	Protection against powerful water jets.
7	Protected against the effects of temporary immersion in water. Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is immersed in water at a depth of 1 m for 30 minutes

Chemical resistance

The resistance refers to the housing of the IP67 modules and the metal parts used. In the table below you will find some typical resistances.

Type	Resistance
Water vapor	unstable at temperatures > 100 °C
Sodium hydroxide solution (ph value > 12)	stable at room temperature unstable > 40 °C
Acetic acid	unstable
Argon (technically pure)	stable

Key

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

8.2 Accessories

Mounting

Ordering information	Description	Link
ZS5300-0011	Mounting rail	Website

Cables

A complete overview of pre-assembled cables can be found on the Beckhoff website: Link.

Ordering information	Description	Link
ZK1090-3xxx-xxxx	EtherCAT cable M8, green	Website
ZK1093-3xxx-xxxx	EtherCAT cable M8, yellow	Website
ZK1090-6xxx-xxxx	EtherCAT cable M12, green	Website
ZK2000-2xxx-xxxx	Sensor cable M8, 3-pin	Website
ZK2000-3xxx-xxxx	Sensor cable M8, 4-pin	Website
ZK2000-6xxx-xxxx	Sensor cable M12, 4-pin	Website
ZK2000-7xxx-0xxx	Sensor cable M12, 4-pin + shield	Website
ZK2020-3xxx-xxxx	Power cable M8, 4-pin	Website
ZK203x-xxxx-xxxx	Power cable 7/8", 5-pin	Website

Connector

Ordering information	Description	Link
ZS2001-000x	Female header with spring connection, IP20	Website
ZS2002-0111	D-sub connector, 25-pin	Website

Labeling material, protective caps

Ordering information	Description
ZS5000-0010	Protective cap for M8 sockets, IP67 (50 pieces)
ZS5000-0020	Protective cap for M12 sockets, IP67 (50 pcs.)
ZS5100-0000	Inscription labels, unprinted, 4 strips of 10
ZS5000-xxxx	Printed inscription labels on enquiry

Tools

Ordering information	Description
ZB8801-0000	Torque wrench for plugs, 0.4…1.0 Nm
ZB8801-0001	Torque cable key for M8 / wrench size 9 for ZB8801-0000
ZB8801-0002	Torque cable key for M12 / wrench size 13 for ZB8801-0000
ZB8801-0003	Torque cable key for M12 field assembly / wrench size 18 for ZB8801-0000

Further accessories

Further accessories can be found in the price list for fieldbus components from Beckhoff and online at https://www.beckhoff.com.

8.3 Version identification of EtherCAT devices

8.3.1 General notes on marking

Designation

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

- family key
- type
- version
- revision

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

Notes

- The elements mentioned above result in the **technical designation**. EL3314-0000-0016 is used in the example below.
- EL3314-0000 is the order identifier, in the case of “-0000” usually abbreviated to EL3314. “-0016” is the EtherCAT revision.
- The **order identifier** is made up of
  - family key (EL, EP, CU, ES, KL, CX, etc.)
  - type (3314)
  - version (-0000)
- The **revision** -0016 shows the technical progress, such as the extension of features with regard to the EtherCAT communication, and is managed by Beckhoff.
  In principle, a device with a higher revision can replace a device with a lower revision, unless specified otherwise, e.g. in the documentation.
  Associated and synonymous with each revision there is usually a description (ESI, EtherCAT Slave Information) in the form of an XML file, which is available for download from the Beckhoff web site.
  From 2014/01 the revision is shown on the outside of the IP20 terminals, see Fig. *“EL2872 with revision 0022 and serial number 01200815”*.
- The type, version and revision are read as decimal numbers, even if they are technically saved in hexadecimal.

8.3.2 Version identification of IP67 modules

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

Structure of the serial number: **KK YY FF HH**	Example with serial number 12 06 3A 02:
KK - week of production (CW, calendar week)	12 - production week 12
YY - year of production	06 - production year 2006
FF - firmware version	3A - firmware version 3A
HH - hardware version	02 - hardware version 02

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

Syntax: D ww yy x y z u

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

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

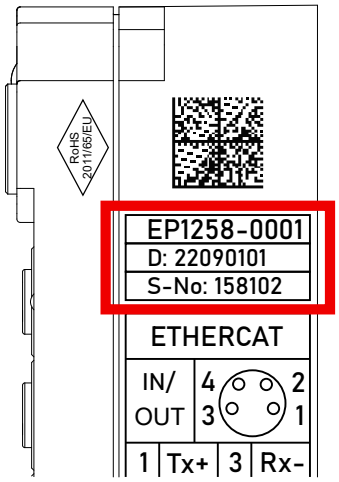


Fig. 41: EP1258-00001 IP67 EtherCAT Box with batch number/DateCode 22090101 and unique serial number 158102

