BECKHOFF New Automation Technology

Documentation | EN

EP8309-1022

Multi-functional I/O box



2024-04-15 | Version: 2.4

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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

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

Patent Pending

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



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Offenders will be held liable for the payment of damages. All rights reserved in the event of the grant of a patent, utility model or design.

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
2.4	• Structure update
2.3	• CoE parameters updated
2.2	• Dimensions updated • UL requirements updated
2.1	• Front page updated • Scope of delivery added • Structure update
2.0.0	• Migration • Technical data updated
1.1.0	• Power Connection updated
1.0.0	• First release

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) YY - year of production FF - firmware version HH - hardware version	29 - week of production 29 10 - year of production 2010 02 - firmware version 02 01 - hardware version 01

Further information on this topic: Version identification of EtherCAT devices [▶ 82].

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.

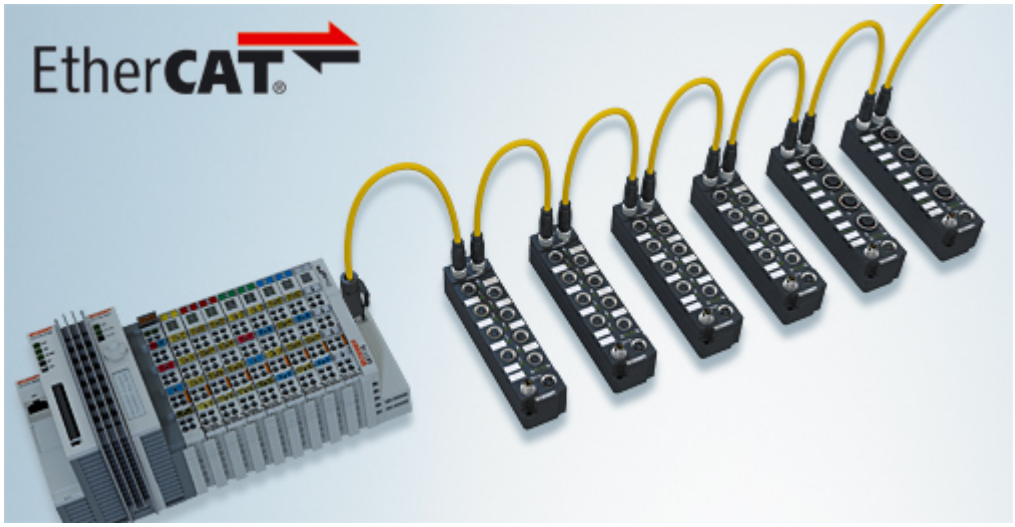


Fig. 1: EtherCAT Box Modules within an EtherCAT network

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



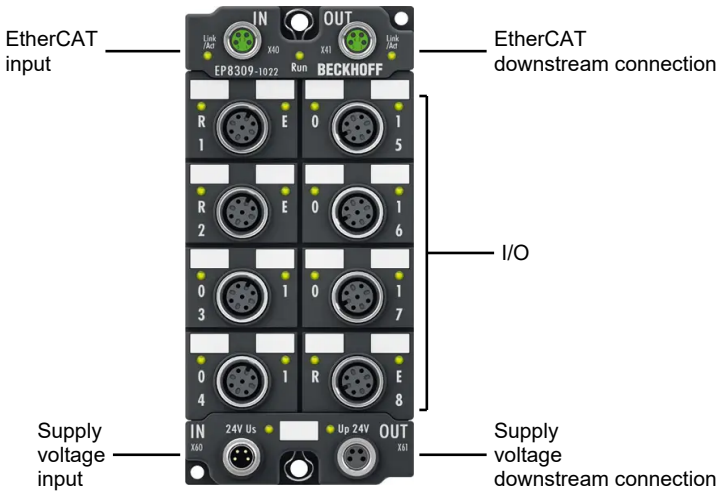
Fig. 3: EtherCAT Box with M12 connections for sensors/actuators

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

3.1 Introduction



The EP8309-1022 has various inputs and outputs: eight digital inputs/outputs, two digital tacho inputs, two analog inputs, one analog output and one current-controlled 1.2 A PWM output.

The current signals have 12-bit resolution. The tacho outputs supply a speed-dependent velocity or frequency value via digital 24 V sensors. Proportional valves, for example, can be actuated directly using the PWM output, while intelligent valves are switched by the analog output.

With its combination of inputs and outputs, the EP8309-1022 offers a compact solution for a wide variety of aggregates that are to be controlled via EtherCAT.

Quick links

Technical data [▶ 11]

3.2 Technical data

Fieldbus

Technical Data	EP8309-1022
Fieldbus	EtherCAT
Fieldbus connection	2 x M8 socket (green)

Tacho inputs

Technical Data	EP8309-1022
Number of tacho inputs	1 or 2 (dual-shaft mode or single-shaft mode)
Input type	Single-shaft mode: two digital sensors on a common axis Dual-shaft mode: two digital sensors on two different axes, no direction detection, no error detection
Tacho inputs connection [▶ 26]	M12
Rated input voltage	24 V_{DC} (-15%/+20%)
Input filter	2.5 kHz
Signal voltage "0"	-3...+5 V (EN 61131-2, type 3)
Signal voltage "1"	+11...+30 V (EN 61131-2, type 3)
Input current	typically 3 mA (EN 61131-2, type 3)
Sensor supply	from the control voltage Us
Current consumption of the sensors	max. 0.5 A, short-circuit-proof overall

Digital inputs and outputs (DIO)

Technical Data	EP8309-1022
Number of digital inputs and outputs (DIO) [▶ 26]	8
Inputs	
Input connections	M12
Rated input voltage	24 V_{DC} (-15%/+20%)
Input filter	3.0 ms
Signal voltage "0"	-3...+5 V (EN 61131-2, type 3)
Signal voltage "1"	+11...+30 V (EN 61131-2, type 3)
Input current	typically 3 mA (EN 61131-2, type 3)
Sensor supply	from the control voltage Us
Current consumption of the sensors	max. 0.5 A, short-circuit-proof overall
Outputs	
Output connections	M12
Load type	ohmic, inductive, lamp load
Rated output voltage	24 V_{DC} (-15%/+20%)
Output current	max. 0.5 A per channel for sockets 4 and 5 max. 1.0 A per channel for sockets 6 and 7
Short circuit current	typically 1.5 A
Output driver supply	from load voltage Up
Output driver current consumption	typically 8 mA per channel

PWM outputs

Technical Data	EP8309-1022
Number of PWM outputs (alternatively analog output)	1
Output connections [▶ 27]	M12
Load type	ohmic/inductive > 1 mH
Supply for the output stage	24 V_{DC} via power contacts
Output current per channel	1.2 A (short-circuit-proof, common thermal overload warning for both output stages)
PWM clock frequency	approx. 30 kHz
Rated load voltage	24 V_{DC} (-15 %/+20 %)
Resolution	10 bit
Distributed Clocks	yes

Analog inputs (AI)

Technical Data	EP8309-1022
Number of analog inputs	2
Input connections [▶ 27]	M12 sockets
Signal type	0…20 mA or 4…20 mA (can be set for each CoE)
Input resistance	85 Ω typ. + diode voltage
Resolution	12 bit (including sign)
Input filter limit frequency	5 kHz
Conversion time	approx. 100 µs
Measuring error	< 0,3 % (relative to full scale value)

Analog outputs (AO)

Technical Data	EP8309-1022
Number of analog outputs (alternatively PWM output)	1
Output connections [▶ 27]	M12 sockets
Signal type	0…20 mA or 4…20 mA (can be set for each CoE)
Load	< 500 Ω
Resolution	12 bit
Conversion time	approx. 40 µs
Measuring error	< 0,3 % (relative to full scale value)

General technical data

Technical Data	EP8309-1022
Special features	Multi-function module
Module electronic supply	from the control voltage Us
Module electronic current consumption	typically 120 mA
Sensor supply	from load voltage U_P, DC, any value up to 30 V
Actuator supply	from load voltage U_P, DC, any value up to 30 V
Power supply connection	Power supply: 1 x M8 plug, 4-pole Onward connection: 1 x M8 socket, 4-pole
Process image	Inputs: 2 x 16 bit Outputs: 2 x 16 bit
Electrical isolation	Control voltage / fieldbus: 500 V
Weight	approx. 165 g
Permissible ambient temperature during operation	-25°C ... +60°C
Permissible ambient temperature during storage	-40°C ... +85°C
Vibration / shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27
EMC immunity / emission	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class	IP65, IP66, IP67 (according to EN 60529)
Installation position	variable
Approvals	CE, cURus

3.3 Scope of supply

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

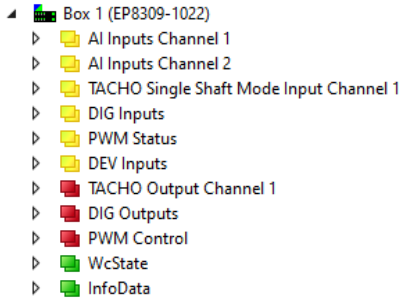
- 1x EtherCAT Box EP8309-1022
- 2x protective cap for EtherCAT socket, M8, green (pre-assembled)
- 1x protective cap for supply voltage input, M8, transparent (pre-assembled)
- 1x protective cap for supply voltage output, M8, black (pre-assembled)
- 10x labels, blank (1 strip of 10)

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.

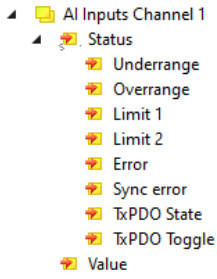
3.4 Process image



In the default setting the EP8309 is configured for:

- analog input channel 1
- analog input channel 2
- Tacho signal from two sensors on one axis (single-shaft mode)
- 6 digital inputs
- Status of PWM output
- Acknowledge / Reset in the event of a PWM error.
- 6 digital outputs
- General EtherCAT process data

AI Inputs Channel 1 and 2



The data for the first analog channel can be found under **AI Inputs Channel 1**.

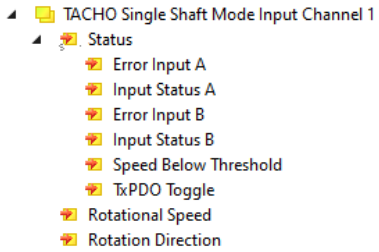
Underrange: Value of the analog input is less than 0/4 mA or -10/0 V
Overrange: Value of the analog input is greater than 20 mA or +10 V

Limit 1: with activated Limit 1 (object 0x8000:07 [▶ 60] = 1) means
1: value less than limit 1 (set in object 0x8000:13 [▶ 60])
2: value greater than limit 1 (set in object 0x8000:13 [▶ 60])
3: value equal to limit 1 (set in object 0x8000:13 [▶ 60])

Limit 2: with activated Limit 2 (object 0x8000:08 [▶ 60] = 1) means
1: value less than limit 2 (set in object 0x8000:14 [▶ 60])
2: value greater than limit 2 (set in object 0x8000:14 [▶ 60])
3: value equal to limit 2 (set in object 0x8000:14 [▶ 60])

Error: This bit is set if over- or under-range was detected.

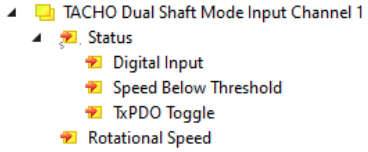
Tacho single-shaft mode (depending on the setting in the PDO assignment)



The data for the tacho input can be found under **TACHO Single Shaft Mode Input Channel 1**.

see data under commissioning

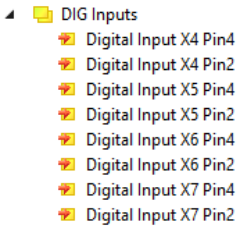
Tacho dual-shaft mode (depending on the setting in the PDO assignment)



The data for the tacho input can be found under **TACHO Dual Shaft Mode Input Channel 1 or 2**.

see data under commissioning

DIG Inputs

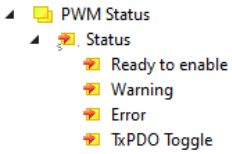


The data for the digital inputs can be found under **DIG Inputs**.

X4 Pin4 -> socket 4, pin 4

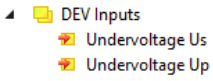
....

PWM Status



The data for the PWM output can be found under **PWM Status**

DEV Inputs

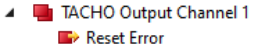


The diagnostic data for the two voltages Us and Up can be found under **DEV Inputs**.

TRUE = voltage <= approx. 18 V_{DC}

....

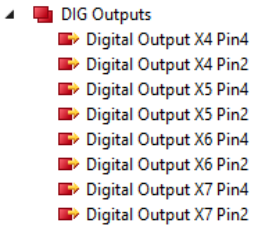
TACHO Output Channel 1



The control data for the tacho input can be found under **TACHO Output Channel 1**.

Reset Error - error reset

DO Outputs

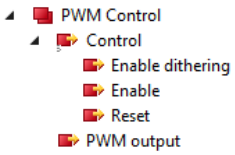


The data for the digital outputs can be found under **DO Outputs**.

X5 pin4 -> socket 5, pin 4

....

PWM control (activated through PDO assignment 0x1602, default PWM, alternatively AO)



The control data for the PWM output can be found under **PWM Control**.

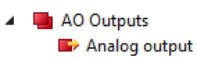
Enable Dithering -> activate dithering

Enable -> activate PWM output

Reset -> reset on error

PWM output -> load-independent current, depending on module rating (e.g. 1.2 A and setting in object 0x8050:10)

AO outputs (activated through PDO assignment 0x1603), not activated by default



The values for the analog output can be found under **AO Outputs**.

Analog Output - output value

3.5 Pulse width modulation (PWM)

The Beckhoff terminals and box modules integrate compact PWM output stages in the smallest of designs.

PWM output stages control the output current through pulse width modulation (PWM) of the supply voltage. This means that the full supply voltage is activated or deactivated at the output. The duty cycle (pulse width) is modified, but not the voltage level. The current is built up based on the load connected to the inductance.

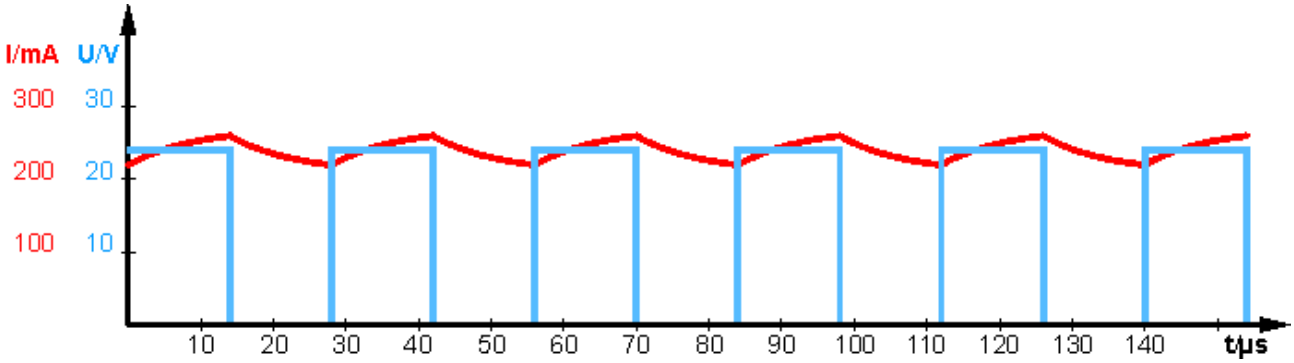


Fig. 4: Operation at load with adequate inductance

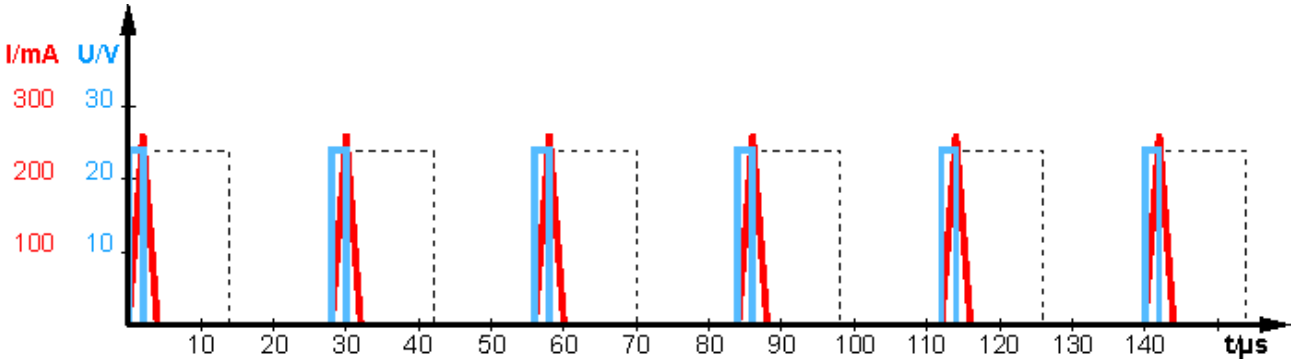


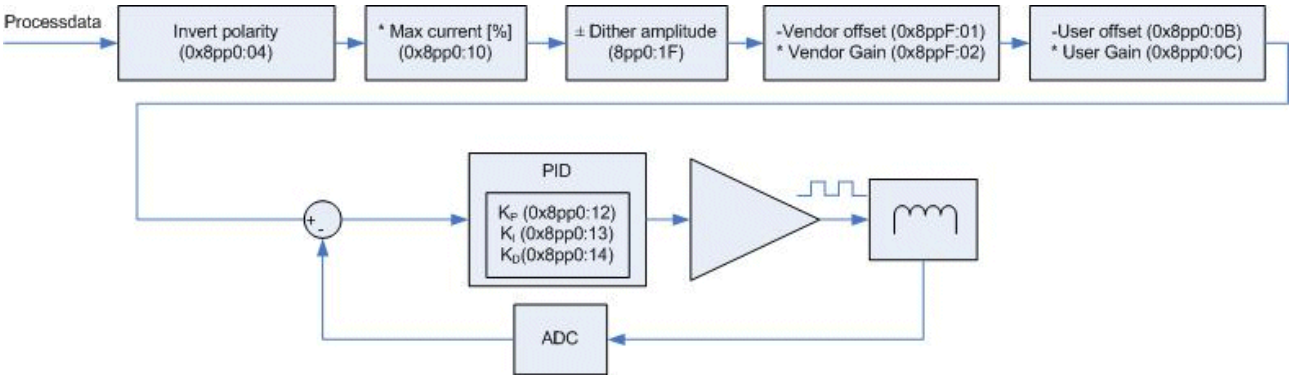
Fig. 5: Operation at load with inadequate inductance (near ohmic)

The figure *Operation at load with inadequate inductance (virtually ohmic)* illustrates operation with an inadequate inductance. Continuous current flow is not reached. The current has "gaps". This mode of operation is not permitted.

Pulse width current terminals require inductive loads

The load inductance should have a minimum inductance of 1 mH. Operation of the pulse width current terminals at loads with an inductance of less than 1 mH is not recommended, since the intermittent current flow prevents reference between the set value and the arithmetic mean of the current.

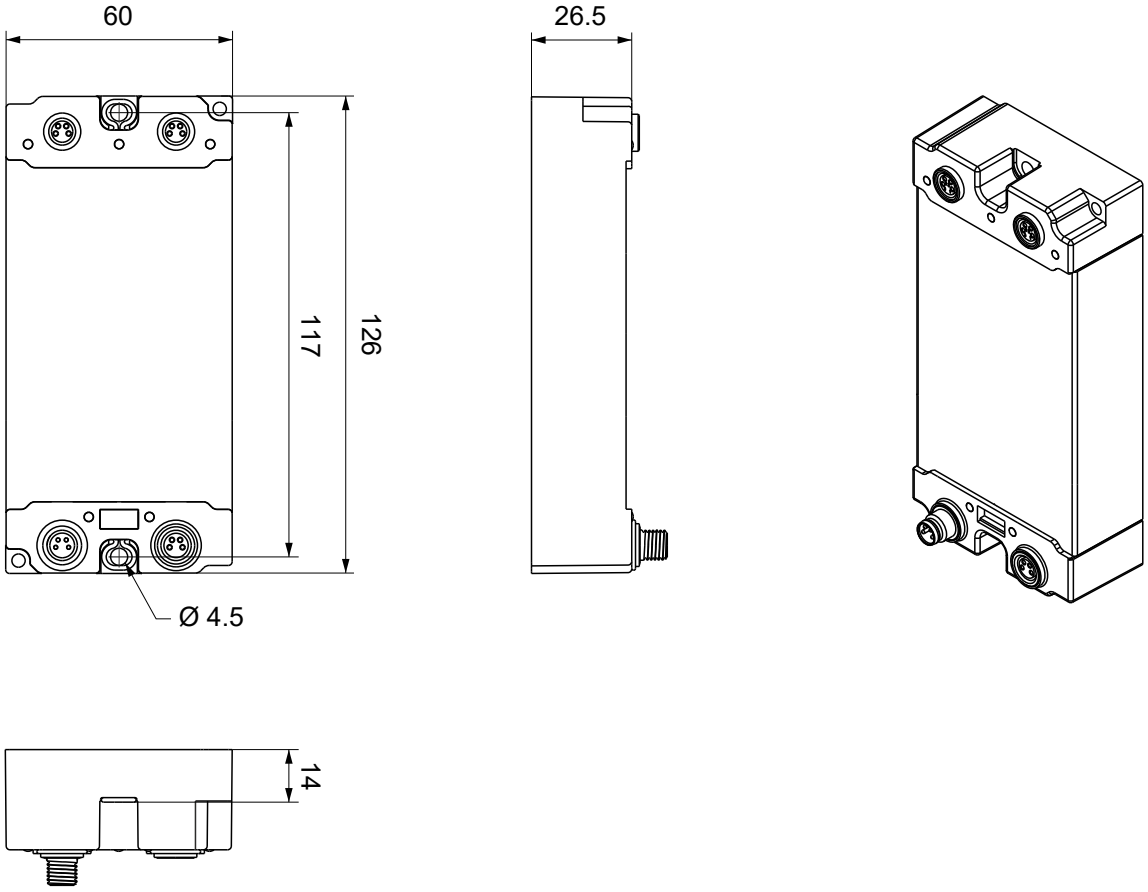
3.6 Influencing of the PWM output value by the parameters



4 Mounting and cabling

4.1 Mounting

4.1.1 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)

4.1.2 Fixing

NOTICE

Dirt during assembly

Dirty connectors can lead to malfunctions. Protection class IP67 can only be guaranteed if all cables and connectors are connected.

- Protect the plug connectors against dirt during the assembly.

Mount the module with two M4 screws in the centrally located mounting holes.

