Documentation for

EP3204 and EP3314

EtherCAT Box Modules for PT100 (RTD) or Thermo Couples

Version: 2.1.0
Date: 2018-12-03

BECKHOFF

Table of contents

1 Foreword

1.1 Notes on the documentation

Intended audience

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards.
It is essential that the documentation and the following notes and explanations are followed when installing and commissioning these components.
It is the duty of the technical personnel to use the documentation published at the respective time of each installation and commissioning.

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

Disclaimer

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

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

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

Trademarks

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Patent Pending

The EtherCAT Technology is covered, including but not limited to the following patent applications and patents: EP1590927, EP1789857, DE102004044764, DE102007017835 with corresponding applications or registrations in various other countries.

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

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Copyright

1.2 Safety instructions

Safety regulations

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

Exclusion of liability

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

Personnel qualification

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

Description of instructions

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

⚠ DANGER

Serious risk of injury!

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

⚠ WARNING

Risk of injury!

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

⚠ CAUTION

Personal injuries!

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

NOTE

Damage to environment/equipment or data loss

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

Tip or pointer

This symbol indicates information that contributes to better understanding.

1.3 Documentation issue status

Version	Comment
2.1.0	• Chapter *EP3204 – Data stream and calculation of the process data* added • Update of chapter *Mounting and connection* • Correction technical data in chapter *Power cables* • Structural update
2.0.1	• EP3204-0002 - Technical data updated
2.0.0	• Migration • Structure update
1.2.0	• EP3204 - object description and parameterization updated • EP3314 - object description and parameterization updated • Foreword updated • Technical data updated
1.1.0	• Power Connection updated
1.0.0	• ATEX notes added • Technical data updated • Extended temperature range for activated modules documented • Overview of EtherCAT cables extended • Description of the power connection updated • Description of the status LEDs for the power supply added
0.6	• Object descriptions corrected
0.5	• First preliminary version

Firmware and hardware versions

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

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

Documentation Version	EP3204-0002		EP3314-0002	
	Firmware	Hardware	Firmware	Hardware
2.1.0	07	13	06	14
2.0.1	07	10	05	11
2.0.0	07	10	05	11
1.2.0	05	08	05	09
1.1.0	05	08	05	09
1.0.0	05	05	02	05
0.6	03	01	01	01
0.5	03	01	01	01

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)

WW YY FF HH

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

Sample with ser. no.: 12 10 03 01:

12 - week of production 12
09 - year of production 2010
03 - firmware version 03
01 - hardware version 01

2 EtherCAT Box

2.1 EtherCAT Box - Introduction

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

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

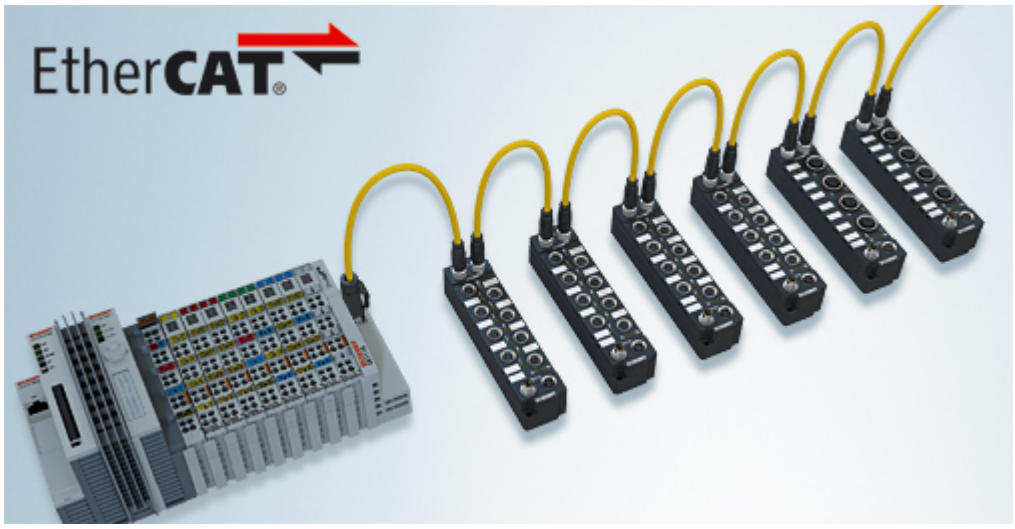

Fig. 1: EtherCAT Box Modules within an EtherCAT network

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

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

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

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

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

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

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

Basic EtherCAT documentation

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

EtherCAT XML Device Description

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

2.2 Module overview

Analog input modules, 24 VDC

Module	Number of inputs	Signal connection	Comment
EP3204-0002 [▶ 12]	4	M12	PT100 (RTD)
EP3314-0002 [▶ 15]	4	M12	Thermocouples

3 EP3204

3.1 Introduction

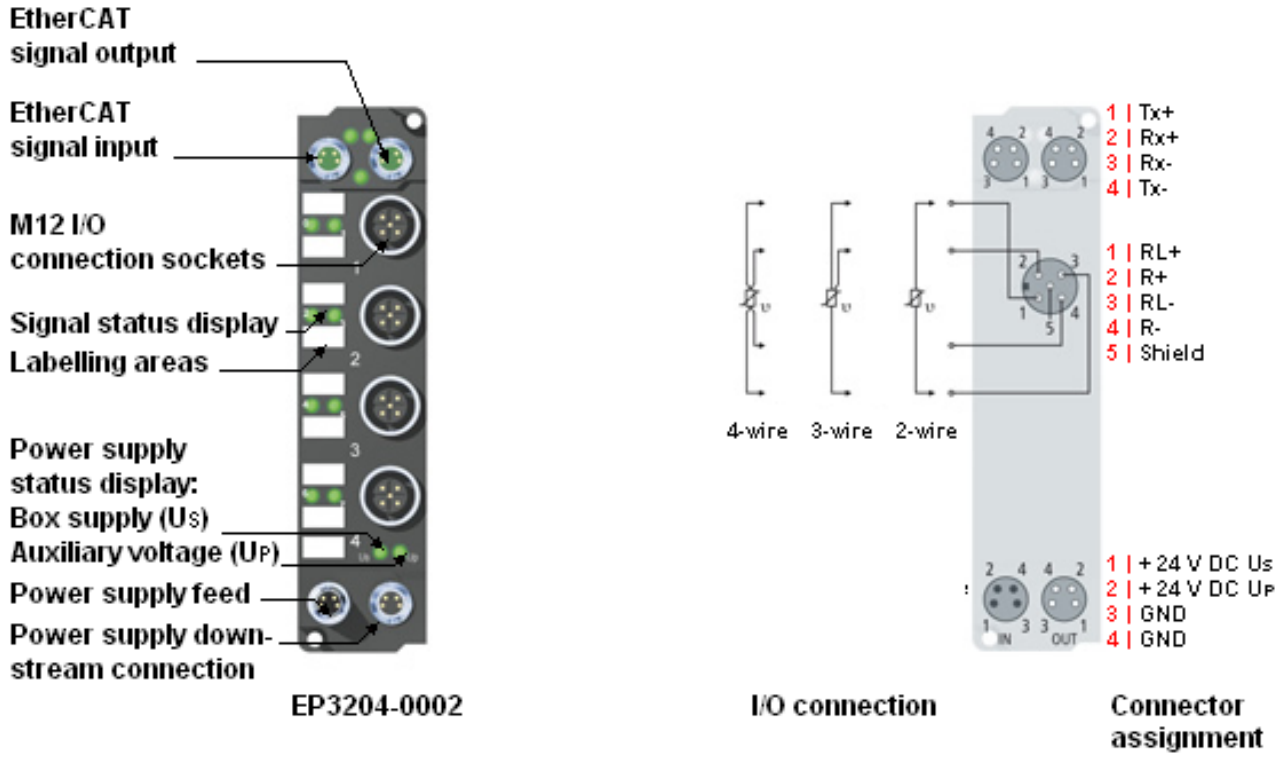

Fig. 4: EP3204-0002

EtherCAT Box with four analog inputs for PT100 (RTD)