8.3.3 Beckhoff Identification Code (BIC)

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

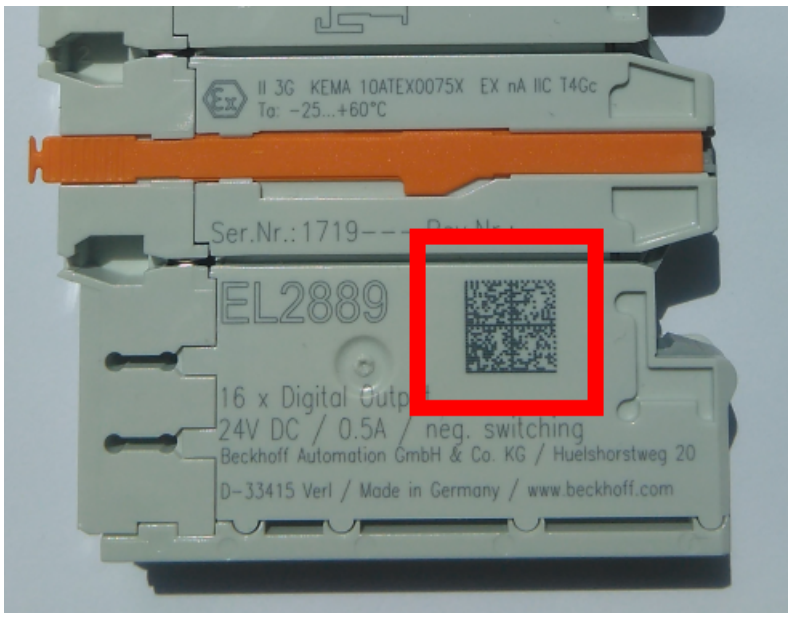


Fig. 42: BIC as data matrix code (DMC, code scheme ECC200)

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

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

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

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

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

Following information is possible, positions 1 to 4 are always present, the other according to need of production:

Position	Type of information	Explanation	Data identifier	Number of digits incl. data identifier	Example
1	Beckhoff order number	**Beckhoff order number**	1P	8	**1P**072222
2	Beckhoff Traceability Number (BTN)	**Unique serial number, see note below**	SBTN	12	**SBTN**k4p562d7
3	Article description	**Beckhoff article description, e.g. EL1008**	1K	32	**1K**EL1809
4	Quantity	**Quantity in packaging unit, e.g. 1, 10, etc.**	Q	6	**Q**1
5	Batch number	Optional: Year and week of production	2P	14	**2P**401503180016
6	ID/serial number	Optional: Present-day serial number system, e.g. with safety products	51S	12	**51S**678294
7	Variant number	Optional: Product variant number on the basis of standard products	30P	12	**30P**F971, 2*K183
...					

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

Structure of the BIC

Example of composite information from positions 1 to 4 and with the above given example value on position 6. The data identifiers are highlighted in bold font:

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

Accordingly as DMC:



Fig. 43: Example DMC **1P**072222**SBTN**k4p562d7**1K**EL1809 **Q**1 **51S**678294

BTN

An important component of the BIC is the Beckhoff Traceability Number (BTN, position 2). The BTN is a unique serial number consisting of eight characters that will replace all other serial number systems at Beckhoff in the long term (e.g. batch designations on IO components, previous serial number range for safety products, etc.). The BTN will also be introduced step by step, so it may happen that the BTN is not yet coded in the BIC.

NOTICE

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

8.3.4 Electronic access to the BIC (eBIC)

Electronic BIC (eBIC)

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

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

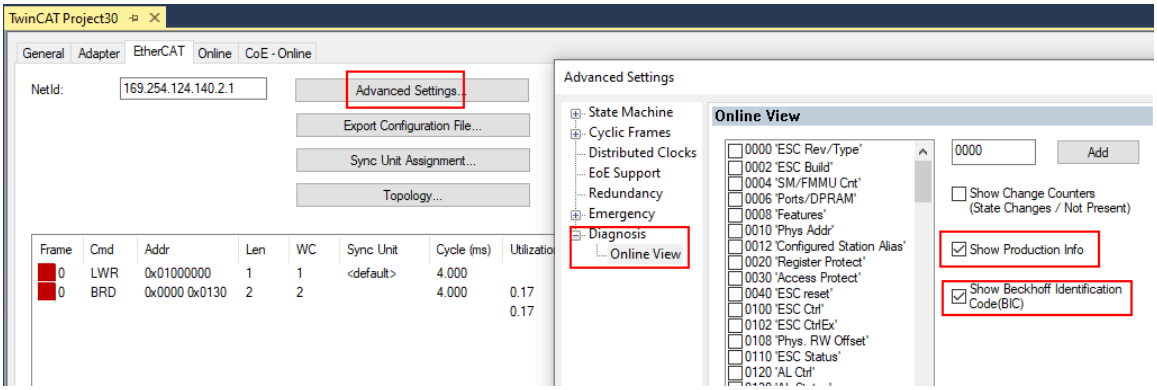
EtherCAT devices (IP20, IP67)