4.1.3 Tightening torques for plug connectors

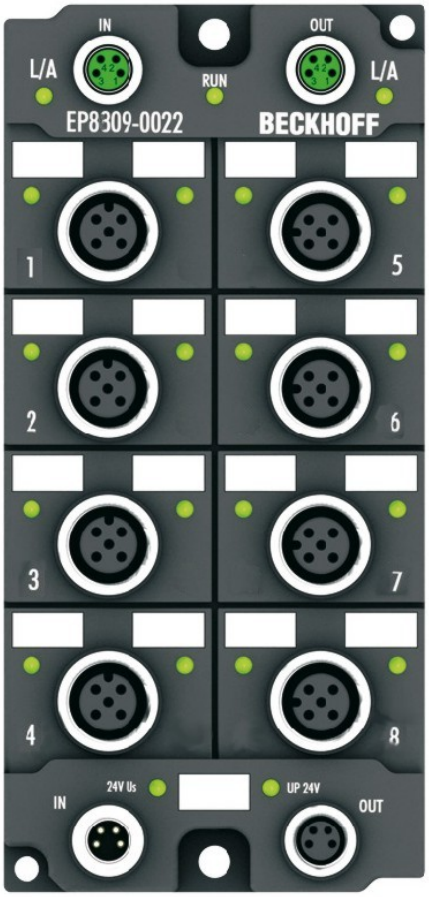
Screw connectors tight with a torque wrench. (e.g. ZB8801 from Beckhoff)

Connector diameter	Tightening torque
M8	0.4 Nm
M12	0.6 Nm

4.2 Cabling

4.2.1 Connections

The EP8309 has different signals that can be connected via the eight M12 sockets.

Comment	Connector	Comment
EtherCAT IN		EtherCAT OUT
Socket 1: • analog In		Socket 5: • digital In/Out channel 1 • digital In/Out channel 2
Socket 2: • analog In		Socket 6: • digital In/Out channel 1 • digital In/Out channel 2
Socket 3: • digital In channel 1 / Tacho input 1 • digital In channel 2 / Tacho input 2		Socket 7: • digital In/Out channel 3 • digital In/Out channel 4
Socket 4: • digital In/Out channel 3 • digital In/Out channel 4		Socket 8: • pulse width current output or • analog output
Power In		Power Out

4.2.2 EtherCAT

4.2.2.1 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 sockets for the incoming and downstream EtherCAT connections.

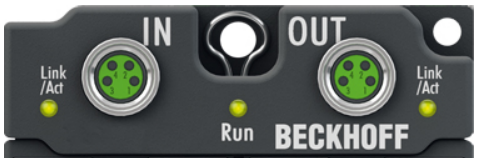


Fig. 6: EtherCAT connectors

Connection

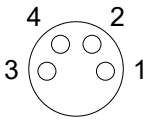


Fig. 7: M8 socket

EtherCAT	M8 socket	Core colors		
Signal	**Contact**	**ZB9010, ZB9020, ZB9030, ZB9032, ZK1090-6292, ZK1090-3xxx-xxxx**	**ZB9031 and old versions of ZB9030, ZB9032, ZK1090-3xxx-xxxx**	**TIA-568B**
Tx +	1	yellow[1)]	orange/white	white/orange
Tx -	4	orange[1)]	orange	orange
Rx +	2	white[1)]	blue/white	white/green
Rx -	3	blue[1)]	blue	green
Shield	Housing	Shield	Shield	Shield

[1)] Core colors according to EN 61918

Adaptation of core colors for cables ZB9030, ZB9032 and ZK1090-3xxxx-xxxx

For standardization, the core colors of the ZB9030, ZB9032 and ZK1090-3xxx-xxxx cables have been changed to the EN61918 core colors: yellow, orange, white, blue. So there are different color codes in circulation. The electrical properties of the cables have been retained when the core colors were changed.

4.2.2.2 Status LEDs



Fig. 8: EtherCAT Status LEDs

L/A (Link/Act)

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

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

Run

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

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

Description of the EtherCAT slave states

4.2.2.3 Cables

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

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

Detailed recommendations for the cabling of EtherCAT devices

4.2.3 Supply voltages

⚠ 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 [▶ 29].

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.

4.2.3.1 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



Fig. 9: Connectors for supply voltages

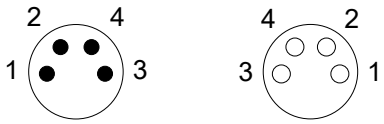


Fig. 10: M8 connector

Contact	Function	Description	Core color [1)]
1	U_S	Control voltage	Brown
2	U_P	Peripheral voltage	White
3	GND_S	GND to U_S	Blue
4	GND_P	GND to U_P	Black

[1)] The core colors apply to cables of the type: Beckhoff ZK2020-3xxx-xxxx

4.2.3.2 Status LEDs



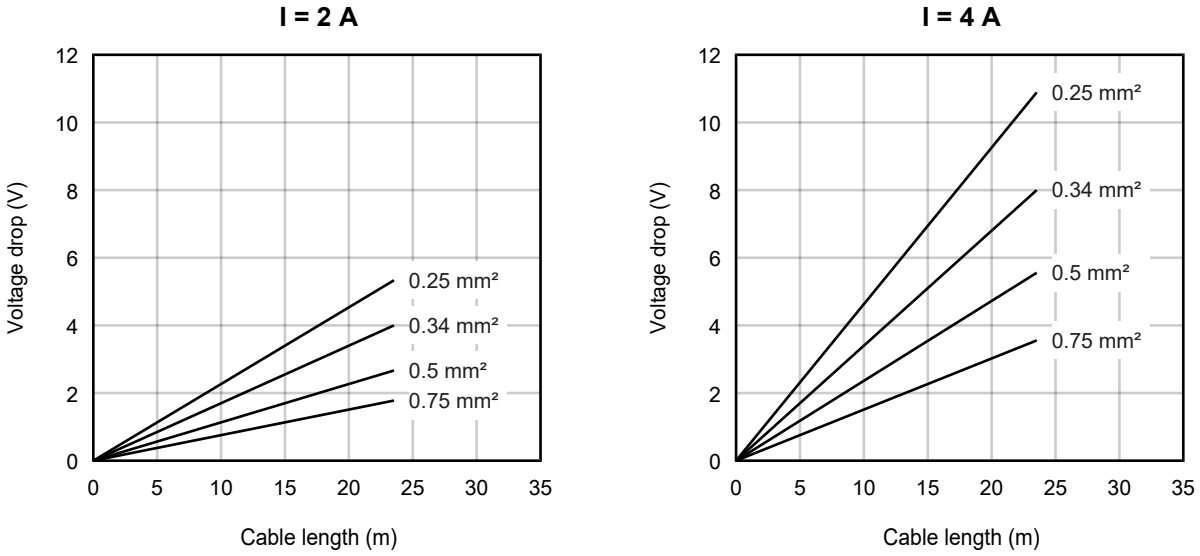
Fig. 11: Status LEDs for the supply voltages

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	Due to overload, the sensor supply generated from U_S was switched off for all sensors supplied by it.
U_P (peripheral voltage)	off	The supply voltage U_P is not available.
	green illuminated	The supply voltage U_P is available.

4.2.3.3 Conductor losses

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

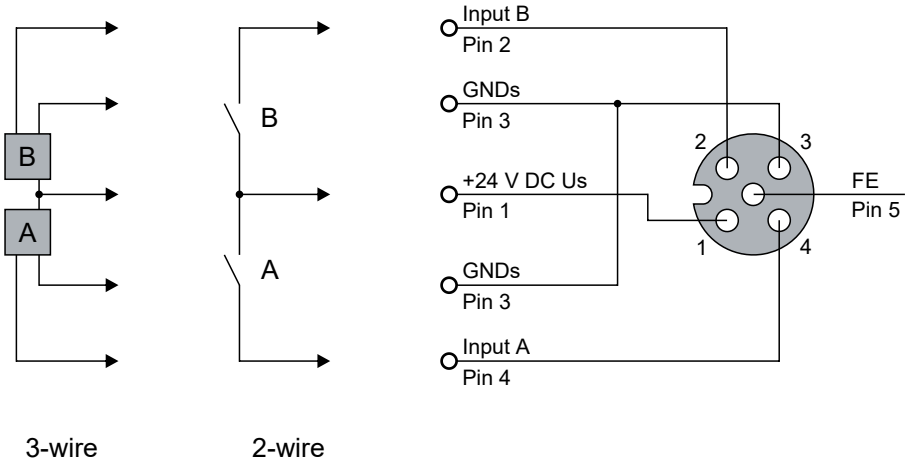
Voltage drop on the supply line



4.2.4 Signal connection

4.2.4.1 Digital inputs

The signal connection is established via M12 connectors.



3-wire 2-wire

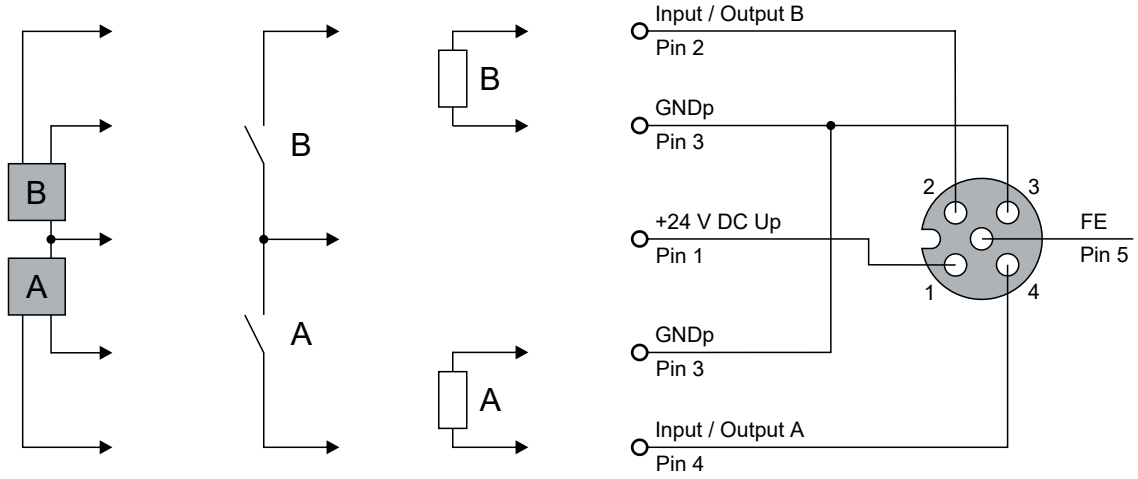
The sensors are supplied with a common maximum current of 0.5 A from the control voltage U_C.

Light emitting diodes indicate the signal state of the inputs.

4.2.4.2 Digital inputs/outputs

No configuration is required. You can connect either a sensor or an actuator to each channel.

The signal connection is established via M12 connectors.



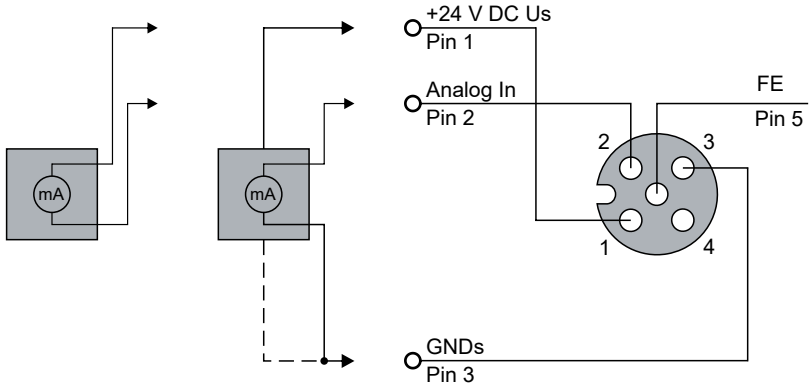
3-wire sensors or actuators | 2-wire sensors | 2-wire actuators

The outputs are short-circuit proof and protected against polarity reversal.

LEDs indicate the signal state of the outputs.

4.2.4.3 Analog inputs

The signal connection is established via M12 connectors.



2-wire 3-wire

If the sensor has separate connections for supply GND and signal GND, connect the two GNDs together. This connection is shown by the dashed line in the figure.

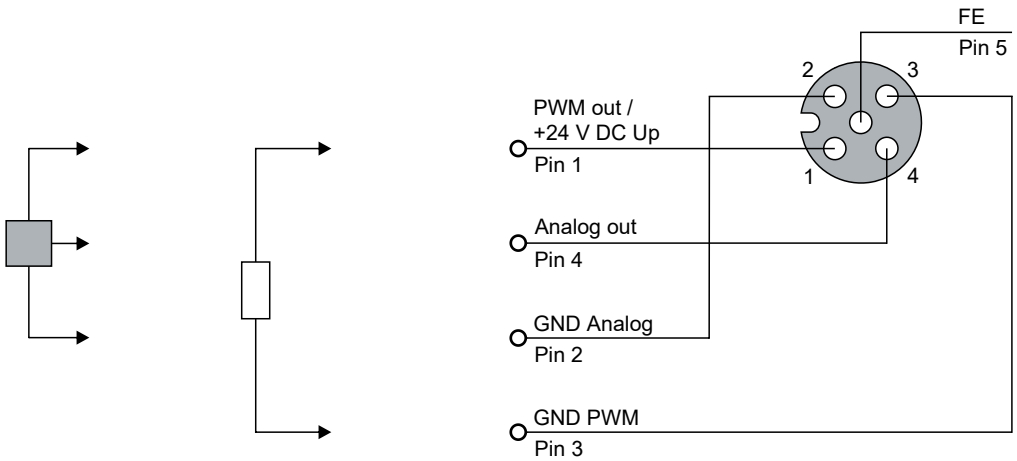
The sensors are supplied with a common maximum current of 0.5 A from the control voltage U_C.

LEDs indicate the status of the inputs.

4.2.4.4 Analog output and current-controlled PWM output

You can use the multifunction output either as an analog output or as a current-controlled PWM output, e.g. to control a proportional valve.
Configure the output according to the instructions in the chapter Switching between PWM and analog output [▶ 35].

The signal connection is established via M12 connectors.



3-wire analog 2-wire PWM

The outputs are short-circuit proof.

LEDs indicate the signal state of the output.

4.2.4.5 Status LEDs

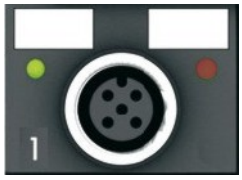


Fig. 12: Status LEDs

Status LEDs at the M12 connections

Connection	LED	Display	Meaning
M12 socket analog inputs, PWMi	left	off	No data transfer to the D/A converter
		green	Data transfer to the D/A converter
	right	off	Function OK
		red	Analog error: broken wire or measured value outside the measuring range PWMi: general error, see status word

Correct function is indicated if the green *Run* LED is on and the red *Error* LED is off.

Status LEDs at the M12 connections

Connection	LED	Display	Meaning
M12 socket digital inputs/outputs	left / right	off	Input / output off or Low
		green	Input / output on or High

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. 13: UL label

4.4 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 this Quick start guide.

5.2 Tacho analysis

Tacho analysis refers to velocity or frequency logging for two digital sensors mounted on one shaft (single-shaft mode) or on two shafts (dual-shaft mode).

In single-shaft mode a plausibility check can be run for the two sensors (e.g. velocity deviation of the two sensors).

The targets (sensor markings) should show a 90° overlapping signal when triggered. The minimum ON of OFF time must not be less than 0.2ms, otherwise detection is not possible due to the sampling frequency.

The number of targets on the axis can be set in CoE object 0x80x0:11. In this way slower velocity/speed detection with many targets or high velocity with few targets can be achieved.

Mode selection via the PDOs

The different modes are activated via the PDO assignment.

Single-shaft mode

The input PDO 0x1A02 activates the corresponding setting. The output data are always set.

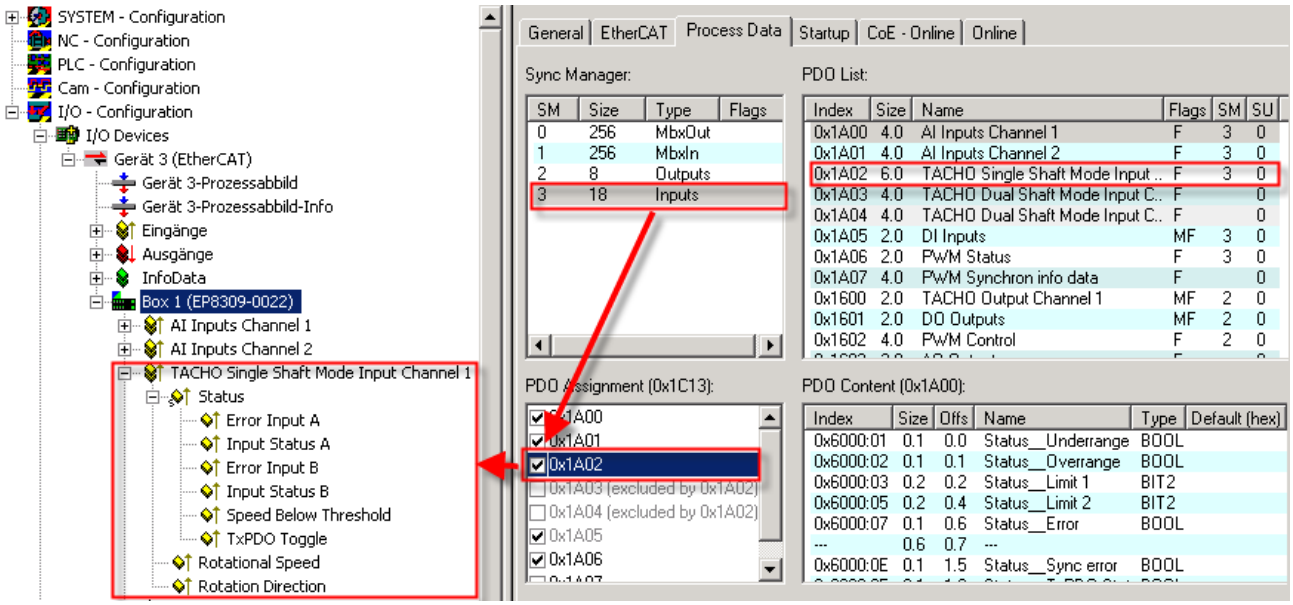


Fig. 14: Tacho evaluation – single shaft mode

Process data

Value	Description
Error Input A	The measured velocity/frequency is lower than that of track B, or it is 0 (sensor faulty)
Input Status A	Status of input A
Error Input B	The measured velocity/frequency is lower than that of track A, or it is 0 (sensor faulty)
Input Status B	Status of input B
Speed below threshold	The velocity is lower than the limit in CoE 0x8020:12 *Rotational Speed Threshold* or = 0
Rotational Speed	Rotational speed and frequency, shown as a function of CoE object 0x80x0:15
Rotation Direction	0: rising edge of input A occurs before rising edge of input B

Display of the rotational speed

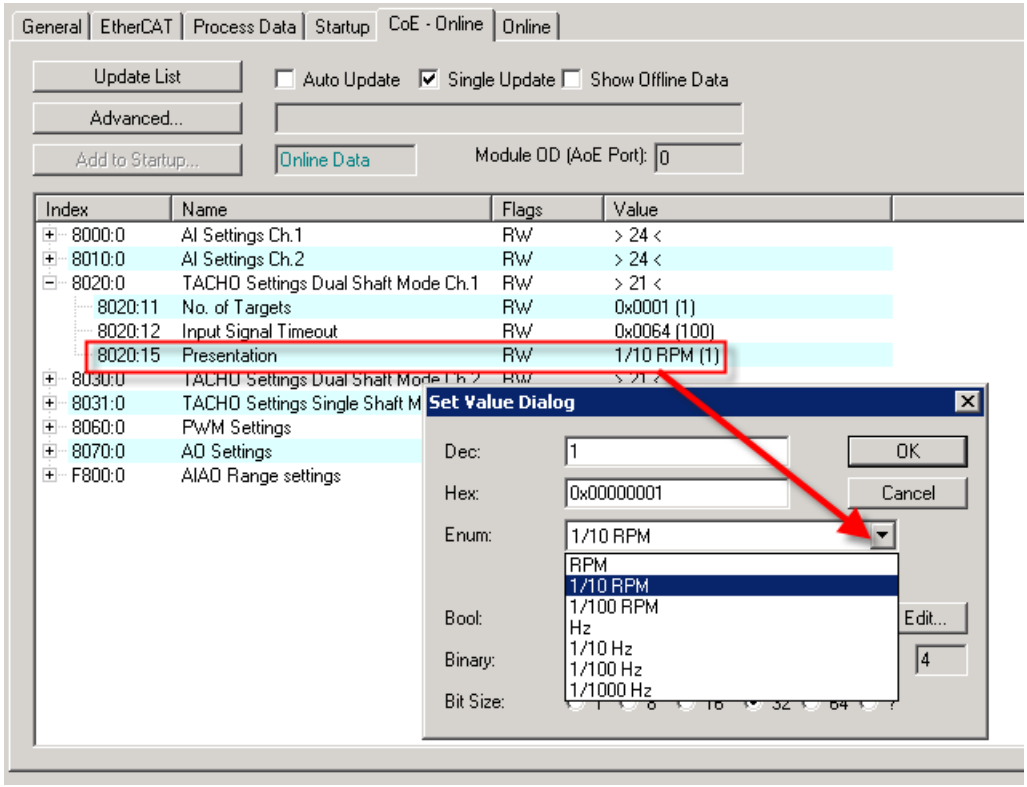


Fig. 15: Tacho evaluation - display of the rotational speed

Dual Shaft Mode

The input PDOs 0x1A03 and 0x1A04 activate the two dual-shaft process data. The output data are always set.

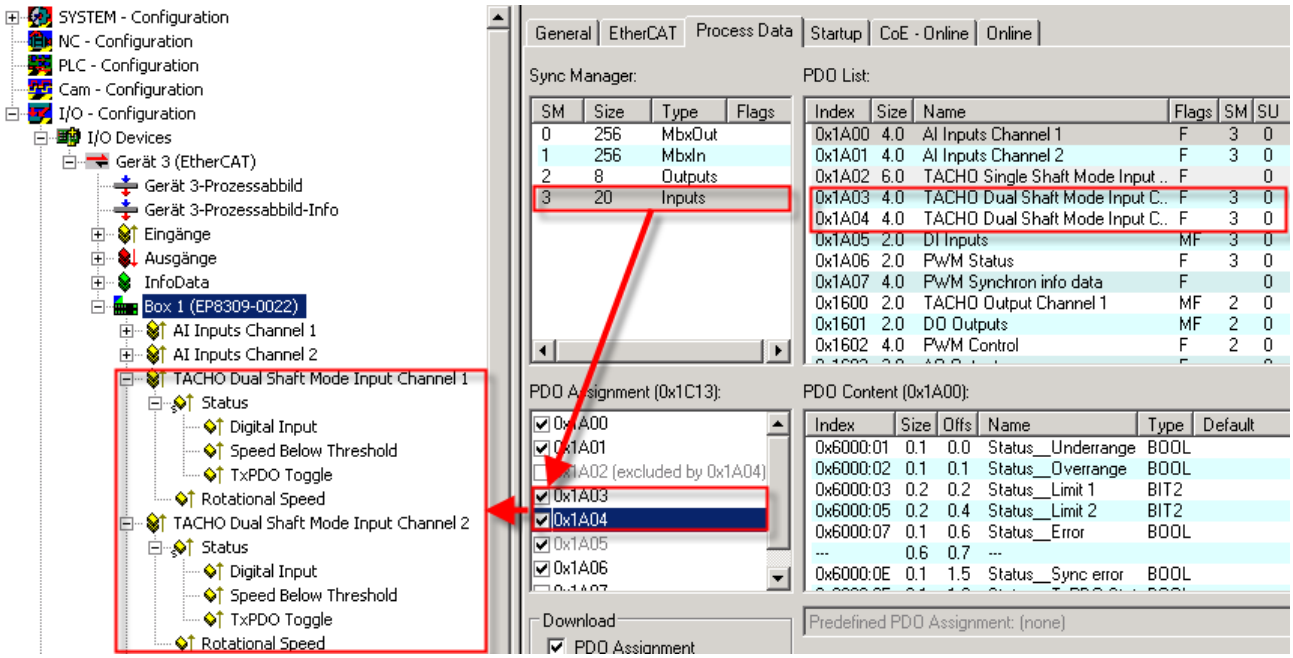


Fig. 16: Tacho evaluation - dual shaft mode

Process data (settings for the second channel equivalent)

Value	Description
Digital input	Status of input
Speed below threshold	The velocity is lower than the limit in CoE 0x8020:12 or = 0
Rotational Speed	Rotational speed and frequency, shown as a function of CoE object 0x80x0:15

Display of the rotational speed

see single-shaft mode

CoE settings

The behavior of the tacho inputs is set via the CoE objects.