The EP3204 EtherCAT Box with analog inputs enables direct connection of resistance sensors. The module circuit can operate sensors with 2-, 3- and 4-wire technology. Linearisation over the full temperature range is realized with the aid of a microprocessor. The temperature range can be selected freely. The module can also be used for simple resistance measurement, with the output in ohms. The module's standard settings are: Resolution 0.1°C in the temperature range of PT100 sensors in 4-wire connection. Sensor malfunctions such as broken wires are indicated by error LEDs.

The module is quite versatile, but the default values are selected in such a way that in most cases it is not necessary to perform configuration. The input filter and associated conversion times can be set within a wide range, and several data output formats may be chosen. The inputs can, if required, be scaled differently, and automatic limit monitoring is also available. EtherCAT is used for parameterization purposes.

Quick links

- Installation [▶ 18]
- Configuration [▶ 42]
- UL requirements [▶ 32] for UL-approved modules
- ATEX - special conditions [▶ 33] for ATEX-approved modules

3.2 Technical data

Technical data	EP3204-0002
Fieldbus	EtherCAT
Fieldbus connection	2 x M8 socket (green)
Number of inputs	4
Input connections	4 x M12 socket [▶ 36]
Connection technology	2-, 3- and 4-wire technology (default: 4-wire)
Sensor types	PT100, PT200, PT500, PT1000, Ni100, Ni120, Ni1000, resistance measurement (e.g. potentiometer connection)
Temperature range	-200…+850 °C (PT sensors); -60…+250 °C (Ni sensors)
Resolution	0.1 °C per digit
Conversion time	approx. 800 ms to 2 ms, depending on the configuration and filter setting; default: approx. 85 ms)
Measuring error	±0.5 °C with PT sensors with 4-wire connection
Measuring current	typically 0.5 mA
Input filter	5 variations, configurable
Special features	open-circuit recognition
Supply of the module electronics	from the control voltage Us
Current consumption of the module electronics	typically 120 mA
Sensor supply	from control voltage Us (electrically isolated)
Power supply connection	Power supply: 1 x M8 plug, 4-pole Downstream connection: 1 x M8 socket, 4-pole
Process image	Inputs: 4 x 16-bit RTD, 4 x 16-bit status
Electrical isolation	Control voltage / fieldbus: 500 V
Permissible ambient temperature during operation	-25°C ... +60°C 0°C ... +55°C (conforms to ATEX, see special conditions [▶ 33]) 0°C ... +55°C (according to cULus, see UL requirements [▶ 32])
Permissible ambient temperature during storage	-40°C ... +85°C
EMC immunity / emission	conforms to EN 61000-6-2 / EN 61000-6-4
Vibration / shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27
Vibration	10 frequency sweeps in 3 axes
	6 Hz < f < 60 Hz displacement 0.35 mm, constant amplitude
	60.1 Hz < f < 500 Hz acceleration 5 g, constant amplitude
Shocks	1000 shocks in each direction, in 3 axes
	25 g, 6 ms
Protection class	IP65, IP66, IP67 (conforms to EN 60529)
Weight	app. 165 g
Installation position	variable
Approvals	CE, cULus, ATEX

3.3 Process image

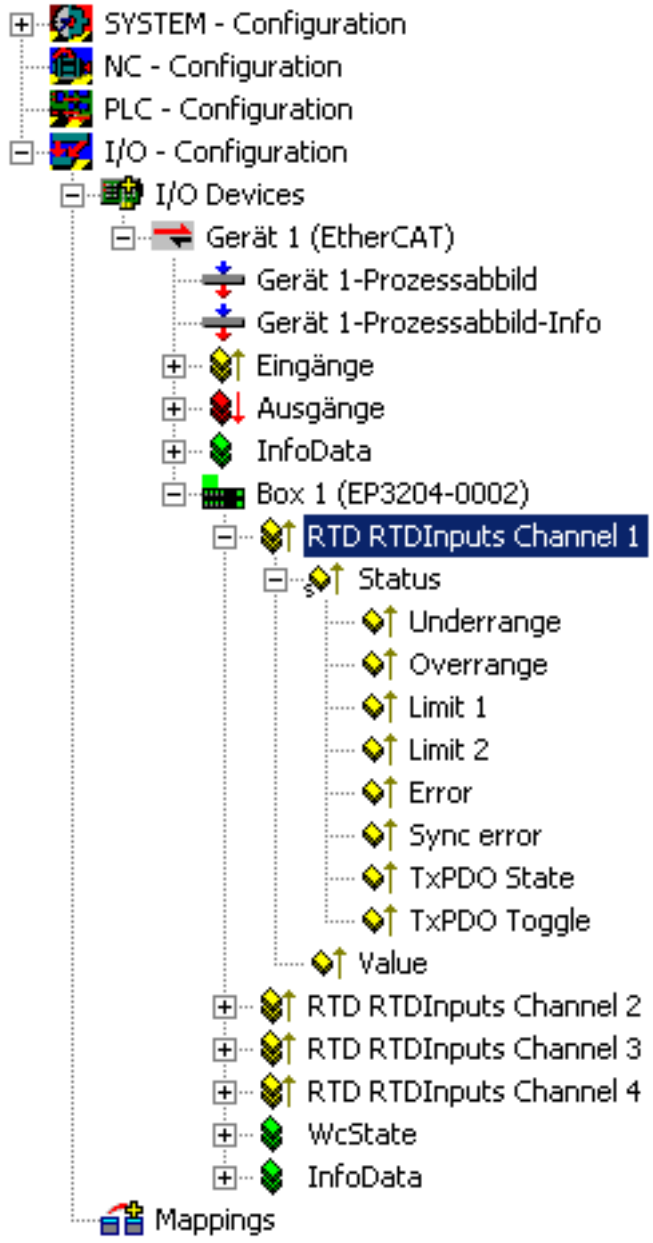

Fig. 5: RTD RTDInputs Channel 1

The data for the first analog channel can be found under **RTD RTDInputs Channel 1**.