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

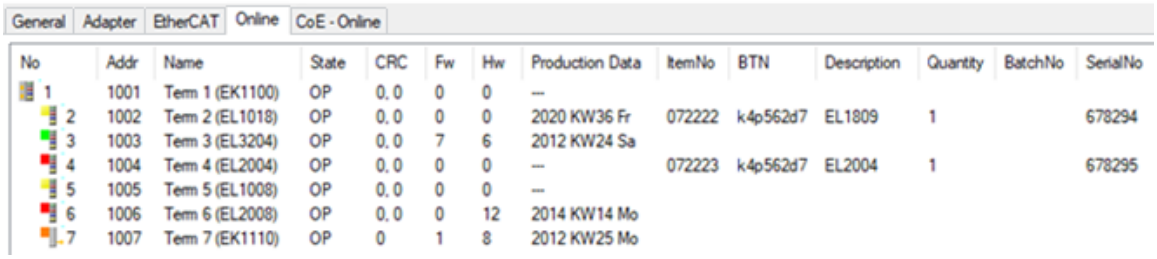
Beckhoff also stores the eBIC in the ESI-EEPROM. The eBIC was introduced into Beckhoff IO production (terminals, box modules) in 2020; as of 2023, implementation is largely complete.

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

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

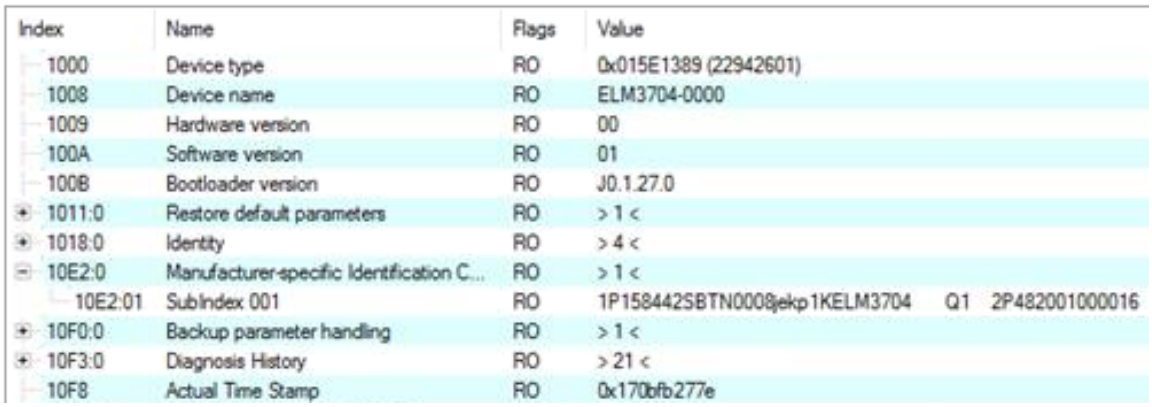


  - The BTN and its contents are then displayed:



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

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



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

  - The object 0x10E2 will be preferentially introduced into stock products in the course of necessary firmware revision.
  - From TwinCAT 3.1. build 4024.24, the functions *FB_EcCoEReadBIC* and *FB_EcCoEReadBTN* for reading into the PLC are available in the Tc2_EtherCAT library from v3.3.19.0
- The following auxiliary functions are available for processing the BIC/BTN data in the PLC in *Tc2_Utilities* as of TwinCAT 3.1 build 4024.24
  - F_SplitBIC: The function splits the Beckhoff Identification Code (BIC) sBICValue into its components using known identifiers and returns the recognized substrings in the ST_SplittedBIC structure as a return value
  - BIC_TO_BTN: The function extracts the BTN from the BIC and returns it as a return value
- Note: If there is further electronic processing, the BTN is to be handled as a string(8); the identifier "SBTN" is not part of the BTN.
- Technical background
  The new BIC information is written as an additional category in the ESI-EEPROM during device production. The structure of the ESI content is largely dictated by the ETG specifications, therefore the additional vendor-specific content is stored using a category in accordance with the ETG.2010. ID 03 tells all EtherCAT masters that they may not overwrite these data in the event of an update or restore the data after an ESI update.
  The structure follows the content of the BIC, see here. The EEPROM therefore requires approx. 50..200 bytes of memory.
- Special cases
  - If multiple hierarchically arranged ESCs are installed in a device, only the top-level ESC carries the eBIC information.
  - If multiple non-hierarchically arranged ESCs are installed in a device, all ESCs carry the eBIC information.
  - If the device consists of several sub-devices which each have their own identity, but only the top-level device is accessible via EtherCAT, the eBIC of the top-level device is located in the CoE object directory 0x10E2:01 and the eBICs of the sub-devices follow in 0x10E2:nn.

8.4 Support and Service

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

Beckhoff's branch offices and representatives

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

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

You will also find further documentation for Beckhoff components there.

Support

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

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

Hotline:	+49 5246 963 157
e-mail:	support@beckhoff.com
web:	www.beckhoff.com/support

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- repair service
- spare parts service
- hotline service

Hotline:	+49 5246 963 460
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