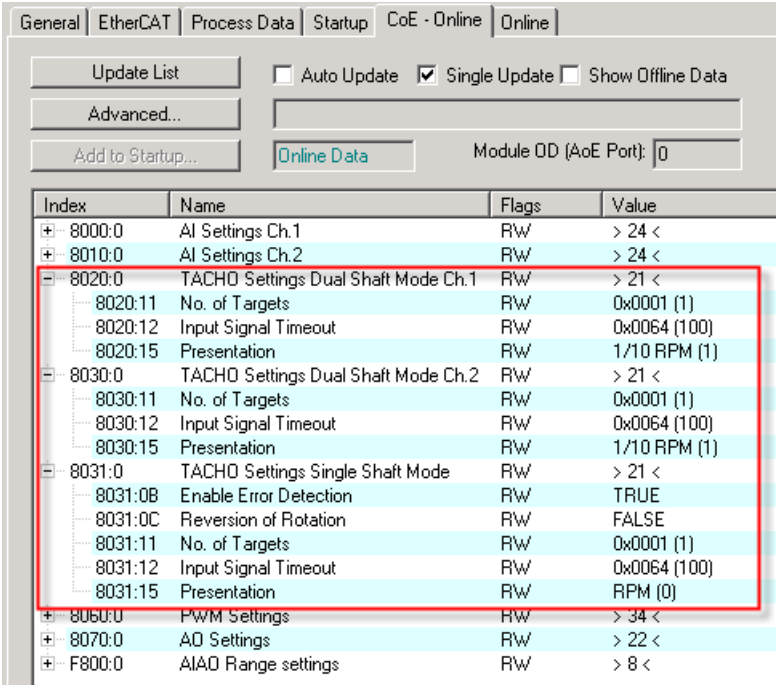


Fig. 17: Tacho evaluation -

The following settings apply to all channels:

CoE	Value	Description
80xx:12	Input Signal Timeout	The process record <Speed Below Threshold> is set after x msec without signal change at the input.

The following settings are only available in single-shaft mode

CoE objects for tacho settings (0x8020 and 0x8030)

CoE	Value	Description
80x0:0B	Enable Error Detection	Enable/disable error display
80x0:0C	Reversion of rotation	Reversion of rotation display in *Rotation direction*
80x0:11	No. of Targets	Number of "cams" on the shaft/axis
80x0:12	Rotational Speed Threshold	Limit value below which the corresponding status bit is set
80x0:15	Presentation	Display of the measured value in RPM, Hz, …

5.3 Switching between PWM and analog output

Mode selection via the PDOs

PWM mode or analog mode can be selected for operating a proportional valve at socket 7, for example.

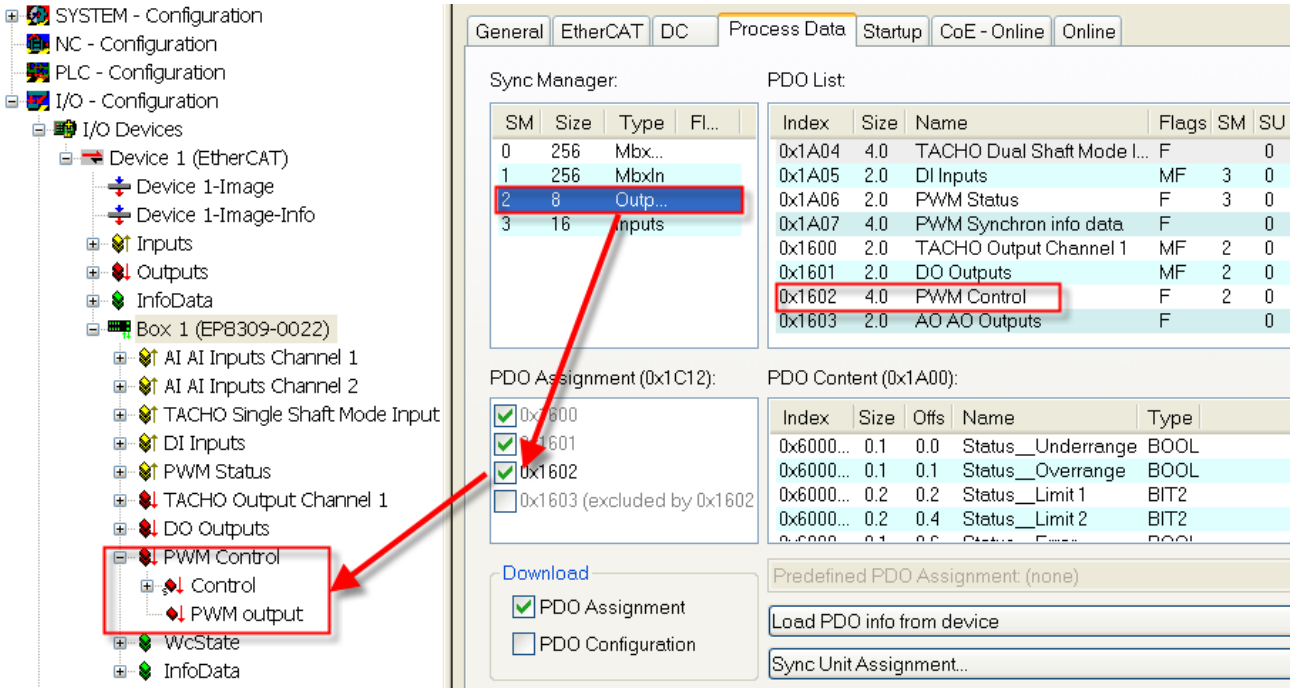
- In PWM mode (default) the coil is controlled directly via a PWM signal. The valve requires no control electronics.
- In analog mode a current value of 0...20 mA or 4...20 mA is output, via which the control electronics integrated in the valve controls the valve travel.

The 24V_{DC} supply is switched on continuously.

The different modes are activated via the PDO assignment.

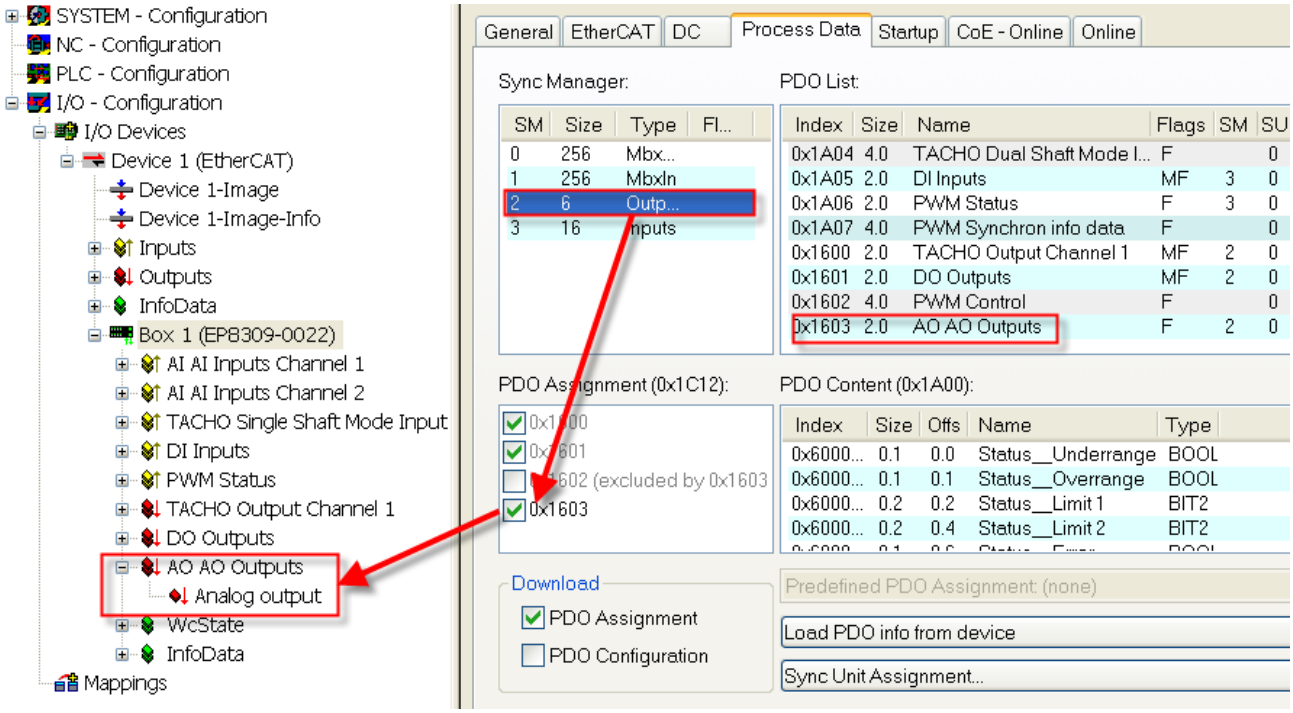
PWM mode

The output PDO **0x1602** activates the PWM mode.



Analog mode

The output PDO **0x1603** activates the analog mode.


SYSTEM - Configuration
NC - Configuration
PLC - Configuration
I/O - Configuration
I/O Devices
Device 1 (EtherCAT)
Device 1-Image
Device 1-Image-Info
Inputs
Outputs
InfoData
Box 1 (EP8309-0022)
AI AI Inputs Channel 1
AI AI Inputs Channel 2
TACHO Single Shaft Mode Input
DI Inputs
PWM Status
TACHO Output Channel 1
DO Outputs
AO AO Outputs
Analog output
WcState
InfoData
Mappings
General
EtherCAT
DC
Process Data
Startup
CoE - Online
Online
Sync Manager:
SM Size Type Fl...
0 256 Mbx...
1 256 MbxIn
2 6 Outp...
3 16 nputs
PDO List:
Index Size Name Flags SM SU
0x1A04 4.0 TACHO Dual Shaft Mode I... F 0
0x1A05 2.0 DI Inputs MF 3 0
0x1A06 2.0 PWM Status F 3 0
0x1A07 4.0 PWM Synchron info data F 0
0x1600 2.0 TACHO Output Channel 1 MF 2 0
0x1601 2.0 DO Outputs MF 2 0
0x1602 4.0 PWM Control F 0
0x1603 2.0 AO AO Outputs F 2 0
PDO Assignment (0x1C12):
0x1600
0x1601
0x1602 (excluded by 0x1603
0x1603
PDO Content (0x1A00):
Index Size Offs Name Type
0x6000... 0.1 0.0 Status__Underrange BOOL
0x6000... 0.1 0.1 Status__Overrange BOOL
0x6000... 0.2 0.2 Status__Limit 1 BIT2
0x6000... 0.2 0.4 Status__Limit 2 BIT2
Download
PDO Assignment
PDO Configuration
Predefined PDO Assignment: (none)
Load PDO info from device
Sync Unit Assignment...

5.4 Quick start

Parameterization of the main settings

The parameters are set at the factory so that the box is ready for use in most applications without further parameterization.

Set the parameter Max Current [mA] (0x8050:10 [▶ 60]) such that the maximum inductance current is not exceeded.

Info data objects

Via the info data objects additional information can be transferred synchronously. For each channel two of these objects are available.

The synchronous info data can be activated in the TwinCAT System Manager via the "Process Data" tab (0x1A07).

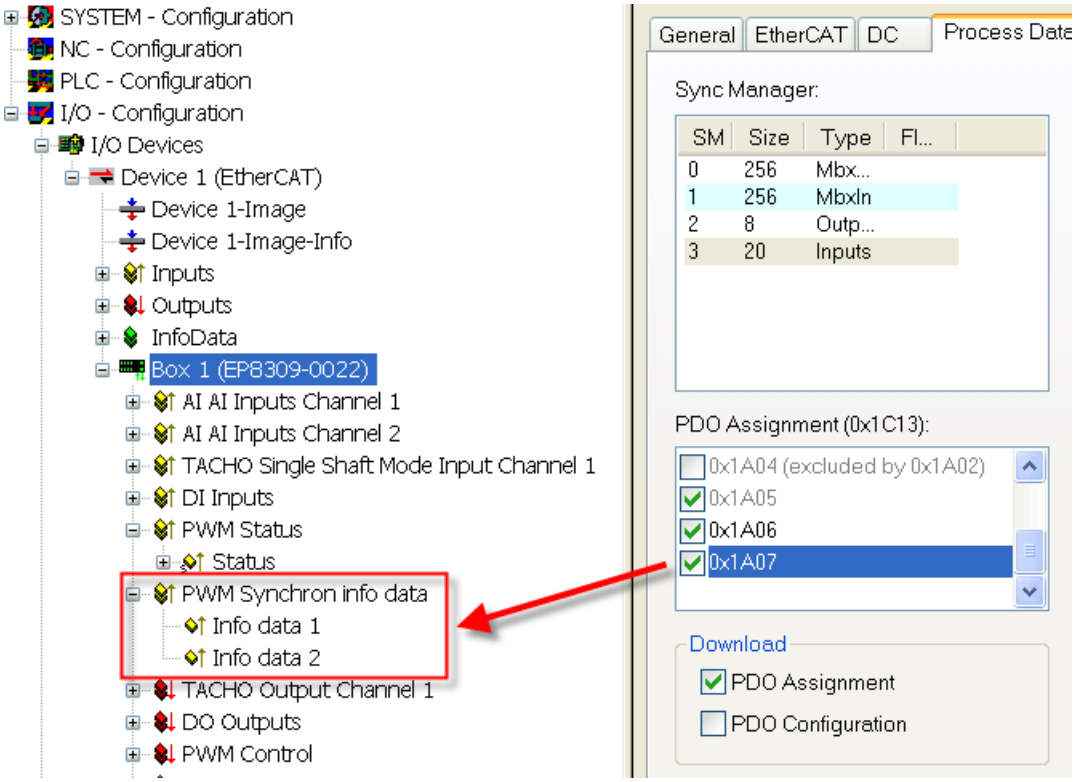


Fig. 18: Info data objects - activation of the synchronous info data

Objects 0x8050:21 [▶ 60] and 0x8050:22 [▶ 60] can be used to set the value to be transferred synchronously.

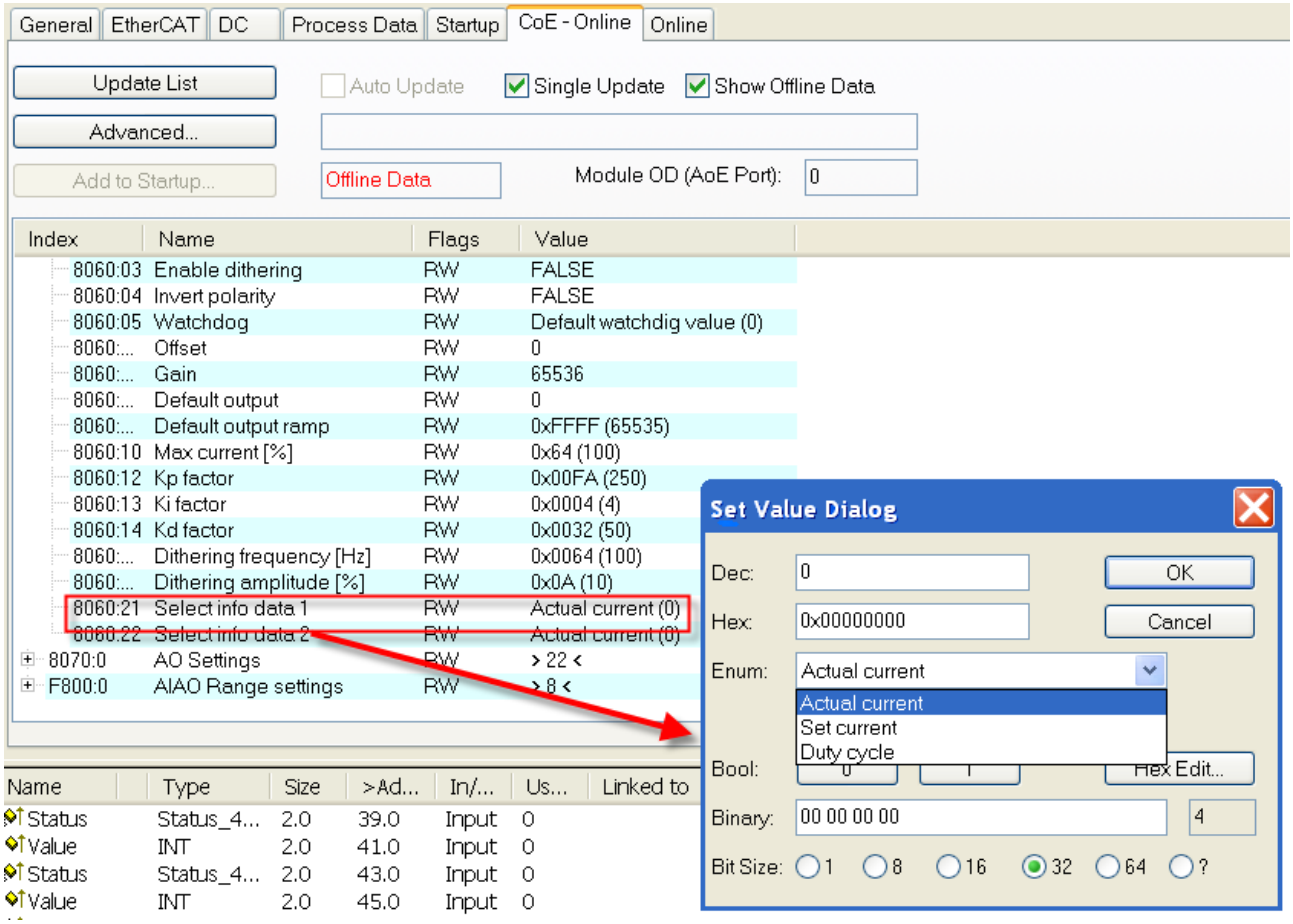


Fig. 19: Info data objects – selection of the value to be transmitted

The following entries are available:

Value	Text	Description
0	Actual current	Actual current in mA
1	Set current	Set current in mA
2	Duty Cycle	The PWM duty cycle of the output stage. A value of 1000 corresponds to 100% duty cycle.

Watchdog

The analog output value can, e.g. in the case of a failure of communication with the controller, be set to a user-specific value.

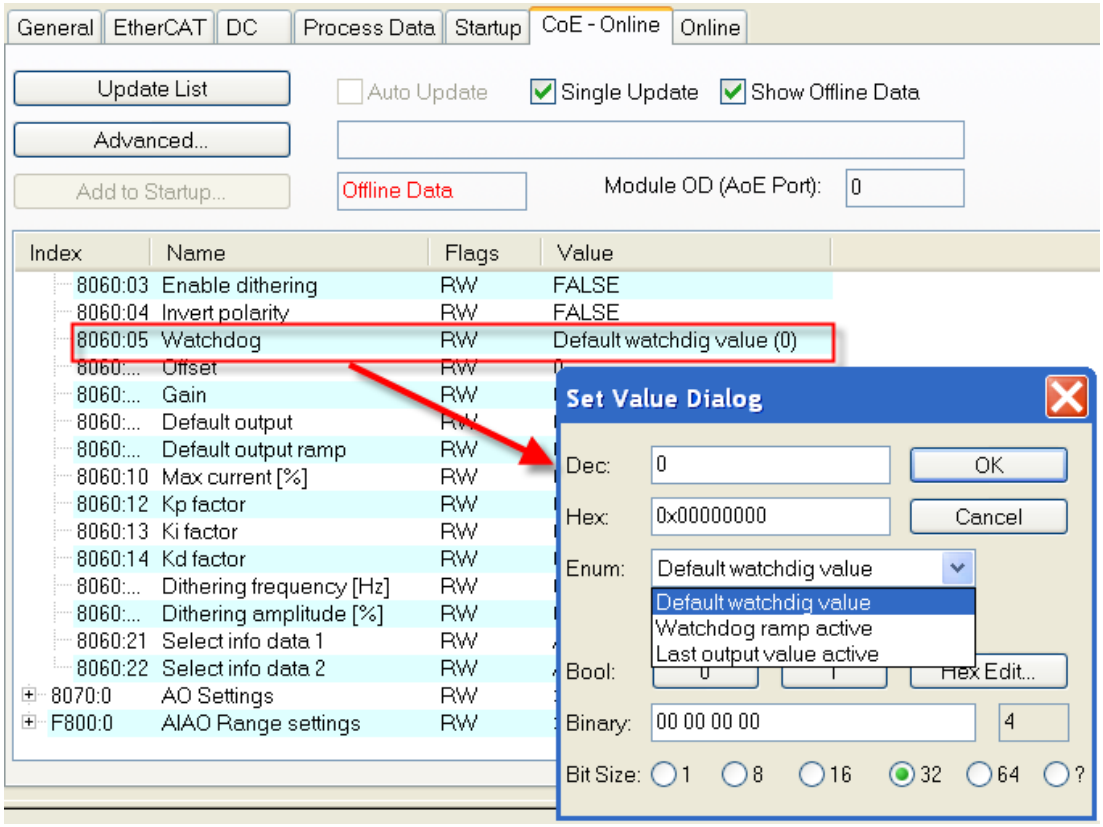


Fig. 20: Watchdog

Three parameterization options are available for this purpose:

Watchdog object (0x8050:05 [▶ 63])	Behavior
0: Default watchdog value	The substitute switching value (0x8050:0D [▶ 63]) is output on error.
1: Watchdog ramp active	On error the output value is moved to the default value (0x8050:0D [▶ 63]) with the ramp time set under 0x8050:0E [▶ 63] The ramp time is specified in digits / ms. If the entry is 100 and the default value 0, for example, it takes 327 ms (32767/100) for the output value to change from the maximum value (32767) to the default value in the event of a fault.
2: Last output value active	In the event of a fault (watchdog drop) the last process data is issued.

Optimization of the current control parameters

In order to be able to support all possible loads ex factory, the terminal was parameterized with moderate controller characteristics. Current regulation can be improved significantly by adapting the controller parameters to the actual load.

To determine the settings a current pulse is applied to the load. This pulse can be picked up with an oscilloscope or with TwinCAT ScopeView.

For evaluation with TwinCAT ScopeView the set and actual current is displayed in the synchronous info data.