AI Standard Channel 2 to 4

The data of analog channels 2 to 4 have the same structure as those of the 1st channel.

4 EP3314

4.1 Introduction

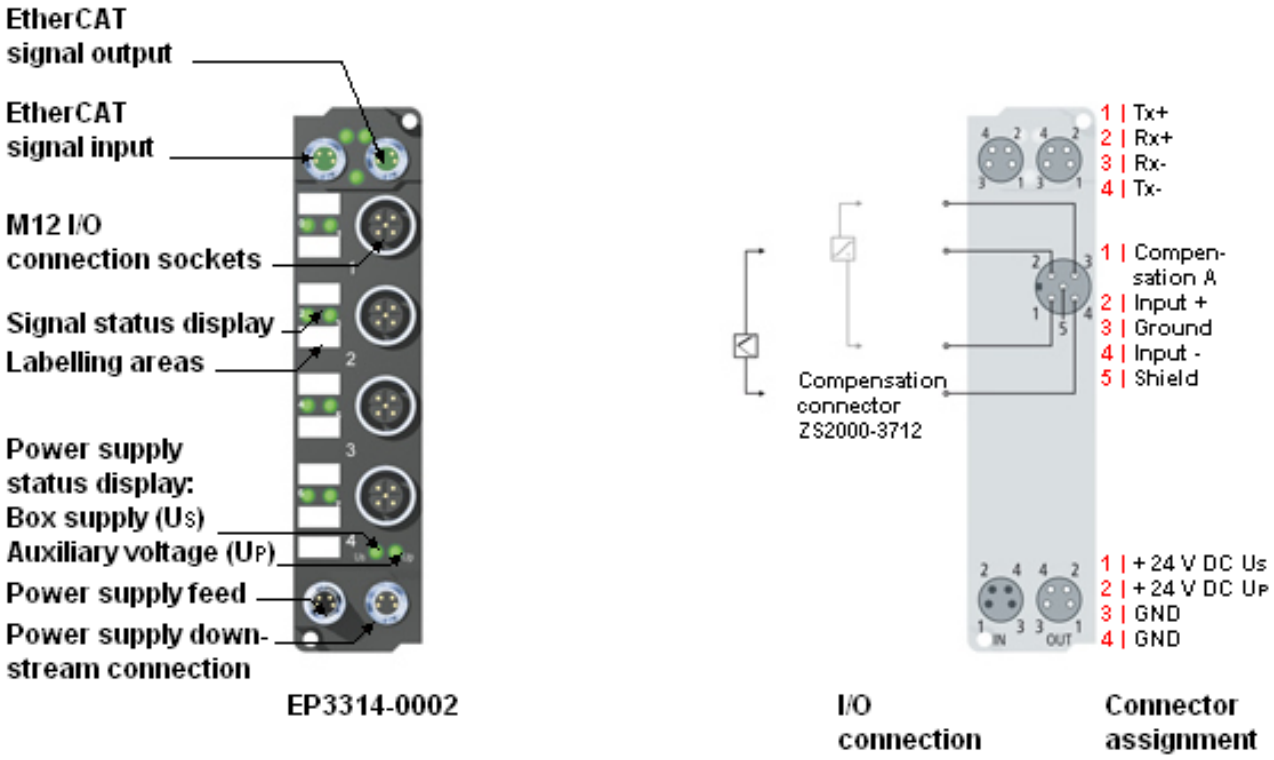

Fig. 6: EP3314-0002

EtherCAT Box with four analog inputs for thermocouples

The EP3314 EtherCAT Box with analog inputs enables direct connection of four thermocouples. The module circuit can operate thermocouple sensors in a 2-wire configuration. Linearisation over the full temperature range is realized with the aid of a microprocessor. The temperature range can be selected freely. The error LEDs indicate a broken wire. Compensation for the cold junction is made through a temperature measurement in the connecting plugs. This means that standard extension leads can be connected. The EP3314 also enables millivolt measurement.

The module is quite versatile, but the default values are selected in such a way that in most cases it is not necessary to perform configuration. The input filter and associated conversion times can be set within a wide range, and several data output formats may be chosen. The inputs can, if required, be scaled differently, and automatic limit monitoring is also available. EtherCAT is used for parameterization purposes. The parameters are stored in the module. For temperature compensation a PT1000 element is required. Beckhoff offers a plug connector with temperature compensation (ZS2000-3712).

Quick links

- Installation [▶ 18]
- Configuration [▶ 42]
- UL requirements [▶ 32] for UL-approved modules
- ATEX - special conditions [▶ 33] for ATEX-approved modules

4.2 Technical data

Technical data	EP3314-0002
Fieldbus	EtherCAT
Fieldbus connection	2 x M8 socket (green)
Number of inputs	4
Input connections	4 x M12 socket [▶ 37]
Connection technology	2-wire technology for thermocouple
Sensor types	Types J, K, L, B, E, N, R, S, T, U (default setting type K), mV measurement
Temperature range	depending on sensor type; default type K, -100…+1,370 °C
Resolution	0.1°C per digit
Conversion time	approx. 2.5 s to 20 ms, depending on the configuration and filter setting; default: approx. 250 ms
Measuring error	< ±0.3 % for type K (based on full-scale value)
Input filter	5 variations, configurable
Special features	Broken wire detection
Supply of the module circuitry	From the control voltage Us
Current consumption of the module circuitry	typically 120 mA
Sensor supply	from control voltage Us (electrically isolated)
Power supply connection	Feed: 1 x M8 plug, 4-pin Onward connection: 1 x M8 socket, 4-pin
Process image	Inputs: 4 x 16 bit TC, 4 x 16 bit status
Electrical isolation	Control voltage/fieldbus: 500 V
Permissible ambient temperature during operation	-25°C ... +60°C 0°C ... +55 °C (according to ATEX, see special conditions [▶ 33]) 0°C ... +55°C (according to cULus, see UL requirements [▶ 32])
Permissible ambient temperature during storage	-40°C ... +85°C
EMC immunity / emission	conforms to EN 61000-6-2 / EN 61000-6-4
Vibration/shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27
Vibration	10 frequency runs in 3 axes
	6 Hz < f < 60 Hz displacement 0.35 mm, constant amplitude
	60.1 Hz < f < 500 Hz acceleration 5 g, constant amplitude
Shocks	1000 shocks in each direction, in 3 axes
	25 g, 6 ms
Protection class	IP65, IP66, IP67 (according to EN 60529)
Weight	approx. 165 g
Installation position	variable
Approvals	CE, cULus, ATEX