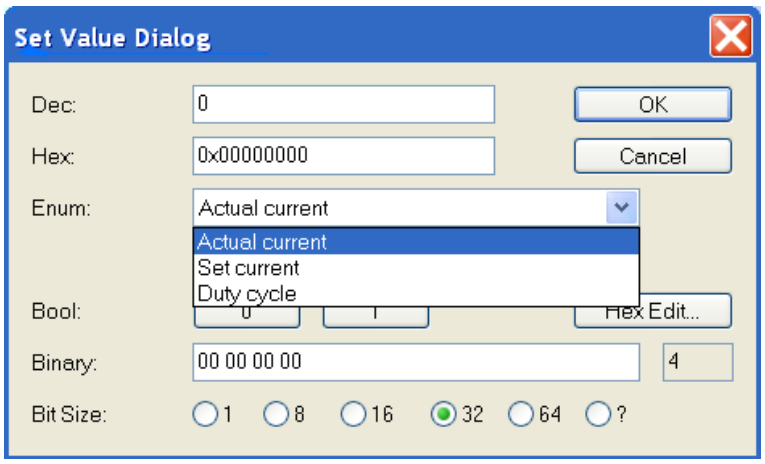
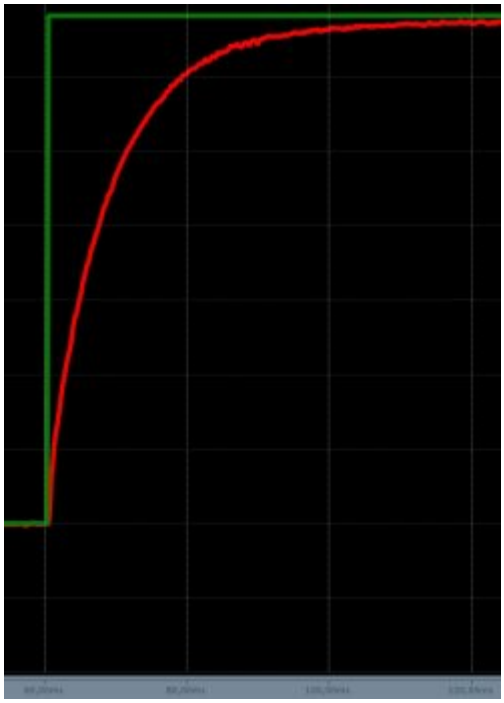


Fig. 21: Selecting the synchronous info data



EP8309 standard parameters (20 ms/div)

Green: Set current
Red: Actual current



Optimized parameters (20 ms/div)

Green: Set current
Red: Actual current

The required step response can be set using the parameters K_p,K_i, and K_d (0x8050:12 [▶ 63] to 0x8050:14 [▶ 63]).

Dithering

Dithering involves modulating a square wave signal on top of the actual output value. The modulated signal results in continuous movement of a valve piston, for example.
This reduces static friction and prevents sudden "breakaway" of the piston.

The configuration required for this depends a lot on the particular application.
To activate dithering, the object 0x8050:03 [▶ 63] ("Enable dithering") and the corresponding control bit must be set.

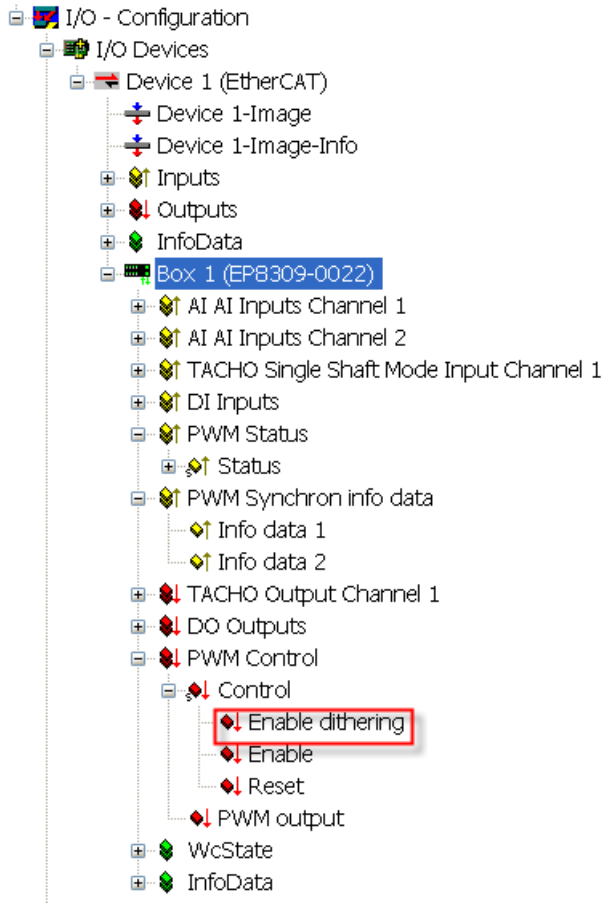
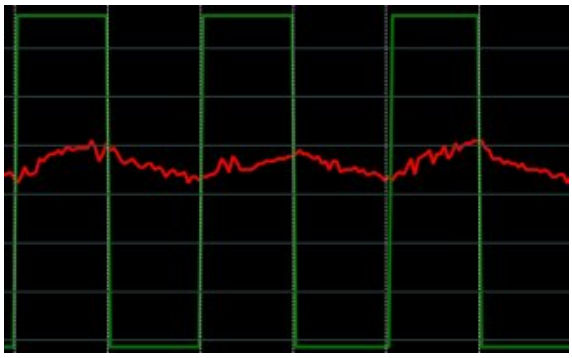


Fig. 22: Enable dithering

The following parameters can be set:

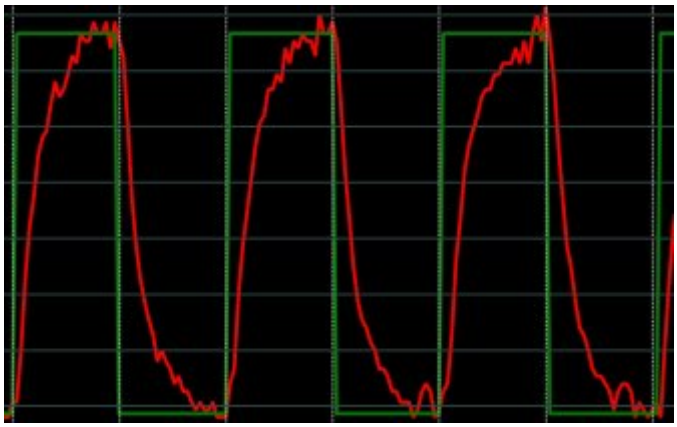
Value	Text	Description
0x8050:1E [▶ 63]	Dithering frequency [Hz]	Frequency of the applied dither in Hz
0x8050:1F [▶ 63]	Dithering amplitude [%]	Amplitude of the applied dither (in % of the rated terminal current)

The controller parameters themselves (K_p,K_i, and K_d) also play a role.
In the diagrams a dither of 10 % of the rated current is shown as 100 Hz.
The controller has 5 ms for compensating a current pulse of 10 %. The steepness of the current rise is limited by the controller parameters and the inductance.
The actual current should follow the set current. This is enabled through suitable settings of the controller and dither parameters (frequency and amplitude).



EP8309 100 Hz dither with 10 % amplitude,
poor parameterization (5 ms/div)

Green: Set current
Red: Actual current



EP8309 100 Hz dither with 10 % amplitude,
better parameterization (5 ms/div)

Green: Set current
Red: Actual current

5.5 Range settings for inputs and outputs

CoE-Online tab

The *CoE-Online* tab lists the contents of the slave object directory of the slave (SDO upload) and enables the user to modify the content of an object in this list.

Object 0xF800:0 [▶ 64] contains the range settings for the inputs and outputs of channels 1 to 4.

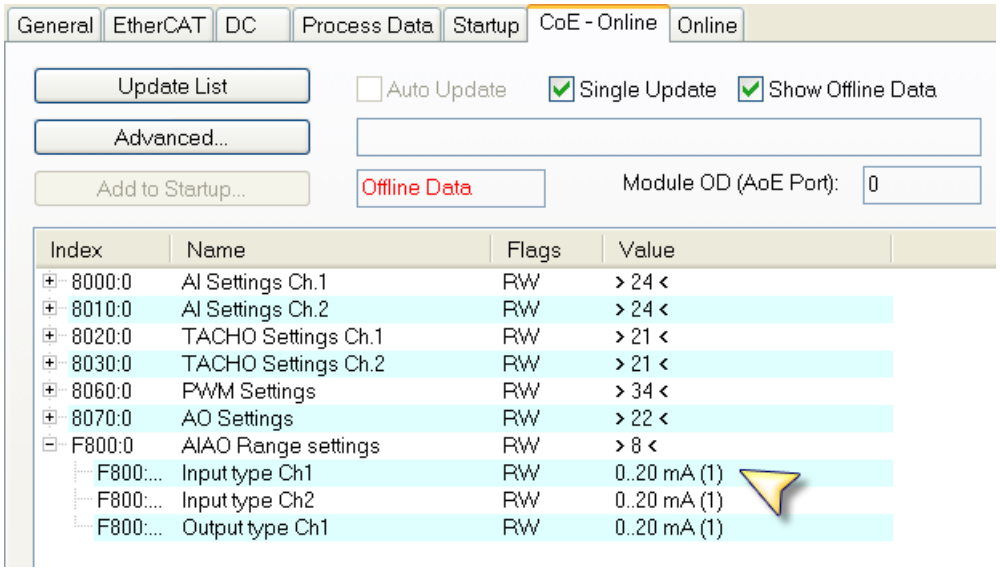


Fig. 23: CoE-Online tab

Click on objects 0xF800:01 to 0xF800:04 to change the settings.

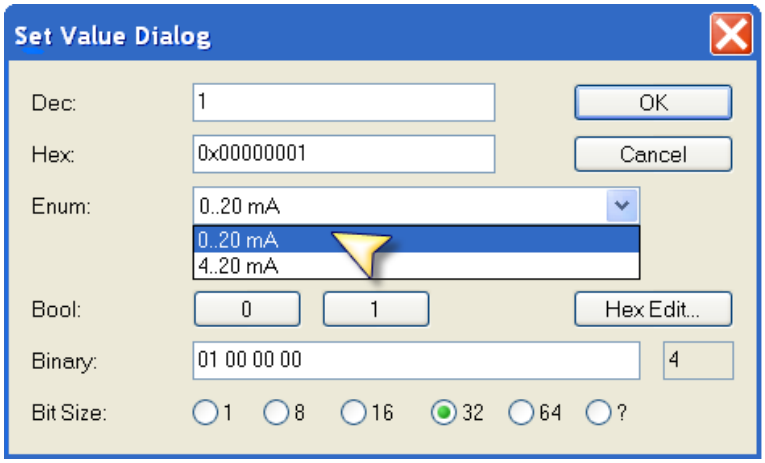
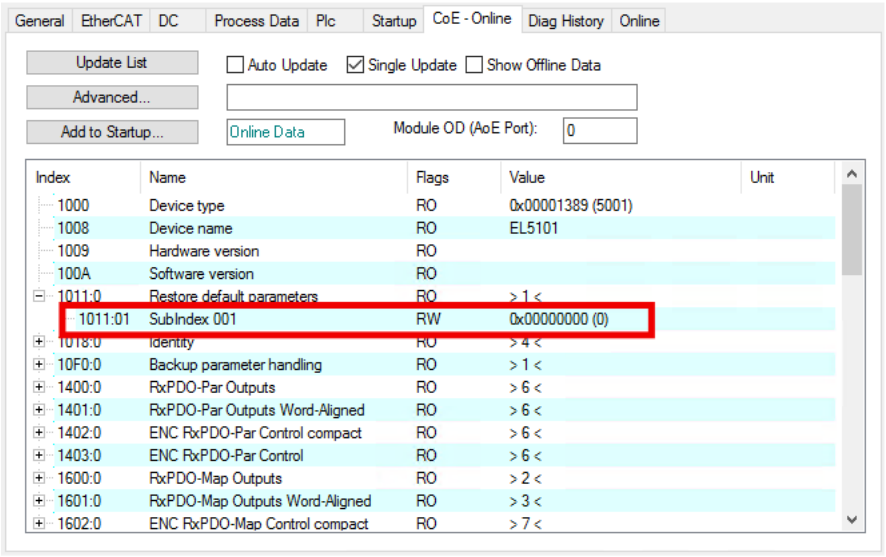


Fig. 24: Changing the settings

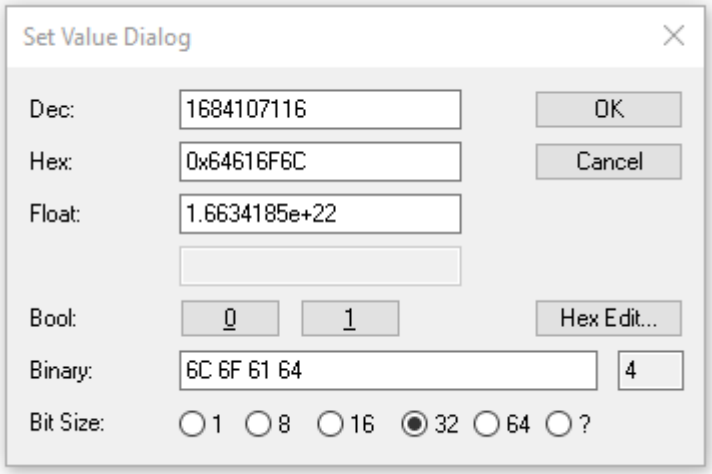
5.6 Restore the delivery state

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.

6 CoE parameters

6.1 CoE interface

General description

The CoE interface (CANopen over EtherCAT) is used for parameter management of EtherCAT devices. EtherCAT slaves or the EtherCAT master manage fixed (read only) or variable parameters which they require for operation, diagnostics or commissioning.

CoE parameters are arranged in a table hierarchy. In principle, the user has read access via the fieldbus. The EtherCAT master (TwinCAT System Manager) can access the local CoE lists of the slaves via EtherCAT in read or write mode, depending on the properties.

Different CoE parameter types are possible, including string (text), integer numbers, Boolean values or larger byte fields. They can be used to describe a wide range of features. Examples of such parameters include manufacturer ID, serial number, process data settings, device name, calibration values for analog measurement or passwords.

Organization takes place on 2 levels by means of hexadecimal numbering: the (main) index is named first, then the subindex. The value ranges are:

- Index 0 to 65535
- Subindex: 0…255

A parameter localized in this way is normally written as x8010:07, with preceding "x" to identify the hexadecimal numerical range and a colon between index and subindex.

The relevant ranges for EtherCAT fieldbus users are:

- x1000: This is where fixed identity information for the device is stored, including name, manufacturer, serial number etc., plus information about the current and available process data configurations.
- x8000: This is where the operational and functional parameters for all channels are stored, such as filter settings or output frequency.

Other important ranges are:

- x4000: In some EtherCAT devices the channel parameters are stored here (as an alternative to the x8000 range).
- x6000: Input PDOs ("input" from the perspective of the EtherCAT master)
- x7000: Output PDOs ("output" from the perspective of the EtherCAT master)

Availability

Not every EtherCAT device must have a CoE list. Simple I/O modules without dedicated processor usually have no variable parameters and therefore no CoE list.

If a device has a CoE list, it is shown in the TwinCAT System Manager as a separate tab with a listing of the elements:

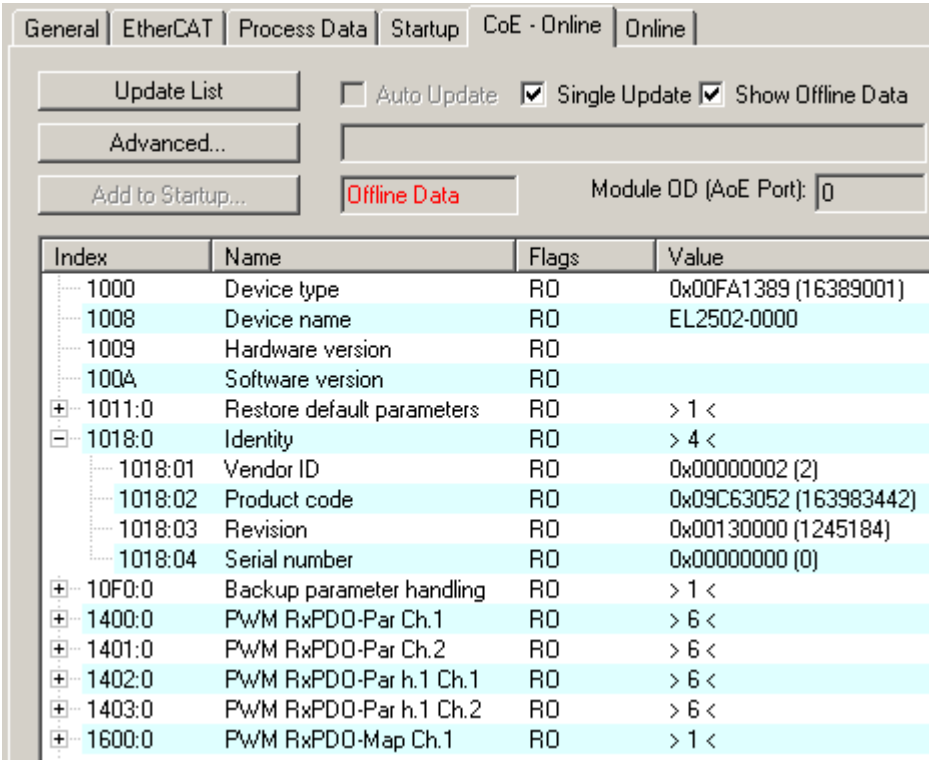


Fig. 25: *CoE-Online* tab

The CoE objects from x1000 to x1600, which are available in the example device "EL2502", can be seen in the above figure; the subindices from x1018 are expanded.

Data management

Some parameters, particularly the setting parameters of the slave, are configurable and writeable. This can be done in write or read mode

- via the System Manager (figure above) by clicking. This is useful for commissioning of the system/ slaves. Click on the row of the index to be parameterized and enter a value in the *SetValue* dialog.
- from the control system/PLC via ADS, e.g. through function blocks from the TcEtherCAT.lib library This is recommended for modifications while the system is running or if no System Manager or operating staff are available.

Data management

If CoE parameters on the slave are changed online, this is saved fail-safe in the device (EEPROM) in Beckhoff devices. This means that the changed CoE parameters are still retained after a restart. The situation may be different with other manufacturers.

Startup list

Startup list

Changes in the local CoE list of the terminal are lost **if the terminal is replaced**. If a terminal is replaced with a new Beckhoff terminal, it will have the factory settings. It is therefore advisable to link all changes in the CoE list of an EtherCAT slave with the **Startup list** of the slave, which is processed whenever the EtherCAT fieldbus is started. In this way a replacement EtherCAT slave can automatically be parameterized with the specifications of the user.

If EtherCAT slaves are used which are unable to store local CoE values permanently, the Startup list must be used.

Recommended approach for manual modification of CoE parameters

- Make the required change in the System Manager. The values are stored locally in the EtherCAT slave

- If the value is to be stored permanently, enter it in the Startup list. The order of the Startup entries is usually irrelevant.

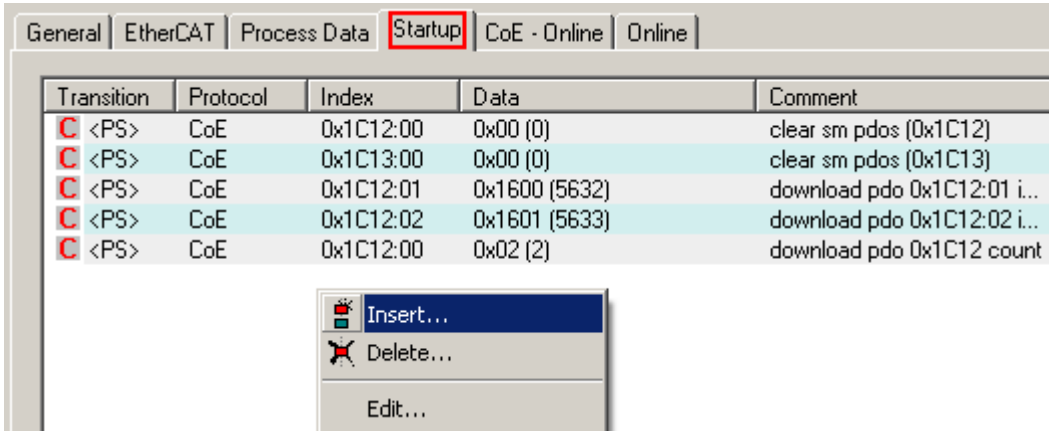


Fig. 26: Startup list in the TwinCAT System Manager

The Startup list may already contain values that were configured by the System Manager based on the ESI specifications. Additional application-specific entries can be created.

Online/offline directory

While working with the TwinCAT System Manager, a distinction has to be made whether the EtherCAT device is "available", i.e. switched on and linked via EtherCAT and therefore **online**, or whether a configuration is created **offline** without connected slaves.

In both cases a CoE directory is visible according to the figure "CoE-Online tab", but the connectivity is displayed as offline/online.

If the slave is offline

- the offline list from the ESI file is displayed. In this case modifications are not meaningful or possible.
- the configured status is shown under Identity
- no firmware or hardware version is displayed, since these are features of the physical device.
- Offline is shown in red

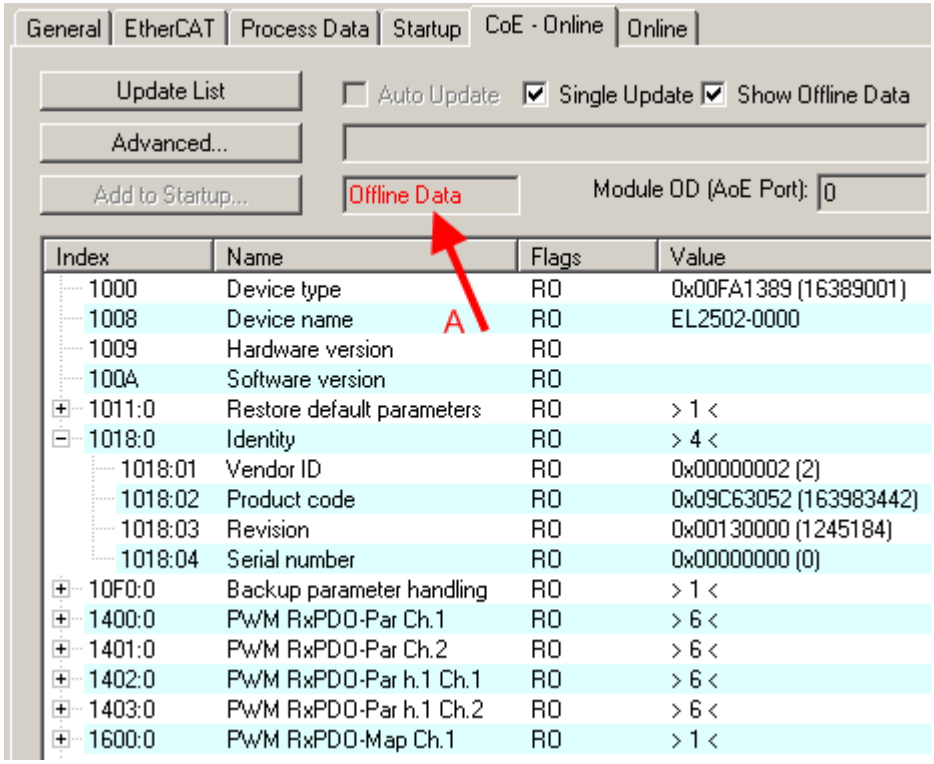


Fig. 27: Offline list

If the slave is online

- the actual current slave directory is read. This may take several seconds, depending on the size and cycle time.
- the actual identity is displayed
- the firmware and hardware version of the equipment according to the electronic information is displayed.
- Online is shown in green

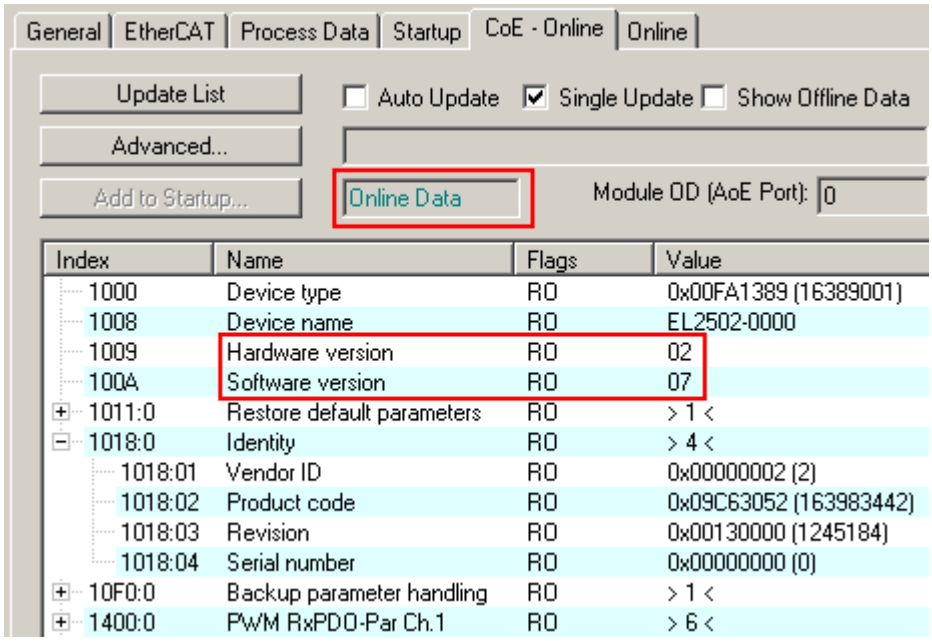


Fig. 28: Online list

Channel-based order

The CoE directory is located in EtherCAT devices that usually encompass several functionally equivalent channels. e.g. a 4-channel 0 – 10 V analog input terminal also has 4 logical channels and thus 4 identical sets of parameter data for the channels. In order to avoid having to list each channel in the documentation, the placeholder "n" tends to be used for the individual channel numbers.

In the CoE system 16 indices, each with 255 subindices, are generally sufficient for representing all channel parameters. The channel-based order is therefore arranged in $16_{dec}/10_{hex}$ steps. The parameter range x8000 exemplifies this:

- Channel 0: parameter range x8000:00 ... x800F:255
- Channel 1: parameter range x8010:00 ... x801F:255
- Channel 2: parameter range x8020:00 ... x802F:255
- …

This is generally written as x80n0. Detailed information on the CoE interface can be found in the EtherCAT system documentation on the Beckhoff website.

6.2 Object overview

EtherCAT XML Device Description

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

Index (hex)		Name	Flags	Default value
1000 [▶ 65]		Device type	RO	0x00001389 (5001$_{dec}$)
1008 [▶ 65]		Device name	RO	EP8309-1022
1009 [▶ 65]		Hardware version	RO	00
100A [▶ 65]		Software version	RO	02
1011 [▶ 65]:0	**Subindex**	Restore default parameters	RO	0x01 (1$_{dec}$)
	1011:01	SubIndex 001	RW	0x00000000 (0$_{dec}$)
1018 [▶ 65]:0	**Subindex**	Identity	RO	0x04 (4$_{dec}$)
	1018:01	Vendor ID	RO	0x00000002 (2$_{dec}$)
	1018:02	Product code	RO	0x20754052 (544555090$_{dec}$)
	1018:03	Revision	RO	0x00110016 (1114134$_{dec}$)
	1018:04	Serial number	RO	0x00000000 (0$_{dec}$)
10F0 [▶ 65]:0	**Subindex**	Backup parameter handling	RO	0x01 (1$_{dec}$)
	10F0:01	Checksum	RO	0x00000000 (0$_{dec}$)
1402 [▶ 66]:0	**Subindex**	PWM RxPDO-Par Control	RO	0x06 (6$_{dec}$)
	1402:06	Exclude RxPDOs	RO	03 16
1403 [▶ 66]:0	**Subindex**	AO RxPDO-Par Outputs	RO	0x06 (6$_{dec}$)
	1403:06	Exclude RxPDOs	RO	02 16
1600 [▶ 66]:0	**Subindex**	TACHO RxPDO-Map OutputsCh.1	RO	0x03 (3$_{dec}$)
	1600:01	SubIndex 001	RO	0x0000:00, 8
	1600:02	SubIndex 002	RO	0x7020:09, 1
	1600:03	SubIndex 003	RO	0x0000:00, 7
1601 [▶ 66]:0	**Subindex**	DO RxPDO-Map Outputs	RO	0x07 (7$_{dec}$)
	1601:01	SubIndex 001	RO	0x7050:01, 1
	1601:02	SubIndex 002	RO	0x7050:02, 1
	1601:03	SubIndex 003	RO	0x7050:03, 1
	1601:04	SubIndex 004	RO	0x7050:04, 1
	1601:05	SubIndex 005	RO	0x7050:05, 1
	1601:06	SubIndex 006	RO	0x7050:06, 1
	1601:07	SubIndex 007	RO	0x0000:00, 10
1602 [▶ 66]:0	**Subindex**	PWM RxPDO-Map Control	RO	0x06 (6$_{dec}$)
	1602:01	SubIndex 001	RO	0x7060:01, 1
	1602:02	SubIndex 002	RO	0x0000:00, 4
	1602:03	SubIndex 003	RO	0x7060:06, 1
	1602:04	SubIndex 004	RO	0x7060:07, 1
	1602:05	SubIndex 005	RO	0x0000:00, 9
	1602:06	SubIndex 006	RO	0x7060:11, 16

Index (hex)		Name	Flags	Default value
1603 [▶ 67]:0	**Subindex**	AO RxPDO-Map Outputs	RO	0x01 (1_{dec})
	1603:01	SubIndex 001	RO	0x7070:11, 16
1802 [▶ 67]:0	**Subindex**	TACHO TxPDO-Par Single Shaft Mode Input Ch.1	RO	0x06 (6_{dec})
	1802:06	Exclude TxPDOs	RO	03 1A 04 1A
1803 [▶ 67]:0	**Subindex**	TACHO TxPDO-Par Dual Shaft Mode Input Ch.1	RO	0x06 (6_{dec})
	1803:06	Exclude TxPDOs	RO	02 1A 00 00
1804 [▶ 67]:0	**Subindex**	TACHO TxPDO-Par Dual Shaft Mode Input Ch.2	RO	0x06 (6_{dec})
	1804:06	Exclude TxPDOs	RO	02 1A 00 00
1A00 [▶ 67]:0	**Subindex**	AI TxPDO-Map Inputs Ch.1	RO	0x0A (10_{dec})
	1A00:01	SubIndex 001	RO	0x6000:01, 1
	1A00:02	SubIndex 002	RO	0x6000:02, 1
	1A00:03	SubIndex 003	RO	0x6000:03, 2
	1A00:04	SubIndex 004	RO	0x6000:05, 2
	1A00:05	SubIndex 005	RO	0x6000:07, 1
	1A00:06	SubIndex 006	RO	0x0000:00, 6
	1A00:07	SubIndex 007	RO	0x6000:0E, 1
	1A00:08	SubIndex 008	RO	0x6000:0F, 1
	1A00:09	SubIndex 009	RO	0x6000:10, 1
	1A00:0A	SubIndex 010	RO	0x6000:11, 16
1A01 [▶ 68]:0	**Subindex**	AI TxPDO-Map Inputs Ch.2	RO	0x0A (10_{dec})
	1A01:01	SubIndex 001	RO	0x6010:01, 1
	1A01:02	SubIndex 002	RO	0x6010:02, 1
	1A01:03	SubIndex 003	RO	0x6010:03, 2
	1A01:04	SubIndex 004	RO	0x6010:05, 2
	1A01:05	SubIndex 005	RO	0x6010:07, 1
	1A01:06	SubIndex 006	RO	0x0000:00, 6
	1A01:07	SubIndex 007	RO	0x6010:0E, 1
	1A01:08	SubIndex 008	RO	0x6010:0F, 1
	1A01:09	SubIndex 009	RO	0x6010:10, 1
	1A01:0A	SubIndex 010	RO	0x6010:11, 16
1A02 [▶ 68]:0	**Subindex**	TACHO TxPDO-Map Single Shaft Mode Input Ch.1	RO	0x0C (12_{dec})
	1A02:01	SubIndex 001	RO	0x0000:00, 1
	1A02:02	SubIndex 002	RO	0x6037:02, 1
	1A02:03	SubIndex 003	RO	0x6037:03, 1
	1A02:04	SubIndex 004	RO	0x6037:04, 1
	1A02:05	SubIndex 005	RO	0x6037:05, 1
	1A02:06	SubIndex 006	RO	0x0000:00, 3
	1A02:07	SubIndex 007	RO	0x0000:00, 3
	1A02:08	SubIndex 008	RO	0x6037:0C, 1
	1A02:09	SubIndex 009	RO	0x0000:00, 3
	1A02:0A	SubIndex 010	RO	0x6037:10, 1
	1A02:0B	SubIndex 011	RO	0x6037:11, 16
	1A02:0C	SubIndex 012	RO	0x6037:12, 16

Index (hex)		Name	Flags	Default value
1A03 [▶ 69]:0	**Subindex**	TACHO TxPDO-Map Dual Shaft Mode Input Ch.1	RO	0x09 (9_{dec})
	1A03:01	SubIndex 001	RO	0x6020:01, 1
	1A03:02	SubIndex 002	RO	0x0000:00, 2
	1A03:03	SubIndex 003	RO	0x0000:00, 1
	1A03:04	SubIndex 004	RO	0x0000:00, 4
	1A03:05	SubIndex 005	RO	0x0000:00, 3
	1A03:06	SubIndex 006	RO	0x6020:0C, 1
	1A03:07	SubIndex 007	RO	0x0000:00, 3
	1A03:08	SubIndex 008	RO	0x6020:10, 1
	1A03:09	SubIndex 009	RO	0x6020:11, 16
1A04 [▶ 69]:0	**Subindex**	TACHO TxPDO-Map Dual Shaft Mode Input Ch.2	RO	0x09 (9_{dec})
	1A04:01	SubIndex 001	RO	0x6030:01, 1
	1A04:02	SubIndex 002	RO	0x0000:00, 2
	1A04:03	SubIndex 003	RO	0x0000:00, 1
	1A04:04	SubIndex 004	RO	0x0000:00, 4
	1A04:05	SubIndex 005	RO	0x0000:00, 3
	1A04:06	SubIndex 006	RO	0x6030:0C, 1
	1A04:07	SubIndex 007	RO	0x0000:00, 3
	1A04:08	SubIndex 008	RO	0x6030:10, 1
	1A04:09	SubIndex 009	RO	0x6030:11, 16
1A05 [▶ 69]:0	**Subindex**	DI TxPDO-Map Inputs	RO	0x07 (7_{dec})
	1A05:01	SubIndex 001	RO	0x6040:01, 1
	1A05:02	SubIndex 002	RO	0x6040:02, 1
	1A05:03	SubIndex 003	RO	0x6040:03, 1
	1A05:04	SubIndex 004	RO	0x6040:04, 1
	1A05:05	SubIndex 005	RO	0x6040:05, 1
	1A05:06	SubIndex 006	RO	0x6040:06, 1
	1A05:07	SubIndex 007	RO	0x0000:00, 10
1A06 [▶ 70]:0	**Subindex**	PWM TxPDO-Map Status	RO	0x08 (8_{dec})
	1A06:01	SubIndex 001	RO	0x0000:00, 1
	1A06:02	SubIndex 002	RO	0x0000:00, 3
	1A06:03	SubIndex 003	RO	0x6060:05, 1
	1A06:04	SubIndex 004	RO	0x6060:06, 1
	1A06:05	SubIndex 005	RO	0x6060:07, 1
	1A06:06	SubIndex 006	RO	0x0000:00, 1
	1A06:07	SubIndex 007	RO	0x0000:00, 7
	1A06:08	SubIndex 008	RO	0x6060:10, 1
1A07 [▶ 70]:0	**Subindex**	PWM TxPDO-Map Synchron info data	RO	0x02 (2_{dec})
	1A07:01	SubIndex 001	RO	0x6060:11, 16
	1A07:02	SubIndex 002	RO	0x6060:12, 16
1C00 [▶ 70]: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})

Index (hex)		Name	Flags	Default value
1C12 [▶ 70]:0	**Subindex**	RxPDO assign	RW	0x03 (3_{dec})
	1C12:01	SubIndex 001	RW	0x1600 (5632_{dec})
	1C12:02	SubIndex 002	RW	0x1601 (5633_{dec})
	1C12:03	SubIndex 003	RW	0x1602 (5634_{dec})
	1C12:04	SubIndex 004	RW	0x0000 (0_{dec})
1C13 [▶ 71]:0	**Subindex**	TxPDO assign	RW	0x05 (5_{dec})
	1C13:01	SubIndex 001	RW	0x1A00 (6656_{dec})
	1C13:02	SubIndex 002	RW	0x1A01 (6657_{dec})
	1C13:03	SubIndex 003	RW	0x1A02 (6658_{dec})
	1C13:04	SubIndex 004	RW	0x1A05 (6661_{dec})
	1C13:05	SubIndex 005	RW	0x1A06 (6662_{dec})
	1C13:06	SubIndex 006	RW	0x0000 (0_{dec})
	1C13:07	SubIndex 007	RW	0x0000 (0_{dec})
1C32 [▶ 72]:0	**Subindex**	SM output parameter	RO	0x20 (32_{dec})
	1C32:01	Sync mode	RW	0x0001 (1_{dec})
	1C32:02	Cycle time	RW	0x000F4240 (1000000_{dec})
	1C32:03	Shift time	RO	0x00000000 (0_{dec})
	1C32:04	Sync modes supported	RO	0xC007 (49159_{dec})
	1C32:05	Minimum cycle time	RO	0x0007A120 (500000_{dec})
	1C32:06	Calc and copy time	RO	0x00000000 (0_{dec})
	1C32:07	Minimum delay time	RO	0x00000000 (0_{dec})
	1C32:08	Command	RW	0x0000 (0_{dec})
	1C32:09	Maximum delay time	RO	0x00000000 (0_{dec})
	1C32:0B	SM event missed counter	RO	0x0000 (0_{dec})
	1C32:0C	Cycle exceeded counter	RO	0x0000 (0_{dec})
	1C32:0D	Shift too short counter	RO	0x0000 (0_{dec})
	1C32:20	Sync error	RO	0x00 (0_{dec})
1C33 [▶ 73]:0	**Subindex**	SM input parameter	RO	0x20 (32_{dec})
	1C33:01	Sync mode	RW	0x0022 (34_{dec})
	1C33:02	Cycle time	RW	0x000F4240 (1000000_{dec})
	1C33:03	Shift time	RO	0x00000000 (0_{dec})
	1C33:04	Sync modes supported	RO	0xC007 (49159_{dec})
	1C33:05	Minimum cycle time	RO	0x0007A120 (500000_{dec})
	1C33:06	Calc and copy time	RO	0x00000000 (0_{dec})
	1C33:07	Minimum delay time	RO	0x00000000 (0_{dec})
	1C33:08	Command	RW	0x0000 (0_{dec})
	1C33:09	Maximum 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})

Index (hex)		Name	Flags	Default value
6000 [▶ 74]:0	**Subindex**	AI Inputs Ch.1	RO	0x11 (17_{dec})
	6000:01	Underrange	RO	0x00 (0_{dec})
	6000:02	Overrange	RO	0x00 (0_{dec})
	6000:03	Limit 1	RO	0x00 (0_{dec})
	6000:05	Limit 2	RO	0x00 (0_{dec})
	6000:07	Error	RO	0x00 (0_{dec})
	6000:0E	Sync error	RO	0x00 (0_{dec})
	6000:0F	TxPDO State	RO	0x00 (0_{dec})
	6000:10	TxPDO Toggle	RO	0x00 (0_{dec})
	6000:11	Value	RO	0x0000 (0_{dec})
6010 [▶ 74]:0	**Subindex**	AI Inputs Ch.2	RO	0x11 (17_{dec})
	6010:01	Underrange	RO	0x00 (0_{dec})
	6010:02	Overrange	RO	0x00 (0_{dec})
	6010:03	Limit 1	RO	0x00 (0_{dec})
	6010:05	Limit 2	RO	0x00 (0_{dec})
	6010:07	Error	RO	0x00 (0_{dec})
	6010:0E	Sync error	RO	0x00 (0_{dec})
	6010:0F	TxPDO State	RO	0x00 (0_{dec})
	6010:10	TxPDO Toggle	RO	0x00 (0_{dec})
	6010:11	Value	RO	0x0000 (0_{dec})
6020 [▶ 74]:0	**Subindex**	TACHO Dual Shaft Mode Input Ch.1	RO	0x11 (17_{dec})
	6020:01	Digital Input	RO	0x00 (0_{dec})
	6020:0C	Speed Below Threshold	RO	0x00 (0_{dec})
	6020:10	TxPDO Toggle	RO	0x00 (0_{dec})
	6020:11	Rotational Speed	RO	0x0000 (0_{dec})
6030 [▶ 74]:0	**Subindex**	TACHO Dual Shaft Mode Input Ch.2	RO	0x11 (17_{dec})
	6030:01	Digital Input	RO	0x00 (0_{dec})
	6030:0C	Speed Below Threshold	RO	0x00 (0_{dec})
	6030:10	TxPDO Toggle	RO	0x00 (0_{dec})
	6030:11	Rotational Speed	RO	0x0000 (0_{dec})
6037 [▶ 75]:0	**Subindex**	TACHO Single Shaft Mode Input	RO	0x12 (18_{dec})
	6037:02	Error Input A	RO	0x00 (0_{dec})
	6037:03	Input Status A	RO	0x00 (0_{dec})
	6037:04	Error Input B	RO	0x00 (0_{dec})
	6037:05	Input Status B	RO	0x00 (0_{dec})
	6037:0C	Speed Below Threshold	RO	0x00 (0_{dec})
	6037:10	TxPDO Toggle	RO	0x00 (0_{dec})
	6037:11	Rotational Speed	RO	0x0000 (0_{dec})
	6037:12	Rotation Direction	RO	0x0000 (0_{dec})
6040 [▶ 75]:0	**Subindex**	DI Inputs	RO	0x06 (6_{dec})
	6040:01	Digital Input X4 Pin4	RO	0x00 (0_{dec})
	6040:02	Digital Input X4 Pin2	RO	0x00 (0_{dec})
	6040:03	Digital Input X6 Pin4	RO	0x00 (0_{dec})
	6040:04	Digital Input X6 Pin2	RO	0x00 (0_{dec})
	6040:05	Digital Input X7 Pin4	RO	0x00 (0_{dec})
	6040:06	Digital Input X7 Pin2	RO	0x00 (0_{dec})

Index (hex)		Name	Flags	Default value
6060 [▶ 75]:0	**Subindex**	PWM Inputs	RO	0x12 (18_{dec})
	6060:05	Ready to enable	RO	0x00 (0_{dec})
	6060:06	Warning	RO	0x00 (0_{dec})
	6060:07	Error	RO	0x00 (0_{dec})
	6060:10	TxPDO Toggle	RO	0x00 (0_{dec})
	6060:11	Info data 1	RO	0x0000 (0_{dec})
	6060:12	Info data 2	RO	0x0000 (0_{dec})
7020 [▶ 75]:0	**Subindex**	TACHO Outputs	RO	0x09 (9_{dec})
	7020:09	Reset Error	RO	0x00 (0_{dec})
7030 [▶ 75]:0	**Subindex**	TACHO Outputs	RO	0x09 (9_{dec})
	7030:09	Reset Error	RO	0x00 (0_{dec})
7050 [▶ 75]:0	**Subindex**	DO Outputs	RO	0x06 (6_{dec})
	7050:01	Digital Output X5 Pin4	RO	0x00 (0_{dec})
	7050:02	Digital Output X5 Pin2	RO	0x00 (0_{dec})
	7050:03	Digital Output X6 Pin4	RO	0x00 (0_{dec})
	7050:04	Digital Output X6 Pin2	RO	0x00 (0_{dec})
	7050:05	Digital Output X7 Pin4	RO	0x00 (0_{dec})
	7050:06	Digital Output X7 Pin2	RO	0x00 (0_{dec})
7060 [▶ 76]:0	**Subindex**	PWM Outputs	RO	0x11 (17_{dec})
	7060:01	Enable dithering	RO	0x00 (0_{dec})
	7060:06	Enable	RO	0x00 (0_{dec})
	7060:07	Reset	RO	0x00 (0_{dec})
	7060:11	PWM output	RO	0x0000 (0_{dec})
7070 [▶ 76]:0	**Subindex**	AO Outputs	RO	0x11 (17_{dec})
	7070:11	Analog output	RO	0x0000 (0_{dec})
8000:0 [▶ 60]	**Subindex**	AI Settings Ch.1	RW	0x18 (24_{dec})
	8000:01	Enable user scale	RW	0x00 (0_{dec})
	8000:02	Presentation	RW	0x00 (0_{dec})
	8000:05	Siemens bits	RW	0x00 (0_{dec})
	8000:06	Enable filter	RW	0x00 (0_{dec})
	8000:07	Enable limit 1	RW	0x00 (0_{dec})
	8000:08	Enable limit 2	RW	0x00 (0_{dec})
	8000:0A	Enable user calibration	RW	0x00 (0_{dec})
	8000:0B	Enable vendor calibration	RW	0x01 (1_{dec})
	8000:0E	Swap limit bits	RW	0x00 (0_{dec})
	8000:11	User scale offset	RW	0x0000 (0_{dec})
	8000:12	User scale gain	RW	0x00010000 (65536_{dec})
	8000:13	Limit 1	RW	0x0000 (0_{dec})
	8000:14	Limit 2	RW	0x0000 (0_{dec})
	8000:15	Filter settings	RW	0x0000 (0_{dec})
	8000:17	User calibration offset	RW	0x0000 (0_{dec})
	8000:18	User calibration gain	RW	0x4000 (16384_{dec})
800E [▶ 76]:0	**Subindex**	AI Internal data Ch.1	RO	0x01 (1_{dec})
	800E:01	ADC raw value	RO	0x0000 (0_{dec})