4.3 Process image

TC TCInputs Channel 1

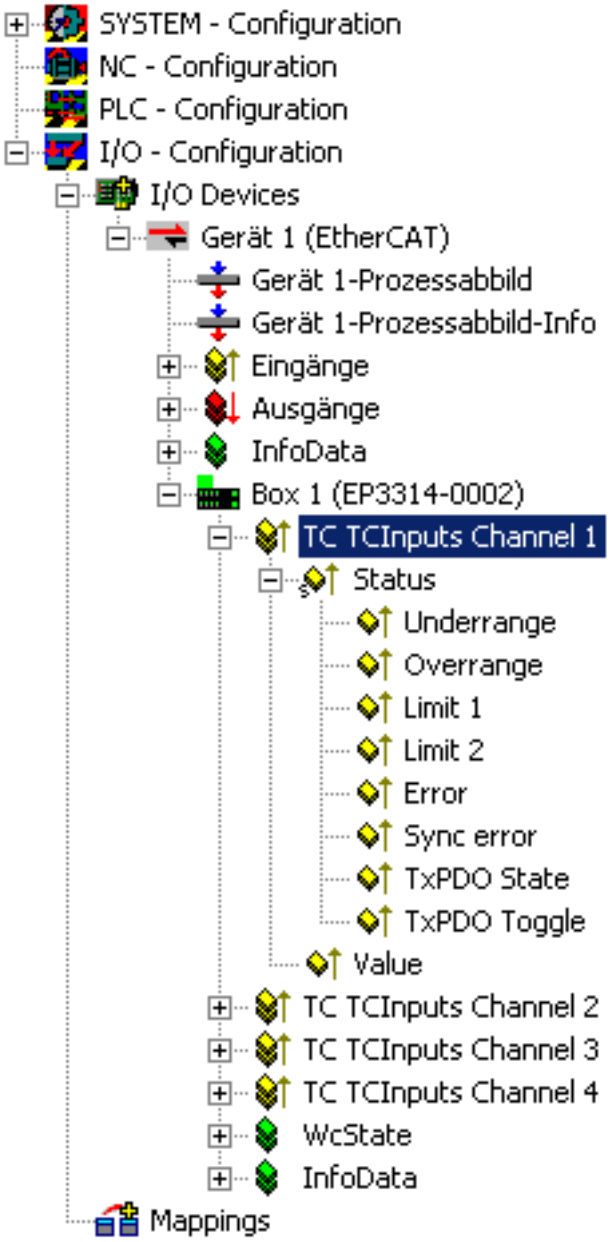

Fig. 7: TC TCInputs Channel 1

The data for the 1st analog channel can be found under **TC TCInputs Channel 1**.

AI Standard Channel 2 to 4

The data of analog channels 2 to 4 have the same structure as those of the 1st channel.

5 Mounting and connection

5.1 Dimensions

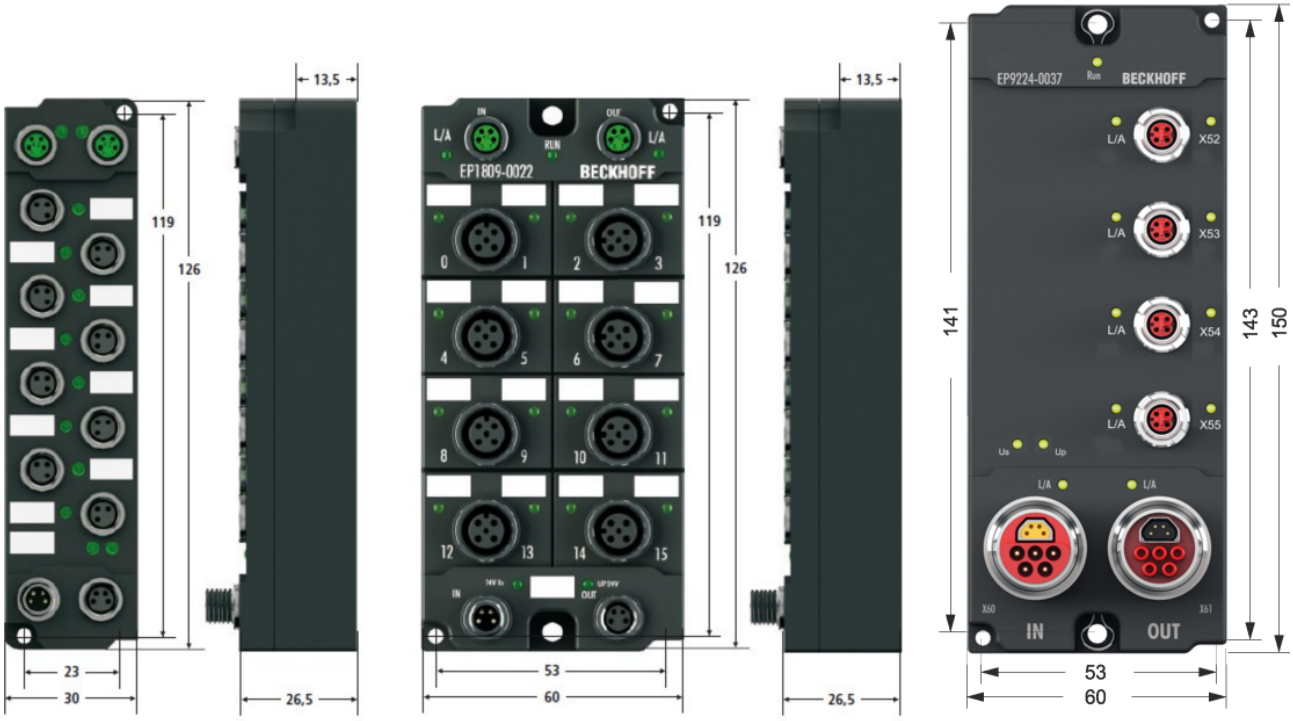

Fig. 8: Dimensions of the EtherCAT Box Modules

All dimensions are given in millimeters.

Housing properties

EtherCAT Box	lean body	wide bodies
Housing material	PA6 (polyamide)	
Casting compound	Polyurethane	
Mounting	two fastening holes Ø 3 mm for M3	two fastening holes Ø 3 mm for M3 two fastening holes Ø 4.5 mm for M4
Metal parts	Brass, nickel-plated	
Contacts	CuZn, gold-plated	
Power feed through	max. 4 A (M8) max. 16 A (7/8“) max. 15.5 A (B17 5G 1.5 mm²)	
Installation position	variable	
Protection class	IP65, IP66, IP67 (conforms to EN 60529) when screwed together	
Dimensions (H x W x D)	app. 126 x 30 x 26.5 mm	app. 126 x 60 x 26,5 mm app. 150 x 60 x 26.5 mm (without 7/8", B17)