Index (hex)		Name	Flags	Default value
800F [▶ 76]:0	**Subindex**	AI Vendor data Ch.1	RW	0x06 (6_{dec})
	800F:01	R0 offset	RW	0x0000 (0_{dec})
	800F:02	R0 gain	RW	0x4000 (16384_{dec})
	800F:03	R1 offset	RW	0x0000 (0_{dec})
	800F:04	R1 gain	RW	0x4000 (16384_{dec})
	800F:05	R2 offset	RW	0x0000 (0_{dec})
	800F:06	R2 gain	RW	0x4000 (16384_{dec})
8010:0 [▶ 61]	**Subindex**	AI Settings Ch.2	RW	0x18 (24_{dec})
	8010:01	Enable user scale	RW	0x00 (0_{dec})
	8010:02	Presentation	RW	0x00 (0_{dec})
	8010:05	Siemens bits	RW	0x00 (0_{dec})
	8010:06	Enable filter	RW	0x00 (0_{dec})
	8010:07	Enable limit 1	RW	0x00 (0_{dec})
	8010:08	Enable limit 2	RW	0x00 (0_{dec})
	8010:0A	Enable user calibration	RW	0x00 (0_{dec})
	8010:0B	Enable vendor calibration	RW	0x01 (1_{dec})
	8010:0E	Swap limit bits	RW	0x00 (0_{dec})
	8010:11	User scale offset	RW	0x0000 (0_{dec})
	8010:12	User scale gain	RW	0x00010000 (65536_{dec})
	8010:13	Limit 1	RW	0x0000 (0_{dec})
	8010:14	Limit 2	RW	0x0000 (0_{dec})
	8010:15	Filter settings	RW	0x0000 (0_{dec})
	8010:17	User calibration offset	RW	0x0000 (0_{dec})
	8010:18	User calibration gain	RW	0x4000 (16384_{dec})
801E [▶ 76]:0	**Subindex**	AI Internal data Ch.2	RO	0x01 (1_{dec})
	801E:01	ADC raw value	RO	0x0000 (0_{dec})
801F [▶ 76]:0	**Subindex**	AI Vendor data Ch.2	RW	0x06 (6_{dec})
	801F:01	R0 offset	RW	0x0000 (0_{dec})
	801F:02	R0 gain	RW	0x4000 (16384_{dec})
	801F:03	R1 offset	RW	0x0000 (0_{dec})
	801F:04	R1 gain	RW	0x4000 (16384_{dec})
	801F:05	R2 offset	RW	0x0000 (0_{dec})
	801F:06	R2 gain	RW	0x4000 (16384_{dec})
8020 [▶ 61]:0	**Subindex**	TACHO Settings Dual Shaft Mode Ch.1	RW	0x15 (21_{dec})
	8020:11	No. of Targets	RW	0x0001 (1_{dec})
	8020:12	Input Signal Timeout	RW	0x0064 (100_{dec})
	8020:15	Presentation	RW	0x0001 (1_{dec})
8030 [▶ 61]:0	**Subindex**	TACHO Settings Dual Shaft Mode Ch.2	RW	0x15 (21_{dec})
	8030:11	No. of Targets	RW	0x0001 (1_{dec})
	8030:12	Input Signal Timeout	RW	0x0064 (100_{dec})
	8030:15	Presentation	RW	0x0001 (1_{dec})
8031 [▶ 62]:0	**Subindex**	TACHO Settings Single Shaft Mode	RW	0x15 (21_{dec})
	8031:0B	Enable Error Detection	RW	0x01 (1_{dec})
	8031:0C	Reversion of Rotation	RW	0x00 (0_{dec})
	8031:11	No. of Targets	RW	0x0001 (1_{dec})
	8031:12	Input Signal Timeout	RW	0x0064 (100_{dec})
	8031:15	Presentation	RW	0x0000 (0_{dec})

Index (hex)		Name	Flags	Default value
8050 [▶ 63]:0	**Subindex**	PWM Settings	RW	0x22 (34_{dec})
	8050:03	Enable dithering	RW	0x00 (0_{dec})
	8050:04	Invert polarity	RW	0x00 (0_{dec})
	8050:05	Watchdog	RW	0x00 (0_{dec})
	8050:0B	Offset	RW	0x0000 (0_{dec})
	8050:0C	Gain	RW	0x00010000 (65536_{dec})
	8050:0D	Default output	RW	0x0000 (0_{dec})
	8050:0E	Default output ramp	RW	0xFFFF (65535_{dec})
	8050:10	Max current [%]	RW	0x64 (100_{dec})
	8050:12	Kp factor	RW	0x00FA (250_{dec})
	8050:13	Ki factor	RW	0x0004 (4_{dec})
	8050:14	Kd factor	RW	0x0032 (50_{dec})
	8050:1E	Dithering frequency [Hz]	RW	0x0064 (100_{dec})
	8050:1F	Dithering amplitude [mA]	RW	0x0A (10_{dec})
	8050:21	Select info data 1	RW	0x00 (0_{dec})
	8050:22	Select info data 2	RW	0x00 (0_{dec})
805F [▶ 76]:0	**Subindex**	PWM Vendor data	RW	0x02 (2_{dec})
	805F:01	Offset	RW	0x0000 (0_{dec})
	805F:02	Gain	RW	0x4000 (16384_{dec})
8060 [▶ 64]:0	**Subindex**	AO Settings	RW	0x16 (22_{dec})
	8060:01	Enable user scale	RW	0x00 (0_{dec})
	8060:02	Presentation	RW	0x00 (0_{dec})
	8060:05	Watchdog	RW	0x00 (0_{dec})
	8060:07	Enable user calibration	RW	0x00 (0_{dec})
	8060:08	Enable vendor calibration	RW	0x01 (1_{dec})
	8060:11	User scale offset	RW	0x0000 (0_{dec})
	8060:12	User scale gain	RW	0x00010000 (65536_{dec})
	8060:13	Default output	RW	0x0000 (0_{dec})
	8060:14	Default output ramp	RW	0xFFFF (65535_{dec})
	8060:15	User calibration offset	RW	0x0000 (0_{dec})
	8060:16	User calibration gain	RW	0x4000 (16384_{dec})
806E [▶ 77]:0	**Subindex**	AO Internal data	RO	0x01 (1_{dec})
	806E:01	DAC raw value	RO	0x0000 (0_{dec})
806F [▶ 77]:0	**Subindex**	AO Vendor data	RW	0x06 (6_{dec})
	806F:01	R0 Calibration Offset	RW	0x0000 (0_{dec})
	806F:02	R0 Calibration Gain	RW	0x4000 (16384_{dec})
	806F:03	R1 Calibration Offset	RW	0x0000 (0_{dec})
	806F:04	R1 Calibration Gain	RW	0x4000 (16384_{dec})
	806F:05	R2 Calibration Offset	RW	0x0000 (0_{dec})
	806F:06	R2 Calibration Gain	RW	0x4000 (16384_{dec})
A060 [▶ 77]:0	**Subindex**	PWM Diag data	RO	0x06 (6_{dec})
	A060:02	Overtemperature	RO	0x00 (0_{dec})
	060A:06	Short circuit	RO	0x00 (0_{dec})
F000 [▶ 77]:0	**Subindex**	Modular device profile	RO	0x02 (2_{dec})
	F000:01	Module index distance	RO	0x0010 (16_{dec})
	F000:02	Maximum number of modules	RO	0x0008 (8_{dec})

Index (hex)		Name	Flags	Default value
F008 [▶ 77]		Code word	RW	0x00000000 (0_{dec})
F010 [▶ 77]:0	**Subindex**	Module list	RW	0x08 (8_{dec})
	F010:01	SubIndex 001	RW	0x0000012C (300_{dec})
	F010:02	SubIndex 002	RW	0x0000012C (300_{dec})
	F010:03	SubIndex 003	RW	0x00000208 (520_{dec})
	F010:04	SubIndex 004	RW	0x00000208 (520_{dec})
	F010:05	SubIndex 005	RW	0x00000064 (100_{dec})
	F010:06	SubIndex 006	RW	0x000000C8 (200_{dec})
	F010:07	SubIndex 007	RW	0x000000FA (250_{dec})
	F010:08	SubIndex 008	RW	0x00000190 (400_{dec})
F800 [▶ 64]:0	**Subindex**	AIAO Range settings	RW	0x08 (8_{dec})
	800F:01	Input type Ch1	RW	0x0001 (1_{dec})
	800F:02	Input type Ch2	RW	0x0001 (1_{dec})
	800F:08	Output type	RW	0x0001 (1_{dec})
F900 [▶ 78]:0	**Subindex**	PWM Info data	RO	0x02 (2_{dec})
	F900:02	Temperature [°C]	RO	0x00 (0_{dec})
FB00 [▶ 78]:0	**Subindex**	PWM Command	RO	0x03 (3_{dec})
	FB00:01	Request	RW	{0}
	FB00:02	Status	RO	0x00 (0_{dec})
	FB00:03	Response	RO	{0}

Legend

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

6.3 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 [▶ 60] during commissioning
- Objects intended for regular operation [▶ 64], e.g. through ADS access.
- Objects for indicating internal settings [▶ 65] (may be fixed)
- Further profile-specific objects [▶ 74] indicating inputs, outputs and status information

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

6.3.1 Objects to be parameterized during commissioning

Index 8000 AI Settings Ch.1

Index (hex)	Name	Meaning		Data type	Flags	Default
8000:0	AI Settings	Maximum subindex		UINT8	RO	0x18 (24_{dec})
8000:01	Enable user scale	1	User scale is active.	BOOLEAN	RW	0x00 (0_{dec})
8000:02	Presentation	0	Signed presentation	BIT3	RW	0x00 (0_{dec})
		1	Unsigned presentation			
		2	Absolute value with MSB as sign (signed amount representation)			
8000:06	Enable filter	1	Enable filter, which makes PLC-cycle-synchronous data exchange unnecessary	BOOLEAN	RW	0x00 (0_{dec})
8000:07	Enable limit 1	1	Limit 1 enabled	BOOLEAN	RW	0x00 (0_{dec})
8000:08	Enable limit 2	1	Limit 2 enabled	BOOLEAN	RW	0x00 (0_{dec})
8000:0A	Enable user calibration	1	Enabling of the user calibration	BOOLEAN	RW	0x00 (0_{dec})
8000:0B	Enable vendor calibration	1	Enabling of the vendor calibration	BOOLEAN	RW	0x01 (1_{dec})
8000:11	User scale offset	User scale offset		INT16	RW	0x0000 (0_{dec})
8000:12	User scale gain	User scale gain. The gain is represented in fixed-point format, with the factor 2^{-16}. The value 1 corresponds to 65535_{dez} ($0x00010000_{hex}$) and is limited to +/- 0x7FFFF		INT32	RW	0x00010000 (65536_{dec})
8000:13	Limit 1	First limit value for setting the status bits		INT16	RW	0x0000 (0_{dec})
8000:14	Limit 2	Second limit value for setting the status bits		INT16	RW	0x0000 (0_{dec})
8000:15	Filter settings	This object determines the digital filter settings **for all channels of the module**, if it is activated via Enable filter (index 0x80n0:06 [▶ 60]). The possible settings are sequentially numbered.		UINT16	RW	0x0000 (0_{dec})
		0	50 Hz FIR			
		1	60 Hz FIR			
		2	IIR 1			
		3	IIR 2			
		4	IIR 3			
		5	IIR 4			
		6	IIR 5			
		7	IIR 6			
		8	IIR 7			
		9	IIR 8			
8000:17	User calibration offset	User calibration: Offset		INT16	RW	0x0000 (0_{dec})
8000:18	User calibration gain	User calibration: Gain		INT16	RW	0x4000 (16384_{dec})

Index 8000 AI Settings Ch.2

Index (hex)	Name	Meaning		Data type	Flags	Default
8010:0	AI Settings	Maximum subindex		UINT8	RO	0x18 (24_{dec})
8010:01	Enable user scale	1	User scale is active.	BOOLEAN	RW	0x00 (0_{dec})
8010:02	Presentation	0	Signed presentation	BIT3	RW	0x00 (0_{dec})
		1	Unsigned presentation			
		2	Absolute value with MSB as sign (signed amount representation)			
8010:06	Enable filter	1	Enable filter, which makes PLC-cycle-synchronous data exchange unnecessary	BOOLEAN	RW	0x00 (0_{dec})
8010:07	Enable limit 1	1	Limit 1 enabled	BOOLEAN	RW	0x00 (0_{dec})
8010:08	Enable limit 2	1	Limit 2 enabled	BOOLEAN	RW	0x00 (0_{dec})
8010:0A	Enable user calibration	1	Enabling of the user calibration	BOOLEAN	RW	0x00 (0_{dec})
8010:0B	Enable vendor calibration	1	Enabling of the vendor calibration	BOOLEAN	RW	0x01 (1_{dec})
8010:11	User scale offset	User scale offset		INT16	RW	0x0000 (0_{dec})
8010:12	User scale gain	User scale gain. The gain is represented in fixed-point format, with the factor 2^{-16}. The value 1 corresponds to 65535_{dez} ($0x00010000_{hex}$) and is limited to +/- 0x7FFFF		INT32	RW	0x00010000 (65536_{dec})
8010:13	Limit 1	First limit value for setting the status bits		INT16	RW	0x0000 (0_{dec})
8010:14	Limit 2	Second limit value for setting the status bits		INT16	RW	0x0000 (0_{dec})
8010:15	Filter settings	This object determines the digital filter settings **for all channels of the module**, if it is activated via Enable filter (index 0x80n0:06 [▶ 60]). The possible settings are sequentially numbered.		UINT16	RW	0x0000 (0_{dec})
		0	50 Hz FIR			
		1	60 Hz FIR			
		2	IIR 1			
		3	IIR 2			
		4	IIR 3			
		5	IIR 4			
		6	IIR 5			
		7	IIR 6			
		8	IIR 7			
		9	IIR 8			
8010:17	User calibration offset	User calibration: Offset		INT16	RW	0x0000 (0_{dec})
8010:18	User calibration gain	User calibration: Gain		INT16	RW	0x4000 (16384_{dec})

Index 8020 TACHO Settings Dual Shaft Mode Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
8020:0	TACHO Settings Dual Shaft Mode Ch.1		UINT8	RO	0x15 (21_{dec})
8020:11	No. of Targets	Number of "cams" on the shaft/axis	UINT16	RW	0x0001 (1_{dec})
8020:12	Input Signal Timeout	The process record <Speed Below Threshold> is set after x msec without signal change at the input.	UINT16	RW	0x0064 (100_{dec})
8020:15	Presentation	Display of the measured value in RPM, Hz, …	UINT16	RW	0x0001 (1_{dec})

Index 8030 TACHO Settings Dual Shaft Mode Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
8030:0	TACHO Settings Dual Shaft Mode Ch.2		UINT8	RO	0x15 (21_{dec})
8030:11	No. of Targets	Number of "cams" on the shaft/axis	UINT16	RW	0x0001 (1_{dec})
8030:12	Input Signal Timeout	The process record <Speed Below Threshold> is set after x msec without signal change at the input.	UINT16	RW	0x0064 (100_{dec})
8030:15	Presentation	Display of the measured value in RPM, Hz, …	UINT16	RW	0x0001 (1_{dec})

Index 8031 TACHO Settings Single Shaft Mode

Index (hex)	Name	Meaning	Data type	Flags	Default
8031:0	TACHO Settings Single Shaft Mode		UINT8	RO	0x15 (21_{dec})
8031:0B	Enable Error Detection	Enable/disable error display	BOOLEAN	RW	0x01 (1_{dec})
8031:0C	Reversion of Rotation	Reversion of rotation display in *Rotation direction*	BOOLEAN	RW	0x00 (0_{dec})
8031:11	No. of Targets	Number of "cams" on the shaft/axis	UINT16	RW	0x0001 (1_{dec})
8031:12	Input Signal Timeout	The process record <Speed Below Threshold> is set after x msec without signal change at the input.	UINT16	RW	0x0064 (100_{dec})
8031:15	Presentation	Display of the measured value in RPM, Hz, …	UINT16	RW	0x0000 (0_{dec})

Index 8040 DIG Safe State Active

Index (hex)	Name	Meaning	Data type	Flags	Default
8040:0	DIG Safe State Active		UINT8	RO	0x08 (8_{dec})
8040:01	X4 Pin4	Activation of Safe State Value if communication is canceled	BOOLEAN	RW	TRUE
8040:02	X4 Pin2	Activation of Safe State Value if communication is canceled	BOOLEAN	RW	TRUE
8040:03	X5 Pin4	Activation of Safe State Value if communication is canceled	BOOLEAN	RW	TRUE
8040:04	X5 Pin2	Activation of Safe State Value if communication is canceled	BOOLEAN	RW	TRUE
8040:05	X6 Pin4	Activation of Safe State Value if communication is canceled	BOOLEAN	RW	TRUE
8040:05	X6 Pin2	Activation of Safe State Value if communication is canceled	BOOLEAN	RW	TRUE
8040:07	X7 Pin4	Activation of Safe State Value if communication is canceled	BOOLEAN	RW	TRUE
8040:08	X7 Pin2	Activation of Safe State Value if communication is canceled	BOOLEAN	RW	TRUE

Index 8041 DIG Safe State Value

Index (hex)	Name	Meaning	Data type	Flags	Default
8040:0	DIG Safe State Value		UINT8	RO	0x00 (0_{dec})
8040:01	X4 Pin4	Output value if communication is canceled	BOOLEAN	RW	False
8040:02	X4 Pin2	Output value if communication is canceled	BOOLEAN	RW	False
8040:03	X5 Pin4	Output value if communication is canceled	BOOLEAN	RW	False
8040:04	X5 Pin2	Output value if communication is canceled	BOOLEAN	RW	False
8040:05	X6 Pin4	Output value if communication is canceled	BOOLEAN	RW	False
8040:05	X6 Pin2	Output value if communication is canceled	BOOLEAN	RW	False
8040:07	X7 Pin4	Output value if communication is canceled	BOOLEAN	RW	False
8040:08	X7 Pin2	Output value if communication is canceled	BOOLEAN	RW	False

Index 8043 DIG Safe State Delay

Index (hex)	Name	Meaning	Data type	Flags	Default
8040:0	DIG Safe State Delay		UINT8	RO	0x00 (0_{dec})
8040:01	X4 Pin4	Delay in msec after communication is canceled	UINT16	RW	False
8040:02	X4 Pin2	Delay in msec after communication is canceled	UINT16	RW	False
8040:03	X5 Pin4	Delay in msec after communication is canceled	UINT16	RW	False
8040:04	X5 Pin2	Delay in msec after communication is canceled	UINT16	RW	False
8040:05	X6 Pin4	Delay in msec after communication is canceled	UINT16	RW	False
8040:05	X6 Pin2	Delay in msec after communication is canceled	UINT16	RW	False
8040:07	X7 Pin4	Delay in msec after communication is canceled	UINT16	RW	False
8040:08	X7 Pin2	Delay in msec after communication is canceled	UINT16	RW	False

Index 8050 PWM Settings

Index (hex)	Name	Meaning	Data type	Flags	Default
8050:0	PWM Settings	Maximum subindex	UINT8	RO	0x22 (34_{dec})
8050:03	Enable dithering	Dithering is "enabled", activation via process data	BOOLEAN	RW	0x00 (0_{dec})
8050:04	Invert polarity	Reverse current direction	BOOLEAN	RW	0x00 (0_{dec})
8050:05	Watchdog	0: Default watchdog value The default value (0x8pp0:0D) is active. 1: Watchdog ramp active The ramp (0x8pp0:0E) for moving to the default value (0x8pp0:0D) is active. 2: Last output value active In the event of a fault (watchdog drop) the last process data is output.	BIT2	RW	0x00 (0_{dec})
8050:0B	Offset	This is the user scale offset Scale: 1 = nominal current of the terminal / 1024	INT16	RW	0x0000 (0_{dec})
8050:0C	Gain	This is the user scale gain. The gain is a fixed-point number with the factor 2^-16. The value one corresponds to 65536 (0x00010000).	INT32	RW	0x00010000 (65536_{dec})
8050:0D	Default output	This is the default output value. The value is output if it is activated via 0x8pp0:05.	INT16	RW	0x0000 (0_{dec})
8050:0E	Default output ramp	This value defines the ramps for the ramp-down to the default value. The value is specified in digits / ms. If the entry is 100 and the default value 0, for example, it takes 327 ms (32767/100) for the output value to change from the maximum value (32767) to the default value in the event of a fault.	UINT16	RW	0xFFFF (65535_{dec})
8050:10	Max current [mA]	Maximum output current in mA. Value range: 0 ... 1200_{dec}. If the value of this parameter is higher than 1200_{dec}, the maximum output current is still 1200 mA.	UINT8	RW	0x7FFF (32767_{dec})
8050:12	Kp factor	This is the user scale gain. The gain is a fixed-point number with the factor 2^{-16}. The value one corresponds to 65535 (0x00010000).	UINT16	RW	0x00FA (250_{dec})
8050:13	Ki factor	This is the default output value	UINT16	RW	0x0004 (4_{dec})
8050:14	Kd factor	This value defines the ramps for the ramp-down to the default value. The value is specified in digits / ms. If the entry is 100 and the default value 0, for example, it takes 327 ms (32767/100) for the output value to change from the maximum value (32767) to the default value in the event of a fault.	UINT16	RW	0x0032 (50_{dec})
8050:1E	Dithering frequency [Hz]	Dither frequency in Hertz	UINT16	RW	0x0064 (100_{dec})
8050:1F	Dithering amplitude [%]	Dithering amplitude in percent of the maximum permitted current (nominal box current * 0x8pp0:10)	UINT8	RW	0x0A (10_{dec})
8050:21	Select info data 1	Selection of synchronous info data (s. 0x6pp0:11)	UINT8	RW	0x00 (0_{dec})
8050:22	Select info data 2	Selection of synchronous info data (s. 0x6pp0:12)	UINT8	RW	0x00 (0_{dec})

Index 8060 AO Settings

Index (hex)	Name	Meaning	Data type	Flags	Default
8060:0	AO Settings		UINT8	RO	0x16 (22_{dec})
8060:01	Enable user scale	This entry activates the scaling for 0x8pp0:11 and 0x8pp0:12.	BOOLEAN	RW	0x00 (0_{dec})
8060:02	Presentation	0: Signed presentation The output value range 0x7pp1:11 is shown as 16 bit signed integer. For unipolar terminals (0-10V or 0-20 mA) the negative range is set to zero. 1: Unsigned presentation The output value range 0x7pp1:11 is shown as 16 bit unsigned integer. Negative values are not possible. 2: Absolute value with MSB as sign, signed amount representation is active. 3: Absolute value, the absolute value of the signed representation is formed.	BIT3	RW	0x00 (0_{dec})
8060:05	Watchdog	0: Default watchdog value The default value (0x8pp0:13) is active. 1: Watchdog ramp The ramp (0x8pp0:14) for moving to the default value ((0x8pp0:13)) is active. 2: Last output value In the event of a fault (watchdog drop) the last process data is issued.	BIT2	RW	0x00 (0_{dec})
8060:07	Enable user calibration	Enabling of the user calibration	BOOLEAN	RW	0x00 (0_{dec})
8060:08	Enable vendor calibration	Enable vendor calibration	BOOLEAN	RW	0x01 (1_{dec})
8060:11	User scale offset	This is the user scaling offset	INT16	RW	0x0000 (0_{dec})
8060:12	User scale gain	This is the user scaling gain. The gain is a fixed-point number with the factor 2^-16. The value 1 corresponds to 65535 (0x00010000).	INT32	RW	0x00010000 (65536_{dec})
8060:13	Default output	This is the default output value	INT16	RW	0x0000 (0_{dec})
8060:14	Default output ramp	This value defines the ramps for the ramp-down to the default value. The value is specified in digits / ms. If the entry is 100 and the default value 0, for example, it takes 327 ms (32767/100) for the output value to change from the maximum value (32767) to the default value in the event of a fault.	UINT16	RW	0xFFFF (65535_{dec})
8060:15	User calibration offset	User calibration offset	INT16	RW	0x0000 (0_{dec})
8060:16	User calibration gain	User gain compensation	UINT16	RW	0x4000 (16384_{dec})

Index F800 AIAO Range settings

Index (hex)	Name	Meaning	Data type	Flags	Default
F800:0	AIAO Range settings		UINT8	RO	0x08 (8_{dec})
F800:01	Input type Ch1	Select input type for Ch1	UINT16	RW	0x0001 (1_{dec})
F800:02	Input type Ch2	Select input type for Ch2	UINT16	RW	0x0001 (1_{dec})
F800:08	Output type	Select input type for Ch1	UINT16	RW	0x0001 (1_{dec})

6.3.2 Objects for regular operation

The EP8309 has no such objects.