5.2 Fixing

Note or pointer

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

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

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

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

Mounting Rail ZS5300-0001

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

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

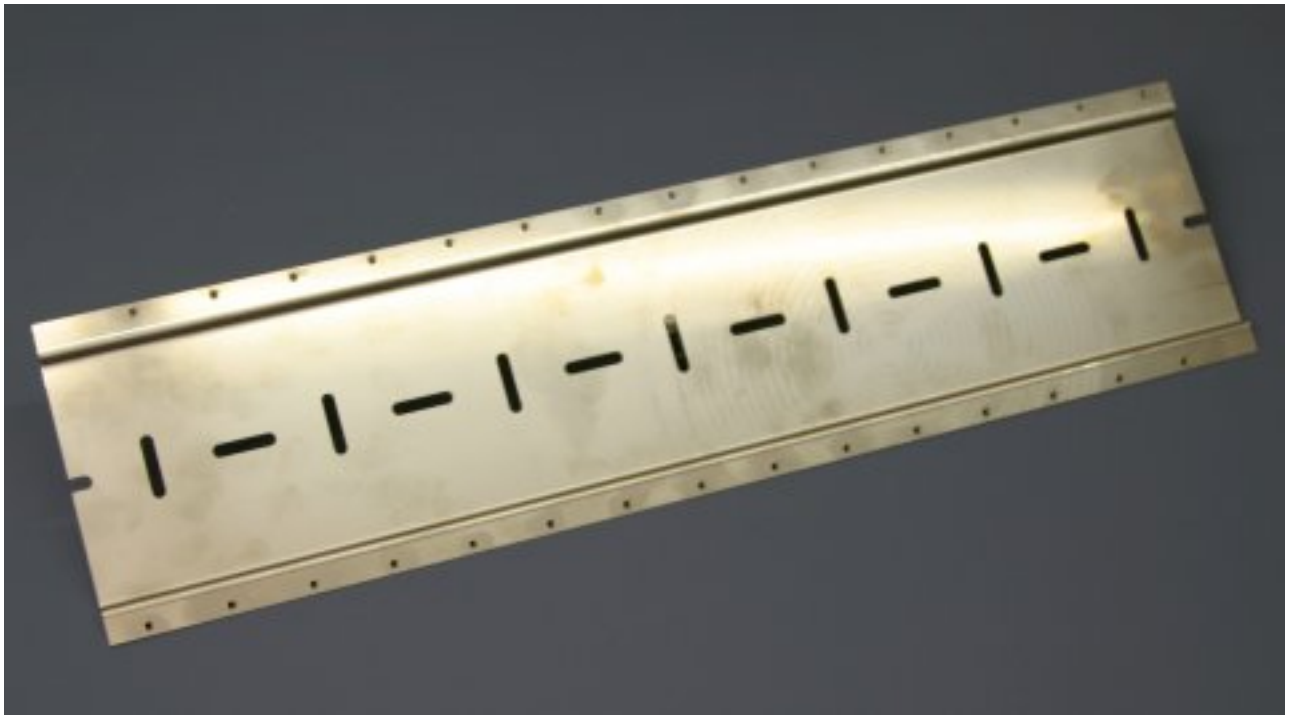

Fig. 9: Mounting Rail ZS5300-000

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

Mounting Rail ZS5300-0011

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

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

5.3 Nut torque for connectors

M8 connectors

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

Fig. 10: EtherCAT Box with M8 connectors

M12 connectors

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

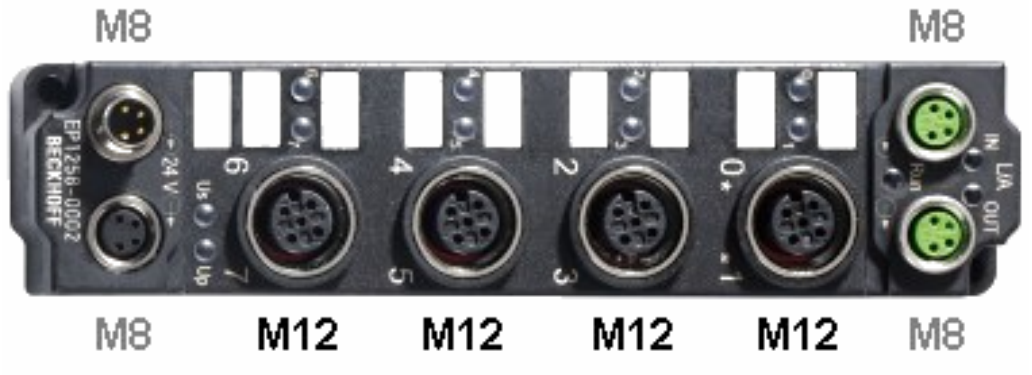

Fig. 11: EtherCAT Box with M8 and M12 connectors

7/8" plug connectors

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

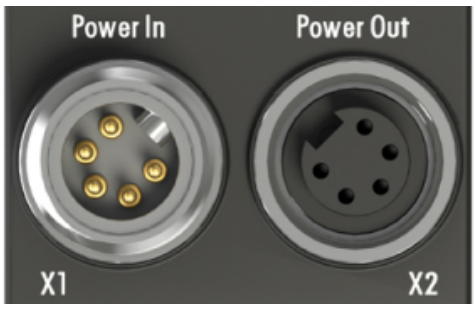

Fig. 12: 7/8" plug connectors

Torque socket wrenches

Fig. 13: ZB8801 torque socket wrench

Ensure the right torque

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

5.4 EtherCAT connection

For the incoming and ongoing EtherCAT connection,

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

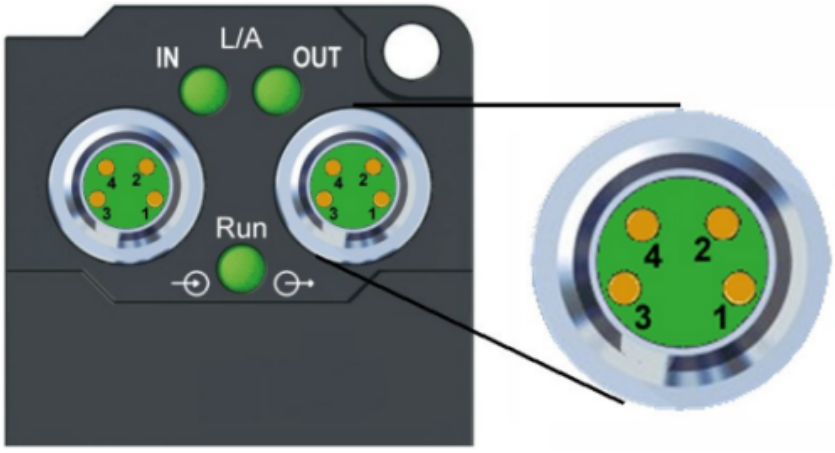

Fig. 14: EtherCAT Box: M8, 30 mm housing

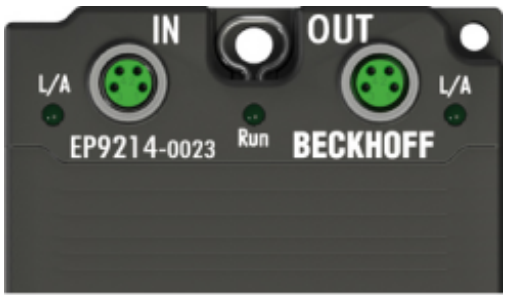

Fig. 15: EtherCAT Box: M860 mm housing (example: EP9214)

Fig. 16: Coupler Box: M12

Assignment

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

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

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

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

For unification the prevalent cables ZB9030, ZB9032 and ZK1090-3xxx-xxxx this means the pre assembled cables with M8 connectors were changed to the colors of EN61918 (yellow, orange, white, blue).So different color coding exists. But the electrical properties are absolutely identical.