6.3.3 Standard objects (0x1000-0x1FFF)

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

Index 1000 Device type

Index (hex)	Name	Meaning	Data type	Flags	Default
1000:0	Device type	Device type of the EtherCAT slave: The Low-Word contains the CoE profile used (5001). The High-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 slave	STRING	RO	EP8309-1022

Index 1009 Hardware version

Index (hex)	Name	Meaning	Data type	Flags	Default
1009:0	Hardware version	Hardware version of the EtherCAT slave	STRING	RO	00

Index 100A Software Version

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

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	0x20754052 (544555090_{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	0x00110016 (1114134_{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	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 1402 PWM RxPDO-Par Control

Index (hex)	Name	Meaning	Data type	Flags	Default
1402:0	PWM RxPDO-Par Control	PDO Parameter RxPDO 3	UINT8	RO	0x06 (6_{dec})
1402:06	Exclude RxPDOs	Specifies the RxPDOs (index of RxPDO mapping objects) that must not be transferred together with RxPDO 3	OCTET-STRING[2]	RO	03 16

Index 1403 AO RxPDO-Par Outputs

Index (hex)	Name	Meaning	Data type	Flags	Default
1403:0	AO RxPDO-Par Outputs	PDO Parameter RxPDO 4	UINT8	RO	0x06 (6_{dec})
1403:06	Exclude RxPDOs	Specifies the RxPDOs (index of RxPDO mapping objects) that must not be transferred together with RxPDO 4	OCTET-STRING[2]	RO	02 16

Index 1600 TACHO RxPDO-Map OutputsCh.1

Index (hex)	Name	Meaning	Data type	Flags	Default
1600:0	TACHO RxPDO-Map OutputsCh.1	PDO Mapping RxPDO 1	UINT8	RO	0x03 (3_{dec})
1600:01	SubIndex 001	1. PDO Mapping entry (object 0x7020 (PWM Outputs Ch.1), entry 0x01 (Enable dithering))	UINT32	RO	0x0000:00, 8
1600:02	SubIndex 002	2. PDO Mapping entry (4 bits align)	UINT32	RO	0x7020:09, 1
1600:03	SubIndex 003	3. PDO Mapping entry (object 0x7020 (PWM Outputs Ch.1), entry 0x06 (Enable))	UINT32	RO	0x0000:00, 7

Index 1601 DO RxPDO-Map Outputs

Index (hex)	Name	Meaning	Data type	Flags	Default
1601:0	DO RxPDO-Map Outputs	PDO Mapping RxPDO 2	UINT8	RO	0x07 (7_{dec})
1601:01	SubIndex 001	1. PDO Mapping entry (object 0x7030 (PWM Outputs Ch.2), entry 0x01 (Enable dithering))	UINT32	RO	0x7050:01, 1
1601:02	SubIndex 002	2. PDO Mapping entry (4 bits align)	UINT32	RO	0x7050:02, 1
1601:03	SubIndex 003	3. PDO Mapping entry (object 0x7030 (PWM Outputs Ch.2), entry 0x06 (Enable))	UINT32	RO	0x7050:03, 1
1601:04	SubIndex 004	4. PDO Mapping entry (object 0x7050 (DO Outputs), entry 0x04 (Digital Output X6 Pin2))	UINT32	RO	0x7050:04, 1
1601:05	SubIndex 005	5. PDO Mapping entry (object 0x7050 (DO Outputs), entry 0x05 (Digital Output X7 Pin4))	UINT32	RO	0x7050:05, 1
1601:06	SubIndex 006	6. PDO Mapping entry (object 0x7050 (DO Outputs), entry 0x06 (Digital Output X7 Pin2))	UINT32	RO	0x7050:06, 1
1601:07	SubIndex 007	7. PDO Mapping entry (10 bits align)	UINT32	RO	0x0000:00, 10

Index 1602 PWM RxPDO-Map Control

Index (hex)	Name	Meaning	Data type	Flags	Default
1602:0	PWM RxPDO-Map Control	PDO Mapping RxPDO 3	UINT8	RO	0x06 (6_{dec})
1602:01	SubIndex 001	1. PDO Mapping entry (object 0x7040 (DO Outputs), entry 0x01 (Output 10))	UINT32	RO	0x7060:01, 1
1602:02	SubIndex 002	2. PDO Mapping entry (object 0x7040 (DO Outputs), entry 0x02 (Output 11))	UINT32	RO	0x0000:00, 4
1602:03	SubIndex 003	3. PDO Mapping entry (14 bits align)	UINT32	RO	0x7060:06, 1
1602:04	SubIndex 004	4. PDO Mapping entry (6 bits align)	UINT32	RO	0x7060:07, 1
1602:05	SubIndex 005	5. PDO Mapping entry (object 0x7050 (DO Outputs), entry 0x0E (Output 14))	UINT32	RO	0x0000:00, 9
1602:06	SubIndex 006	6. PDO Mapping entry (object 0x7050 (DO Outputs), entry 0x0E (Output 15))	UINT32	RO	0x7060:11, 16

Index 1603 AO RxPDO-Map Outputs

Index (hex)	Name	Meaning	Data type	Flags	Default
1603:0	AO RxPDO-Map Outputs	PDO Mapping RxPDO 4	UINT8	RO	0x01 (1_{dec})
1603:01	SubIndex 001	1. PDO Mapping entry (object 0x7060 (AO Outputs Ch.3), entry 0x11 (Analog output))	UINT32	RO	0x7070:11, 16

Index 1802 TACHO TxPDO-Par Single Shaft Mode Input Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
1802:0	TACHO TxPDO-Par Single Shaft Mode Input Ch.1	PDO parameter TxPDO 3	UINT8	RO	0x06 (6_{dec})
1802:06	Exclude TxPDOs	Specifies the TxPDOs (index of TxPDO mapping objects) that must not be transferred together with TxPDO 3	OCTET STRING[4]	RO	03 1A 04 1A

Index 1803 TACHO TxPDO-Par Dual Shaft Mode Input Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
1803:0	TACHO TxPDO-Par Dual Shaft Mode Input Ch.1	PDO parameter TxPDO 4	UINT8	RO	0x06 (6_{dec})
1803:06	Exclude TxPDOs	Specifies the TxPDOs (index of TxPDO mapping objects) that must not be transferred together with TxPDO 4	OCTET STRING[4]	RO	02 1A 00 00

Index 1804 TACHO TxPDO-Par Dual Shaft Mode Input Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
1804:0	TACHO TxPDO-Par Dual Shaft Mode Input Ch.2	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[4]	RO	02 1A 00 00

Index 1A00 AI TxPDO-Map Inputs Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
1A00:0	AI TxPDO-Map Inputs Ch.1	PDO Mapping TxPDO 1	UINT8	RO	0x0A (10_{dec})
1A00:01	SubIndex 001	1. PDO Mapping entry (object 0x6000 (AI Inputs Ch.1), entry 0x01 (Underrange))	UINT32	RO	0x6000:01, 1
1A00:02	SubIndex 002	2. PDO Mapping entry (object 0x6000 (AI Inputs Ch.1), entry 0x02 (Overrange))	UINT32	RO	0x6000:02, 1
1A00:03	SubIndex 003	3. PDO Mapping entry (object 0x6000 (AI Inputs Ch.1), entry 0x03 (Limit 1))	UINT32	RO	0x6000:03, 2
1A00:04	SubIndex 004	4. PDO Mapping entry (object 0x6000 (AI Inputs Ch.1), entry 0x05 (Limit 2))	UINT32	RO	0x6000:05, 2
1A00:05	SubIndex 005	5. PDO Mapping entry (object 0x6000 (AI Inputs Ch.1), entry 0x07 (Error))	UINT32	RO	0x6000:07, 1
1A00:06	SubIndex 006	6. PDO Mapping entry (6 bits align)	UINT32	RO	0x0000:00, 6
1A00:07	SubIndex 007	7. PDO Mapping entry (object 0x6000 (AI Inputs Ch.1), entry 0x0E (Sync error))	UINT32	RO	0x6000:0E, 1
1A00:08	SubIndex 008	8. PDO Mapping entry (object 0x6000 (AI Inputs Ch.1), entry 0x0F (TxPDO State))	UINT32	RO	0x6000:0F, 1
1A00:09	SubIndex 009	9. PDO Mapping entry (object 0x6000 (AI Inputs Ch.1), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x6000:10, 1
1A00:0A	SubIndex 010	10. PDO Mapping entry (object 0x6000 (AI Inputs Ch.1), entry 0x11 (Value))	UINT32	RO	0x6000:11, 16

Index 1A01 AI TxPDO-Map Inputs Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
1A01:0	AI TxPDO-Map Inputs Ch.2	PDO Mapping TxPDO 2	UINT8	RO	0x0A (10_{dec})
1A01:01	SubIndex 001	1. PDO Mapping entry (object 0x6000 (AI Inputs Ch.1), entry 0x01 (Underrange))	UINT32	RO	0x6010:01, 1
1A01:02	SubIndex 002	2. PDO Mapping entry (object 0x6000 (AI Inputs Ch.1), entry 0x02 (Overrange))	UINT32	RO	0x6010:02, 1
1A01:03	SubIndex 003	3. PDO Mapping entry (object 0x6000 (AI Inputs Ch.1), entry 0x03 (Limit 1))	UINT32	RO	0x6010:03, 2
1A01:04	SubIndex 004	4. PDO Mapping entry (object 0x6000 (AI Inputs Ch.1), entry 0x05 (Limit 2))	UINT32	RO	0x6010:05, 2
1A01:05	SubIndex 005	5. PDO Mapping entry (object 0x6000 (AI Inputs Ch.1), entry 0x07 (Error))	UINT32	RO	0x6010:07, 1
1A01:06	SubIndex 006	6. PDO Mapping entry (6 bits align)	UINT32	RO	0x0000:00, 6
1A01:07	SubIndex 007	7. PDO Mapping entry (object 0x6000 (AI Inputs Ch.1), entry 0x0E (Sync error))	UINT32	RO	0x6010:0E, 1
1A01:08	SubIndex 008	8. PDO Mapping entry (object 0x6000 (AI Inputs Ch.1), entry 0x0F (TxPDO State))	UINT32	RO	0x6010:0F, 1
1A01:09	SubIndex 009	9. PDO Mapping entry (object 0x6000 (AI Inputs Ch.1), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x6010:10, 1
1A01:0A	SubIndex 010	10. PDO Mapping entry (object 0x6000 (AI Inputs Ch.1), entry 0x11 (Value))	UINT32	RO	0x6010:11, 16

Index 1A02 TACHO TxPDO-Map Single Shaft Mode Input Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
1A02:0	TACHO TxPDO-Map Single Shaft Mode Input Ch.1	PDO Mapping TxPDO 3	UINT8	RO	0x0C (12_{dec})
1A02:01	SubIndex 001	1. PDO Mapping entry (object 0x6010 (AI Inputs Ch.2), entry 0x01 (Underrange))	UINT32	RO	0x0000:00, 1
1A02:02	SubIndex 002	2. PDO Mapping entry (object 0x6027 (TACHO Redundant Tracks Inputs Ch.1), entry 0x02 (Track Error A))	UINT32	RO	0x6037:02, 1
1A02:03	SubIndex 003	3. PDO Mapping entry (object 0x6027 (TACHO Redundant Tracks Inputs Ch.1), entry 0x03 (Input Status Track A))	UINT32	RO	0x6037:03, 1
1A02:04	SubIndex 004	4. PDO Mapping entry (object 0x6027 (TACHO Redundant Tracks Inputs Ch.1), entry 0x04 (Track Error B))	UINT32	RO	0x6037:04, 1
1A02:05	SubIndex 005	5. PDO Mapping entry (object 0x6027 (TACHO Redundant Tracks Inputs Ch.1), entry 0x05 (Input Status Track B))	UINT32	RO	0x6037:05, 1
1A02:06	SubIndex 006	6. PDO Mapping entry (6 bits align)	UINT32	RO	0x0000:00, 3
1A02:07	SubIndex 007	7. PDO Mapping entry (object 0x6027 (TACHO Redundant Tracks Inputs Ch.1), entry 0x0C (Speed Below Threshold))	UINT32	RO	0x0000:00, 3
1A02:08	SubIndex 008	8. PDO Mapping entry (3 bits align)	UINT32	RO	0x6037:0C, 1
1A02:09	SubIndex 009	9. PDO Mapping entry (object 0x6027 (TACHO Redundant Tracks Inputs Ch.1), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x0000:00, 3
1A02:0A	SubIndex 010	10. PDO Mapping entry (object 0x6027 (TACHO Redundant Tracks Inputs Ch.1), entry 0x11 (Rotational Speed))	UINT32	RO	0x6037:10, 1
1A02:0B	SubIndex 011	11. PDO Mapping entry (object 0x6027 (TACHO Single Shaft Mode Input), entry 0x11 (Rotational Speed))	UINT32	RO	0x6037:11, 16
1A02:0C	SubIndex 012	12. PDO Mapping entry (object 0x6027 (TACHO Single Shaft Mode Input), entry 0x12 (Rotation Direction))	UINT32	RO	0x6037:12, 16

Index 1A03 TACHO TxPDO-Map Dual Shaft Mode Input Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
1A03:0	TACHO TxPDO-Map Dual Shaft Mode Input Ch.1	PDO Mapping TxPDO 4	UINT8	RO	0x09 (9_{dec})
1A03:01	SubIndex 001	1. PDO Mapping entry (object 0x6010 (AI Inputs Ch.2), entry 0x01 (Underrange))	UINT32	RO	0x6020:01, 1
1A03:02	SubIndex 002	2. PDO Mapping entry (object 0x6010 (AI Inputs Ch.2), entry 0x02 (Overrange))	UINT32	RO	0x0000:00, 2
1A03:03	SubIndex 003	3. PDO Mapping entry (object 0x6010 (AI Inputs Ch.2), entry 0x03 (Limit 1))	UINT32	RO	0x0000:00, 1
1A03:04	SubIndex 004	4. PDO Mapping entry (object 0x6010 (AI Inputs Ch.2), entry 0x05 (Limit 2))	UINT32	RO	0x0000:00, 4
1A03:05	SubIndex 005	5. PDO Mapping entry (object 0x6010 (AI Inputs Ch.2), entry 0x07 (Error))	UINT32	RO	0x0000:00, 3
1A03:06	SubIndex 006	6. PDO Mapping entry (6 bits align)	UINT32	RO	0x6020:0C, 1
1A03:07	SubIndex 007	7. PDO Mapping entry (object 0x6020 (TACHO Dual Shaft Mode Input Ch.1), entry 0x11 (Rotational Speed))	UINT32	RO	0x0000:00, 3
1A03:08	SubIndex 008	8. PDO Mapping entry (object 0x6020 (TACHO Dual Shaft Mode Input Ch.1), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x6020:10, 1
1A03:09	SubIndex 009	9. PDO Mapping entry (object 0x6020 (TACHO Dual Shaft Mode Input Ch.1), entry 0x11 (Rotational Speed))	UINT32	RO	0x6020:11, 16

Index 1A04 TACHO TxPDO-Map Dual Shaft Mode Input Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
1A04:0	TACHO TxPDO-Map Dual Shaft Mode Input Ch.2	PDO Mapping TxPDO 5	UINT8	RO	0x09 (9_{dec})
1A04:01	SubIndex 001	1. PDO Mapping entry (object 0x6020 (PWM Inputs Ch.1), entry 0x01 (Digital input 1))	UINT32	RO	0x6030:01, 1
1A04:02	SubIndex 002	2. PDO Mapping entry (3 bits align)	UINT32	RO	0x0000:00, 2
1A04:03	SubIndex 003	3. PDO Mapping entry (object 0x6020 (PWM Inputs Ch.1), entry 0x05 (Ready to enable))	UINT32	RO	0x0000:00, 1
1A04:04	SubIndex 004	4. PDO Mapping entry (object 0x6020 (PWM Inputs Ch.1), entry 0x06 (Warning))	UINT32	RO	0x0000:00, 4
1A04:05	SubIndex 005	5. PDO Mapping entry (object 0x6020 (PWM Inputs Ch.1), entry 0x07 (Error))	UINT32	RO	0x0000:00, 3
1A04:06	SubIndex 006	6. PDO Mapping entry (8 bits align)	UINT32	RO	0x6030:0C, 1
1A04:07	SubIndex 007	7. PDO Mapping entry (object 0x6030 (TACHO Dual Shaft Mode Input Ch.2), entry 0x11 (Rotational Speed))	UINT32	RO	0x0000:00, 3
1A04:08	SubIndex 008	8. PDO Mapping entry (object 0x6030 (TACHO Dual Shaft Mode Input Ch.2), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x6030:10, 1
1A04:09	SubIndex 009	9. PDO Mapping entry (object 0x6030 (TACHO Dual Shaft Mode Input Ch.2), entry 0x11 (Rotational Speed))	UINT32	RO	0x6030:11, 16

Index 1A05 DI TxPDO-Map Inputs

Index (hex)	Name	Meaning	Data type	Flags	Default
1A05:0	DI TxPDO-Map Inputs	PDO Mapping TxPDO 6	UINT8	RO	0x07 (7_{dec})
1A05:01	SubIndex 001	1. PDO Mapping entry (object 0x6020 (PWM Inputs Ch.1), entry 0x01 (Digital input 1))	UINT32	RO	0x6040:01, 1
1A05:02	SubIndex 002	2. PDO Mapping entry (3 bits align)	UINT32	RO	0x6040:02, 1
1A05:03	SubIndex 003	3. PDO Mapping entry (object 0x6020 (PWM Inputs Ch.1), entry 0x05 (Ready to enable))	UINT32	RO	0x6040:03, 1
1A05:04	SubIndex 004	4. PDO Mapping entry (object 0x6020 (PWM Inputs Ch.1), entry 0x06 (Warning))	UINT32	RO	0x6040:04, 1
1A05:05	SubIndex 005	5. PDO Mapping entry (object 0x6020 (PWM Inputs Ch.1), entry 0x07 (Error))	UINT32	RO	0x6040:05, 1
1A05:06	SubIndex 006	6. PDO Mapping entry (8 bits align)	UINT32	RO	0x6040:06, 1
1A05:07	SubIndex 007	7. PDO Mapping entry (object 0x6020 (PM Inputs Ch.1), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x0000:00, 10

Index 1A06 PWM TxPDO-Map Status

Index (hex)	Name	Meaning	Data type	Flags	Default
1A06:0	PWM TxPDO-Map Status	PDO Mapping TxPDO 7	UINT8	RO	0x08 (8_{dec})
1A06:01	SubIndex 001	1. PDO Mapping entry (object 0x6040 (DI Inputs), entry 0x01 (Digital Input X4 Pin4))	UINT32	RO	0x0000:00, 1
1A06:02	SubIndex 002	2. PDO Mapping entry (object 0x6040 (DI Inputs), entry 0x02 (Digital Input X4 Pin2))	UINT32	RO	0x0000:00, 3
1A06:03	SubIndex 003	3. PDO Mapping entry (object 0x6040 (DI Inputs), entry 0x03 (Digital Input X6 Pin4))	UINT32	RO	0x6060:05, 1
1A06:04	SubIndex 004	4. PDO Mapping entry (object 0x6040 (DI Inputs), entry 0x04 (Digital Input X6 Pin2))	UINT32	RO	0x6060:06, 1
1A06:05	SubIndex 005	5. PDO Mapping entry (object 0x6040 (DI Inputs), entry 0x05 (Digital Input X7 Pin4))	UINT32	RO	0x6060:07, 1
1A06:06	SubIndex 006	6. PDO Mapping entry (object 0x6040 (DI Inputs), entry 0x06 (Digital Input X7 Pin2))	UINT32	RO	0x0000:00, 1
1A06:07	SubIndex 007	7. PDO Mapping entry (10 bits align)	UINT32	RO	0x0000:00, 7
1A06:08	SubIndex 008	8. PDO Mapping entry (object 0x6060 (PWM Inputs), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x6060:10, 1

Index 1A07 PWM TxPDO-Map Synchronous info data

Index (hex)	Name	Meaning	Data type	Flags	Default
1A07:0	PWM TxPDO-Map Synchronous Info Data	PDO Mapping TxPDO 8	UINT8	RO	0x02 (2_{dec})
1A07:01	SubIndex 001	1. PDO Mapping entry (object 0x6060 (PWM Inputs), entry 0x01 (Digital input 1))	UINT32	RO	0x6060:11, 16
1A07:02	SubIndex 002	2. PDO Mapping entry (3 bits align)	UINT32	RO	0x6060:12, 16