EtherCAT connector

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

Name	Connector	Comment
ZS1090-0003	RJ45	four-pole, IP20, field-configurable
ZS1090-0004	M12, male	four-pin, IP67, for field assembly
ZS1090-0005	RJ45	eight-pole, IP20, field-configurable, suitable for gigabit Ethernet
ZS1090-0006	M8 plug connector	four-pole, IP67, field-configurable, for cable type ZB903x
ZS1090-0007	M8 socket	four-pole, IP67, field-configurable, for cable type ZB903x
ZS1090-1006	M8 plug connector	four-pole, IP67, field-configurable up to OD = 6.5 mm
ZS1090-1007	M8 socket	four-pole, IP67, field-configurable up to OD = 6.5 mm

5.5 EtherCAT - Fieldbus LEDs

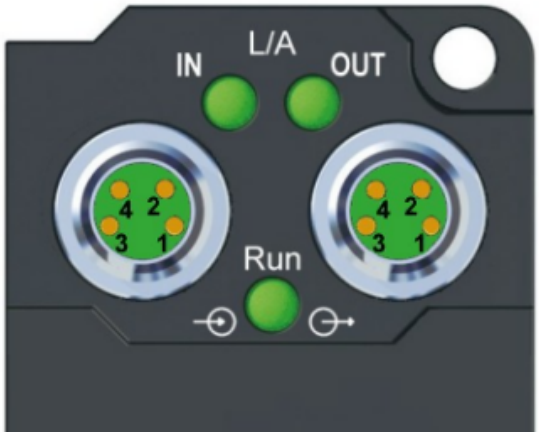

Fig. 17: EtherCAT-LEDs

LED display

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

EtherCAT statuses

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

5.6 Cabling

A list of EtherCAT cables, power cables, sensor cables, Ethernet/EtherCAT connectors and field-configurable connectors can be found under the following link: https://beckhoff.de/english/fieldbus_box/ethercat_box_accessories_overview.htm?id=25525466903389

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

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

EtherCAT cables

Fig. 18: ZK1090-3131-0xxx

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

Wiring recommendations

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

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

Power cable

Fig. 19: ZK2020-3132-0xxx

Sensor cables

Fig. 20: Selection of Beckhoff sensor cables

5.7 Power Connection

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

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

Fig. 21: EtherCAT Box, Connectors for power supply

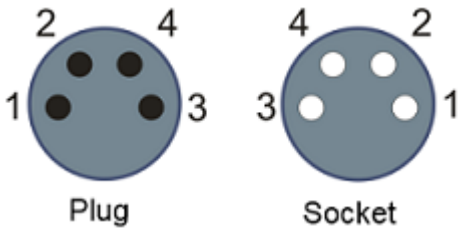

Fig. 22: Pin assignment M8, Power In and Power Out

Table 1: PIN assignment

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

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

Two LEDs display the status of the supply voltages.

NOTE

Don't confuse the power connectors with the EtherCAT connectors!

Never connect the power cables (M8, 24 V_{DC}) with the green marked EtherCAT sockets of the EtherCAT Box Modules! This can damage the modules!

Control voltage Us: 24 V_{DC}

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

Auxiliary voltage Up 24 V_{DC}

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

Redirection of the supply voltages

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

NOTE

Pay attention to the maximum permissible current!

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

Supply via EP92x4-0023 PowerBox modules

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

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

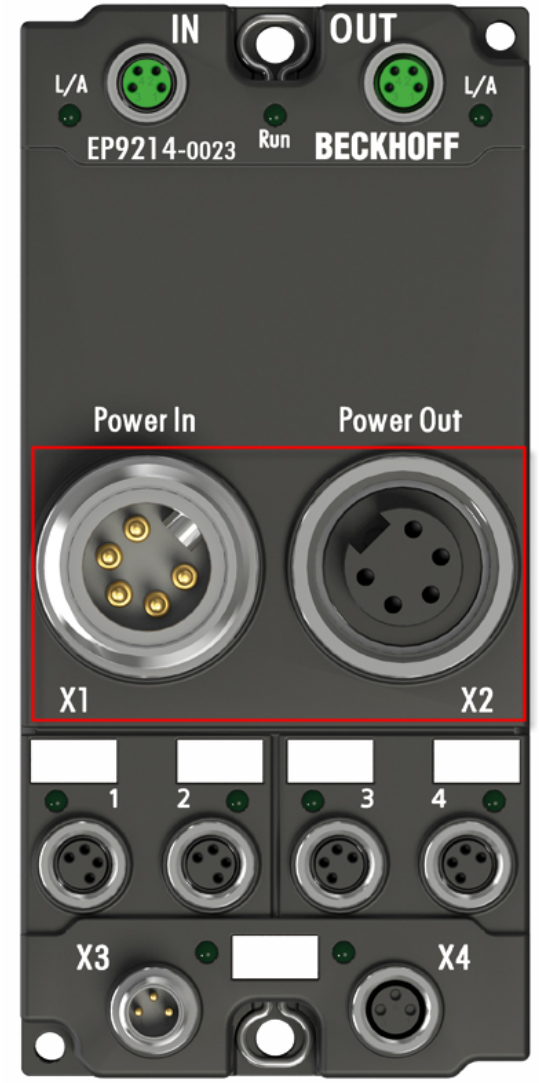

Fig. 23: EP92x4-0023, Connectors for Power In and Power Out

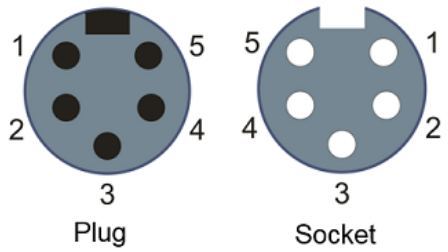

Fig. 24: Pin assignment 7/8”, Power In and Power Out

Electrical isolation

Digital modules

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

Check this at the documentation of each used EtherCAT Box.

Analog modules

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

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

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

NOTE

Electrical isolation may be cancelled!

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

5.8 Power cables

Ordering data

Order designation	Power cable	Screw-in connector	Contacts	Cross-section	Length
ZK2020-3200-0020	Straight socket, open end	M8	4-pin	0.34 mm²	2.00 m
ZK2020-3200-0050					5.00 m
ZK2020-3200-0100					10.00 m
ZK2020-3400-0020	Angled socket, open end				2.00 m
ZK2020-3400-0050					5.00 m
ZK2020-3400-0100					10.00 m
ZK2020-3132-0001	Straight socket, straight socket				0.15 m
ZK2020-3132-0005					0.50 m
ZK2020-3132-0010					1.00 m
ZK2020-3132-0020					2.00 m
ZK2020-3132-0050					5.00 m
ZK2020-3334-0001	Angled socket, angled socket				0.15 m
ZK2020-3334-0005					0.50 m
ZK2020-3334-0010					1.00 m
ZK2020-3334-0020					2.00 m
ZK2020-3334-0050					5.00 m

Further available power cables may be found in the Beckhoff catalog or on our internet pages (http://www.beckhoff.com).