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	0x03 (3_{dec})
1C12:01	Subindex 001	1st allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x1600 (5632_{dec})
1C12:02	Subindex 002	2nd allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x1601 (5633_{dec})
1C12:03	Subindex 003	3rd allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x1602 (5634_{dec})
1C12:04	Subindex 004	4th 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	0x05 (5_{dec})
1C13:01	Subindex 001	1st allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x1A00 (6656_{dec})
1C13:02	Subindex 002	2nd allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x1A01 (6657_{dec})
1C13:03	Subindex 003	3rd allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x1A02 (6658_{dec})
1C13:04	Subindex 004	4th allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x1A05 (6661_{dec})
1C13:05	Subindex 005	5th allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x1A06 (6662_{dec})
1C13:06	Subindex 006	6th allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x0000 (0_{dec})
1C13:07	Subindex 007	7th 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: Synchronous with SM 2 event • 2: DC-Mode - Synchronous with SYNC0 Event • 3: DC-Mode - Synchronous with SYNC1 event	UINT16	RW	0x0001 (1_{dec})
1C32:02	Cycle time	Cycle time (in ns): • Free Run: Cycle time of the local timer • Synchronous with SM 2 event: Master cycle time • DC mode: SYNC0/SYNC1 Cycle Time	UINT32	RW	0x000F4240 (1000000_{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: Synchronous with SM 2 event is supported • Bit 2-3 = 01: DC mode is supported • Bit 4-5 = 10: Output shift with SYNC1 event (only DC mode) • Bit 14 = 1: dynamic times (measurement through writing of 0x1C32:08 [▶ 72])	UINT16	RO	0xC007 (49159_{dec})
1C32:05	Minimum cycle time	Minimum cycle time (in ns)	UINT32	RO	0x0007A120 (500000_{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	Command	• 0: Measurement of the local cycle time is stopped • 1: Measurement of the local cycle time is started The entries 0x1C32:03 [▶ 72], 0x1C32:05 [▶ 72], 0x1C32:06 [▶ 72], 0x1C32:09 [▶ 72], 0x1C33:03 [▶ 73], 0x1C33:06 [▶ 72], 0x1C33:09 [▶ 73] are updated with the maximum measured values. For a subsequent measurement the measured values are 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: Synchronous with SM 3 Event (no outputs available) • 2: DC - Synchronous with SYNC0 Event • 3: DC - Synchronous with SYNC1 Event • 34: Synchronous with SM 2 event (outputs available)	UINT16	RW	0x0022 (34_{dec})
1C33:02	Cycle time	as 0x1C32:02 [▶ 72]	UINT32	RW	0x000F4240 (1000000_{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 [▶ 72] or 0x1C33:08 [▶ 73])	UINT16	RO	0xC007 (49159_{dec})
1C33:05	Minimum cycle time	as 0x1C32:05 [▶ 72]	UINT32	RO	0x0007A120 (500000_{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 [▶ 72]	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 [▶ 72]	UINT16	RO	0x0000 (0_{dec})
1C33:0C	Cycle exceeded counter	as 0x1C32:12 [▶ 72]	UINT16	RO	0x0000 (0_{dec})
1C33:0D	Shift too short counter	as 0x1C32:13 [▶ 72]	UINT16	RO	0x0000 (0_{dec})
1C33:20	Sync error	as 0x1C32:32 [▶ 72]	BOOLEAN	RO	0x00 (0_{dec})

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

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

Index 6000 AI Inputs Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
6000:0	AI Inputs Ch.1		UINT8	RO	0x11 (17_{dec})
6000:01	Underrange	Underrange event active	BOOLEAN	RO	0x00 (0_{dec})
6000:02	Overrange	Overrange event active	BOOLEAN	RO	0x00 (0_{dec})
6000:03	Limit 1	Bit0: Value greater than Limit1 Bit1: Value smaller than Limit1	BIT2	RO	0x00 (0_{dec})
6000:05	Limit 2	Bit0: Value greater than Limit2 Bit1: Value smaller than Limit2	BIT2	RO	0x00 (0_{dec})
6000:07	Error	Bit set when Over- or Underrange	BOOLEAN	RO	0x00 (0_{dec})
6000:0E	Sync error		BOOLEAN	RO	0x00 (0_{dec})
6000:0F	TxPDO State		BOOLEAN	RO	0x00 (0_{dec})
6000:10	TxPDO Toggle		BOOLEAN	RO	0x00 (0_{dec})
6000:11	Value		INT16	RO	0x0000 (0_{dec})

Index 6010 AI Inputs Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
6010:0	AI Inputs Ch.2		UINT8	RO	0x11 (17_{dec})
6010:01	Underrange	Underrange event active	BOOLEAN	RO	0x00 (0_{dec})
6010:02	Overrange	Overrange event active	BOOLEAN	RO	0x00 (0_{dec})
6010:03	Limit 1	Bit0: Value greater than Limit1 Bit1: Value smaller than Limit1	BIT2	RO	0x00 (0_{dec})
6010:05	Limit 2	Bit0: Value greater than Limit2 Bit1: Value smaller than Limit2	BIT2	RO	0x00 (0_{dec})
6010:07	Error	Bit set when Over- or Underrange	BOOLEAN	RO	0x00 (0_{dec})
6010:0E	Sync error		BOOLEAN	RO	0x00 (0_{dec})
6010:0F	TxPDO State		BOOLEAN	RO	0x00 (0_{dec})
6010:10	TxPDO Toggle		BOOLEAN	RO	0x00 (0_{dec})
6010:11	Value		INT16	RO	0x0000 (0_{dec})

Index 6020 TACHO Dual Shaft Mode Input Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
6020:0	TACHO Dual Shaft Mode Input Ch.1		UINT8	RO	0x11 (17_{dec})
6020:01	Digital input		BOOLEAN	RO	0x00 (0_{dec})
6020:0C	Speed Below Threshold		BOOLEAN	RO	0x00 (0_{dec})
6020:10	TxPDO Toggle		BOOLEAN	RO	0x00 (0_{dec})
6020:11	Rotational Speed		INT16	RO	0x0000 (0_{dec})

Index 6030 TACHO Dual Shaft Mode Input Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
6030:0	TACHO Dual Shaft Mode Input Ch.2		UINT8	RO	0x11 (17_{dec})
6030:01	Digital input		BOOLEAN	RO	0x00 (0_{dec})
6030:0C	Speed Below Threshold		BOOLEAN	RO	0x00 (0_{dec})
6030:10	TxPDO Toggle		BOOLEAN	RO	0x00 (0_{dec})
6030:11	Rotational Speed		INT16	RO	0x0000 (0_{dec})

Index 6037 TACHO Single Shaft Mode Input

Index (hex)	Name	Meaning	Data type	Flags	Default
6037:0	TACHO Single Shaft Mode Input		UINT8	RO	0x12 (18_{dec})
6037:02	Error Input A		BOOLEAN	RO	0x00 (0_{dec})
6037:03	Input Status A		BOOLEAN	RO	0x00 (0_{dec})
6037:04	Error Input B		BOOLEAN	RO	0x00 (0_{dec})
6037:05	Input Status B		BOOLEAN	RO	0x00 (0_{dec})
6037:0C	Speed Below Threshold		BOOLEAN	RO	0x00 (0_{dec})
6037:10	TxPDO Toggle		BOOLEAN	RO	0x00 (0_{dec})
6037:11	Rotational Speed		INT16	RO	0x0000 (0_{dec})
6037:12	Rotation Direction		UINT16	RO	0x0000 (0_{dec})

Index 6040 DI Inputs

Index (hex)	Name	Meaning	Data type	Flags	Default
6040:0	DI Inputs		UINT8	RO	0x06 (6_{dec})
6040:01	Digital Input X4 Pin4		BOOLEAN	RO	0x00 (0_{dec})
6040:02	Digital Input X4 Pin2		BOOLEAN	RO	0x00 (0_{dec})
6040:03	Digital Input X6 Pin4		BOOLEAN	RO	0x00 (0_{dec})
6040:04	Digital Input X6 Pin2		BOOLEAN	RO	0x00 (0_{dec})
6040:05	Digital Input X7 Pin4		BOOLEAN	RO	0x00 (0_{dec})
6040:06	Digital Input X7 Pin2		BOOLEAN	RO	0x00 (0_{dec})

Index 6060 PWM Inputs

Index (hex)	Name	Meaning	Data type	Flags	Default
6060:0	PWM Inputs		UINT8	RO	0x12 (18_{dec})
6060:05	Ready to enable		BOOLEAN	RO	0x00 (0_{dec})
6060:06	Warning		BOOLEAN	RO	0x00 (0_{dec})
6060:07	Error		BOOLEAN	RO	0x00 (0_{dec})
6060:10	TxPDO Toggle		BOOLEAN	RO	0x00 (0_{dec})
6060:11	Info data 1		INT16	RO	0x0000 (0_{dec})
6060:12	Info data 2		INT16	RO	0x0000 (0_{dec})

Index 7020 TACHO Outputs

Index (hex)	Name	Meaning	Data type	Flags	Default
7020:0	TACHO Outputs		UINT8	RO	0x09 (9_{dec})
7020:09	Reset Error		BOOLEAN	RO	0x00 (0_{dec})

Index 7030 TACHO Outputs

Index (hex)	Name	Meaning	Data type	Flags	Default
7030:0	TACHO Outputs		UINT8	RO	0x09 (9_{dec})
7030:09	Reset Error		BOOLEAN	RO	0x00 (0_{dec})

Index 7040 DIG Output

Index (hex)	Output 11>Name	Meaning	Data type	Flags	Default
7050:0	DIG Outputs		UINT8	RO	0x06 (6_{dec})
7050:01	Digital Output X4 Pin4		BOOLEAN	RO	0x00 (0_{dec})
7050:02	Digital Output X4 Pin2		BOOLEAN	RO	0x00 (0_{dec})
7050:03	Digital Output X5 Pin4		BOOLEAN	RO	0x00 (0_{dec})
7050:04	Digital Output X5 Pin2		BOOLEAN	RO	0x00 (0_{dec})
7050:05	Digital Output X6 Pin4		BOOLEAN	RO	0x00 (0_{dec})
7050:06	Digital Output X6 Pin2		BOOLEAN	RO	0x00 (0_{dec})
7050:07	Digital Output X7 Pin4		BOOLEAN	RO	0x00 (0_{dec})
7050:08	Digital Output X7 Pin2		BOOLEAN	RO	0x00 (0_{dec})

Index 7060 PWM Outputs

Index (hex)	Name	Meaning	Data type	Flags	Default
7060:0	PWM Outputs		UINT8	RO	0x11 (17_{dec})
7060:01	Enable dithering		BOOLEAN	RO	0x00 (0_{dec})
7060:06	Enable		BOOLEAN	RO	0x00 (0_{dec})
7060:07	Reset		BOOLEAN	RO	0x00 (0_{dec})
7060:11	PWM output	Analog output data	INT16	RO	0x0000 (0_{dec})

Index 7070 AO Outputs

Index (hex)	Name	Meaning	Data type	Flags	Default
7070:0	AO Outputs		UINT8	RO	0x11 (17_{dec})
7070:11	Analog output	Analog output data	INT16	RO	0x0000 (0_{dec})

Index 800E AI Internal data Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
800E:0	AI Internal data Ch.1		UINT8	RO	0x01 (1_{dec})
800E:01	ADC raw value		INT16	RO	0x0000 (0_{dec})

Index 800F AI Vendor data Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
800F:0	AI Vendor data Ch.1		UINT8	RO	0x06 (6_{dec})
800F:01	R0 Offset		INT16	RW	0x0000 (0_{dec})
800F:02	R0 Gain		INT16	RW	0x4000 (16384_{dec})
800F:03	R1 Offset		INT16	RW	0x0000 (0_{dec})
800F:04	R1 Gain		INT16	RW	0x4000 (16384_{dec})
800F:05	R2 Offset		INT16	RW	0x0000 (0_{dec})
800F:06	R2 Gain		INT16	RW	0x4000 (16384_{dec})

Index 801E AI Internal data Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
801E:0	AI Internal Data Ch.2		UINT8	RO	0x01 (1_{dec})
801E:01	ADC raw value		INT16	RO	0x0000 (0_{dec})

Index 801F AI Vendor data Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
801F:0	AI Vendor Data Ch.2		UINT8	RO	0x06 (6_{dec})
801F:01	R0 Offset		INT16	RW	0x0000 (0_{dec})
801F:02	R0 Gain		INT16	RW	0x4000 (16384_{dec})
801F:03	R1 Offset		INT16	RW	0x0000 (0_{dec})
801F:04	R1 Gain		INT16	RW	0x4000 (16384_{dec})
801F:05	R2 Offset		INT16	RW	0x0000 (0_{dec})
801F:06	R2 Gain		INT16	RW	0x4000 (16384_{dec})

Index 805F PWM Vendor data

Index (hex)	Name	Meaning	Data type	Flags	Default
805F:0	PWM Vendor data		UINT8	RO	0x02 (2_{dec})
805F:01	Offset	Vendor calibration for +/-10 V	INT16	RW	0x0000 (0_{dec})
805F:02	Gain	Vendor calibration for +/-10 V	INT16	RW	0x4000 (16384_{dec})

Index 806E AO Internal data

Index (hex)	Name	Meaning	Data type	Flags	Default
806E:0	AO Internal Data		UINT8	RO	0x01 (1_{dec})
806E:01	DAC Raw Value	This is the raw DAC value.	UINT16	RO	0x0000 (0_{dec})

Index 806F AO Vendor data

Index (hex)	Name	Meaning	Data type	Flags	Default
806F:0	AO Vendor Data		UINT8	RO	0x06 (6_{dec})
806F:01	R0 Calibration Offset	Vendor calibration for +/-10 V	INT16	RW	0x0000 (0_{dec})
806F:02	R0 Calibration Gain	Vendor calibration for +/-10 V	UINT16	RW	0x4000 (16384_{dec})
806F:03	R1 Calibration Offset	Vendor calibration for 0-20 mA	INT16	RW	0x0000 (0_{dec})
806F:04	R1 Calibration Gain	Vendor calibration for 0-20 mA	UINT16	RW	0x4000 (16384_{dec})
806F:05	R2 Calibration Offset	Vendor calibration for 4-20 mA	INT16	RW	0x0000 (0_{dec})
806F:06	R2 Calibration Gain	Vendor calibration for 4-20 mA	UINT16	RW	0x4000 (16384_{dec})

Index A060 PWM Diag data

Index (hex)	Name	Meaning	Data type	Flags	Default
A060:0	PWM Diag data		UINT8	RO	0x06 (6_{dec})
A060:02	Overtemperature		BOOLEAN	RO	0x00 (0_{dec})
A060:06	Short circuit		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	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	0x0008 (8_{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	0x08 (8_{dec})
F010:01	SubIndex 001		UINT32	RW	0x0000012C (300_{dec})
F010:02	SubIndex 002		UINT32	RW	0x0000012C (300_{dec})
F010:03	SubIndex 003		UINT32	RW	0x00000208 (520_{dec})
F010:04	SubIndex 004		UINT32	RW	0x00000208 (520_{dec})
F010:05	SubIndex 005		UINT32	RW	0x00000064 (100_{dec})
F010:06	SubIndex 006		UINT32	RW	0x000000C8 (200_{dec})
F010:07	SubIndex 007		UINT32	RW	0x000000FA (250_{dec})
F010:08	SubIndex 008		UINT32	RW	0x00000190 (400_{dec})

Index F900 PWM Info data

Index (hex)	Name	Meaning	Data type	Flags	Default
F900:0	PWM Info data		UINT8	RO	0x02 (2_{dec})
F900:02	Temperature [°C]		UINT8	RO	0x00 (0_{dec})

Index FB00 PWM Command

Index (hex)	Name	Meaning	Data type	Flags	Default
FB00:0	PWM 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[4]	RO	{0}

7 Diagnostics

The module offers various diagnostic options for users. These messages are divided into hardware warnings and hardware errors. The respective status words for the channels (except digital inputs and outputs) contain a bit for warnings and errors. The exact cause is analyzed via the diagnostic data (0xA050). Warnings are reset automatically. Errors may result in the output stage being switched off (PWMi) and have to be acknowledged in the control word (0x7050:07 Reset)

Error/warning for the PWM stage

Index (hex)	Warning	Meaning
A050:02	Overtemperature	from 100 °C
A050:06	Short circuit	An overcurrent/short circuit of more than 105% of the rated current has occurred for more than 200 ms

Control voltage (Us) and peripheral voltage (Up) of the EP8309

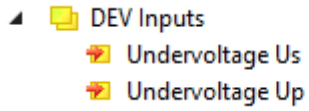


Fig. 29: Diagnostic control voltage (Us) and peripheral voltage (Up) of the EP8309

DEV input process data	Meaning
Undervoltage Us	Warning below 18 V_{DC}
Undervoltage Up	Warning below 18 V_{DC}

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 for fieldbus components can be found here.

Ordering information	Description	Link
ZK1090-3xxx-xxxx	EtherCAT cable M8, green	Website
ZK1093-3xxx-xxxx	EtherCAT cable M8, yellow	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

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

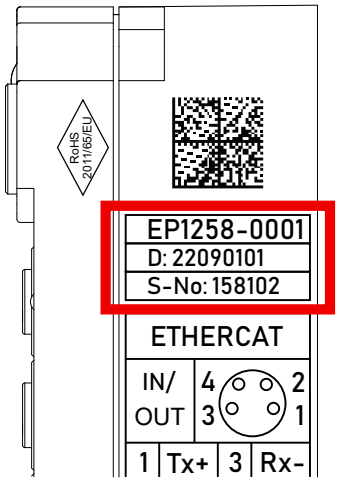


Fig. 30: EP1258-00001 IP67 EtherCAT Box with batch number/DateCode 22090101 and unique serial number 158102

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.

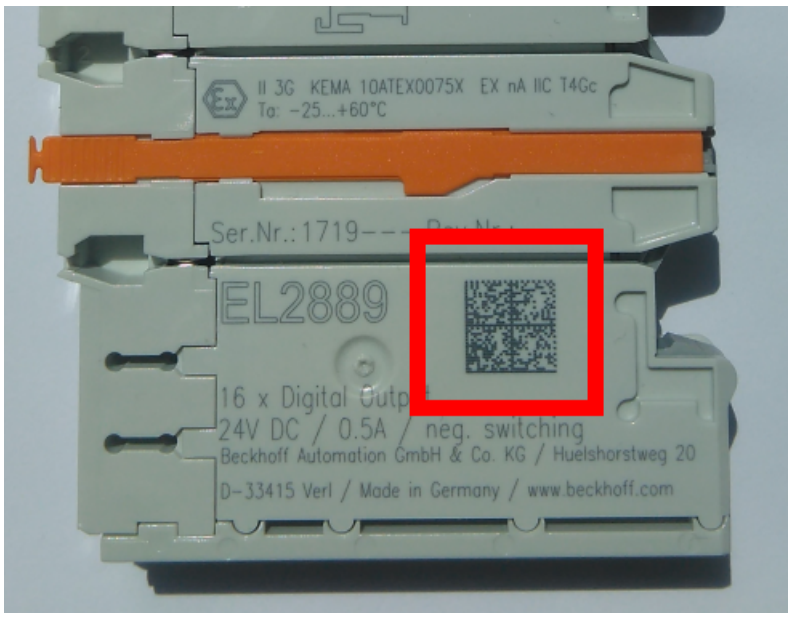


Fig. 31: BIC as data matrix code (DMC, code scheme ECC200)

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	1P072222
2	Beckhoff Traceability Number (BTN)	**Unique serial number, see note below**	SBTN	12	SBTNk4p562d7
3	Article description	**Beckhoff article description, e.g. EL1008**	1K	32	1KEL1809
4	Quantity	**Quantity in packaging unit, e.g. 1, 10, etc.**	Q	6	Q1
5	Batch number	Optional: Year and week of production	2P	14	2P401503180016
6	ID/serial number	Optional: Present-day serial number system, e.g. with safety products	51S	12	51S678294
7	Variant number	Optional: Product variant number on the basis of standard products	30P	32	30PF971, 2*K183
...					

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

Structure of the BIC

Example of composite information from positions 1 to 4 and with the above given example value on position 6. The data identifiers are highlighted in bold font:

1P072222**S**BTNk4p562d7**1K**EL1809 **Q**1 **51S**678294

Accordingly as DMC:



Fig. 32: Example DMC **1P**072222**S**BTNk4p562d7**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.

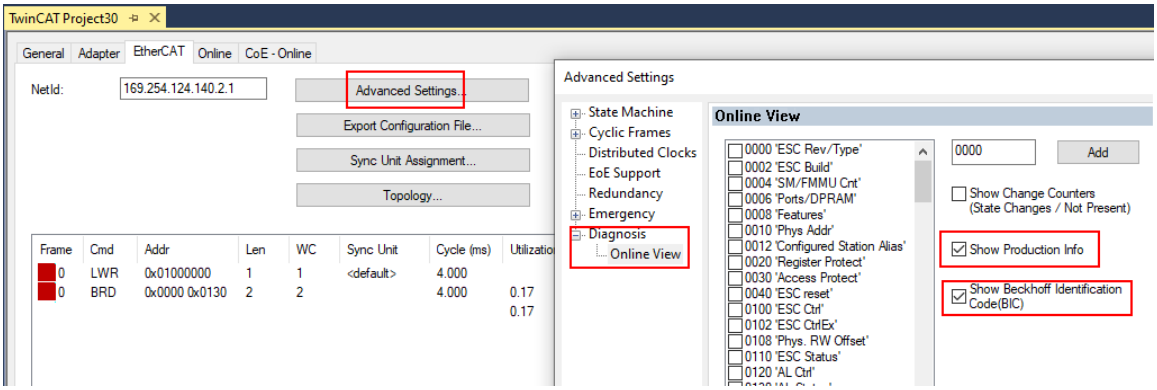
EtherCAT devices (IP20, IP67)

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.

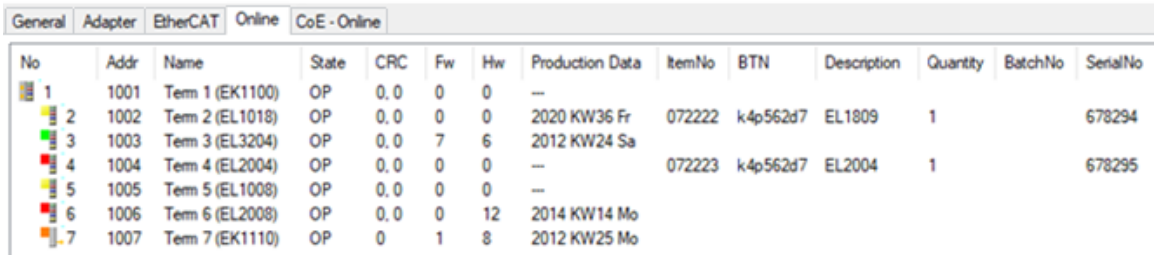
Beckhoff also stores the eBIC in the ESI-EEPROM. The eBIC was introduced into Beckhoff IO production (terminals, box modules) in 2020; as of 2023, implementation is largely complete.

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:

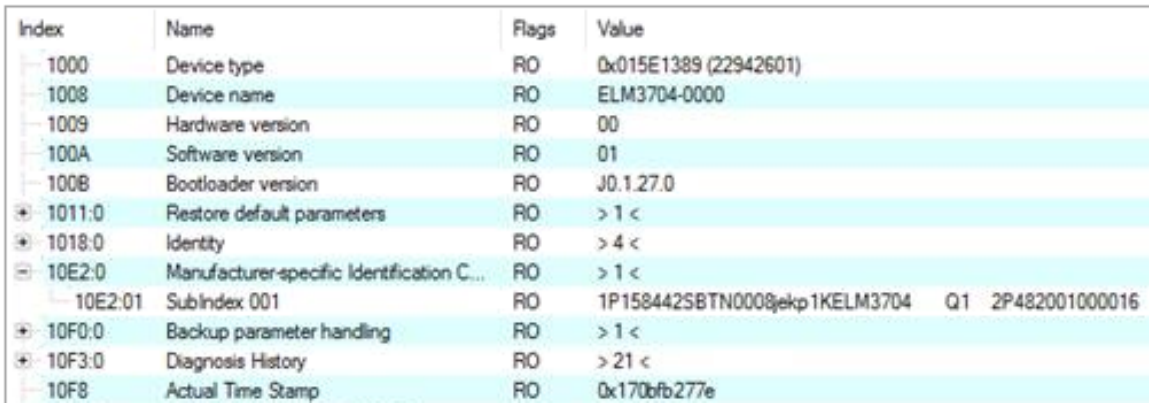


  - The BTN and its contents are then displayed:



  - 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

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e-mail:	support@beckhoff.com
web:	www.beckhoff.com/support

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- repair service
- spare parts service
- hotline service

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