Technical data

Technical data	
Rated voltage according to IEC61076-2-101	30 V_{DC}
Contamination level according to IEC 60 664-1	3/2
Insulation resistance IEC 60 512-2	>$10^9\Omega$
Current carrying capacity according to IEC 60512-3	4 A
Volume resistance according to IEC 60512-2	< 5 mΩ
Protection class according to IEC 60529	IP65/66/67, when screwed together
Ambient temperature	-30°C to +80°C

5.9 Status LEDs for power supply

Fig. 25: Status LEDs for power supply

LED display

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

5.10 Power cable conductor losses M8

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

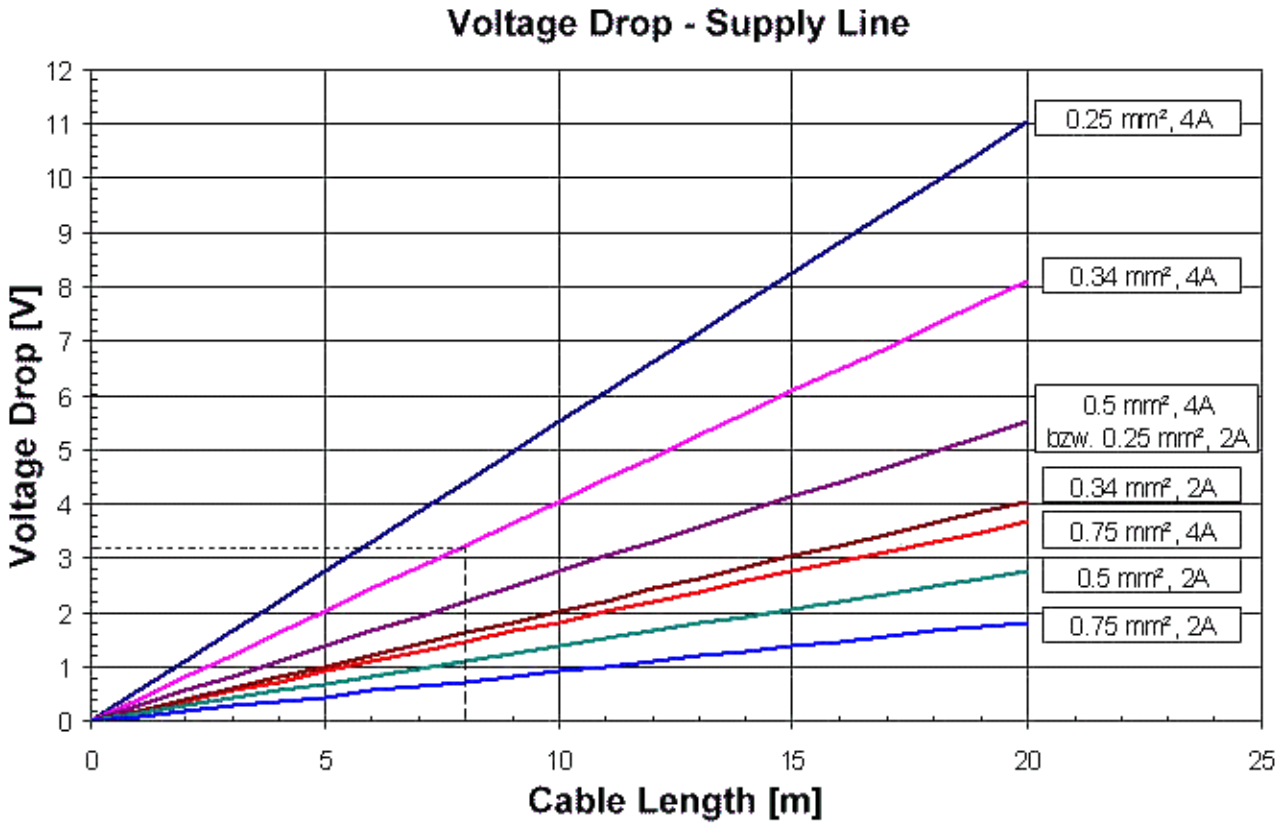

Fig. 26: Power cable conductor losses

Example

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

EP92x4 Power Distribution Modules

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

5.11 UL Requirements

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

Supply voltage

⚠ CAUTION

CAUTION!

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

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

⚠ CAUTION

CAUTION!

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

Networks

⚠ CAUTION

CAUTION!

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

Ambient temperature range

⚠ CAUTION

CAUTION!

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

Marking for UL

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

Fig. 27: UL label

5.12 ATEX notes

5.12.1 ATEX - Special conditions

⚠ WARNING

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

- The certified components are to be installed in the BG2000-0000 protection enclosure [▶ 34] that guarantees a protection against mechanical hazards!
- If the temperatures during rated operation are higher than 70°C at the feed-in points of cables, lines or pipes, or higher than 80°C at the wire branching points, then cables must be selected whose temperature data correspond to the actual measured temperature values!
- Observethe permissible ambient temperature range of 0 - 55°C for the use of EtherCAT Box modules in potentially explosive areas!
- Measures must be taken to protect against the rated operating voltage being exceeded by more than 40% due to short-term interference voltages!
- The connections of the certified components may only be connected or disconnected if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!

Standards

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

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

Marking

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

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

or

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

Batch number (D number)

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

D: WW YY FF HH

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

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

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

5.12.2 BG2000-0000 - EtherCAT Box protection enclosure

⚠ WARNING

Risk of electric shock and damage of device!

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

ATEX

The BG2000-0000 protection enclosure has to be mounted over a single EtherCAT Box to fulfill the special conditions according to ATEX [▶ 33].

Installation

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

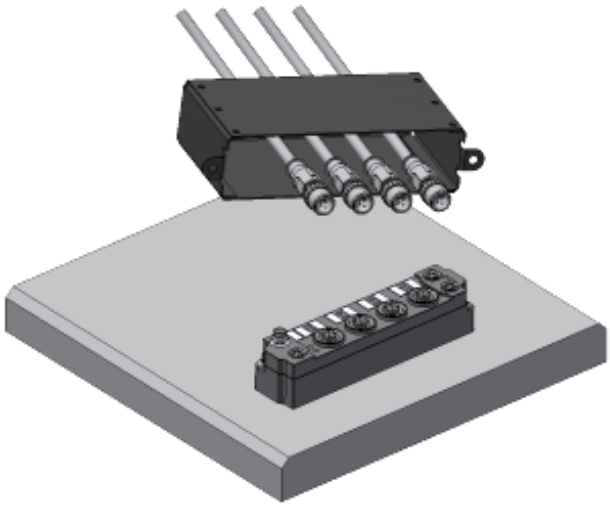

Fig. 28: BG2000-0000, putting the cables

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

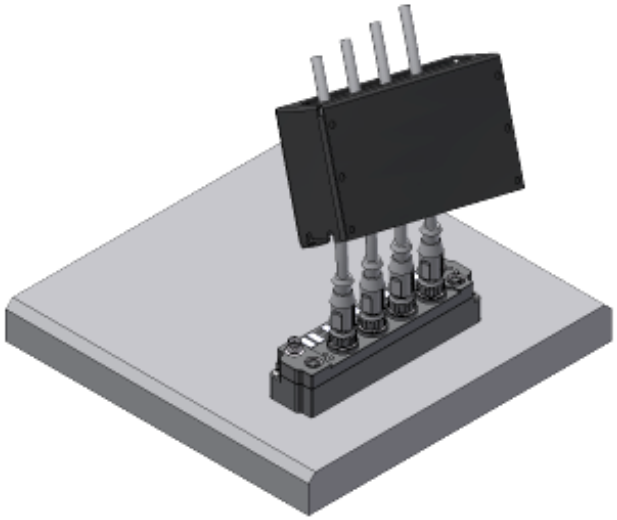

Fig. 29: BG2000-0000, fixing the cables

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

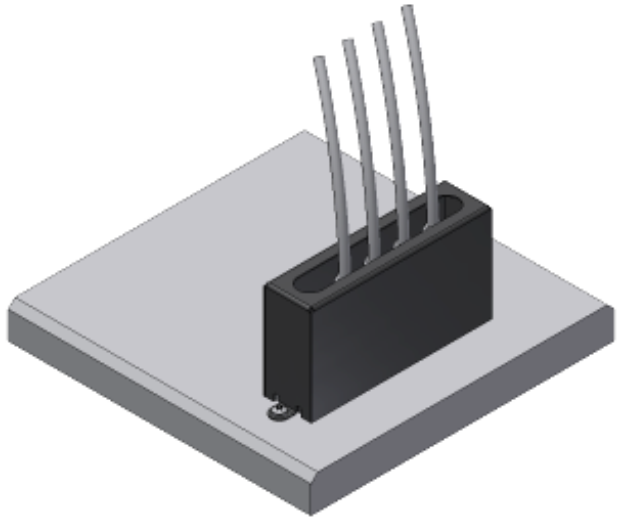

Fig. 30: BG2000-0000, mounting the protection enclosure

5.12.3 ATEX Documentation

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

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

5.13 Signal connection

5.13.1 Signal connection - PT100 (RTD)

The advantage of four-wire technique is that the error resulting from the cable and contacts is included in the measurement and cancelled out. In the 3-wire technique, the line resistance to the resistance sensor is measured in one direction only, and is multiplied by two. This requires the outward and return lines to have approximately the same ohmic resistance. An error is present in the two-wire technique; temperature differences and cable cross-sections can make this error vary considerably.

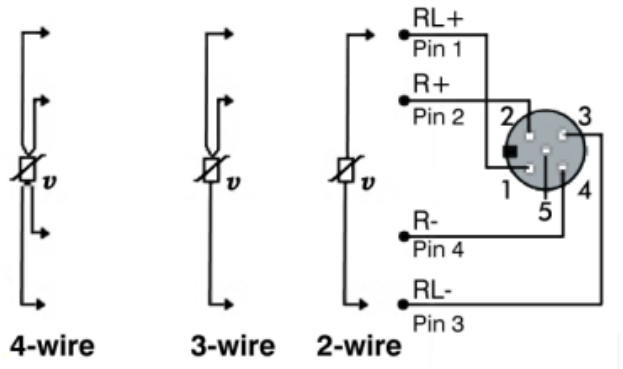

Fig. 31: Signal connection - PT100 (RTD)

Supply voltage

U_S - supplies the electronics for the fieldbus and for the sensor. It is electrically isolated from U_P.

U_P - Is not required for the function of the module, and does not have to be fed in.

NOTE

Redirection of the supply voltages

If you use UP to pass the power on, and you connect a module in which US and UP are not electrically isolated (e.g. any digital module) then the electrical isolation is removed by the downstream connection.

5.13.2 Signal connection - thermocouple

The temperature compensation is fed to the outside of the modules. This means that in the connector the temperature compensation is measured directly at the connection point. This allows the temperature to be measured with significantly better accuracy. Beckhoff offer a connector (ZS2000-3712) for this. The temperature compensation can also be carried out at a location other than the Fieldbus Box. You must then wire a PT1000 between pins 1 and 3. The longer the cables you choose to use, the larger is the measurement error caused by the length of the conductor, conductor losses and interference.

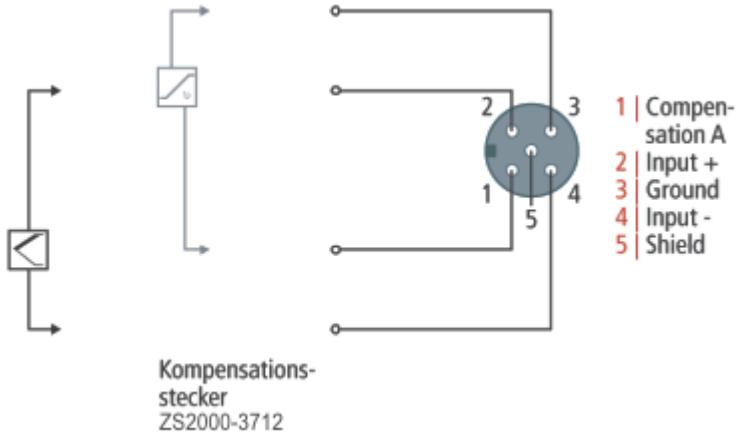

Fig. 32: Signal connection - thermocouple

Supply voltage

U_S - supplies the electronics for the fieldbus and for the sensor. It is electrically isolated from U_P.

U_P - Is not required for the function of the module, and does not have to be fed in.

NOTE

Redirection of the supply voltages

If you use U_P to pass the power on, and you connect a module in which U_S and U_P are not electrically isolated (e.g. any digital module) then the electrical isolation is removed by the downstream connection.

5.13.3 Status LEDs at the signal connections

There is a green *Run* LED and a red *Error* LED for each channel.
Correct function is indicated if the green *Run* LED is on and the red *Error* is off.

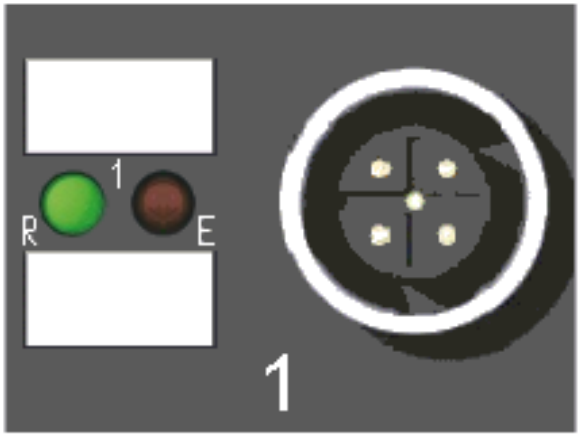

Fig. 33: Status LEDs at the signal connections

Connection	LED	Display	Meaning
M12 socket no. 1-4	R left	off	No data transfer to the A/D converter
		green	Data transfer to A/D converter
	E right	off	Function OK
		red	Error: • Broken wire or • measured value outside measuring range or • temperature compensation outside the valid range

6 Commissioning/Configuration

6.1 Inserting into the EtherCAT network

Installation of the latest XML device description

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

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

- by scanning [▶ 39] for existing hardware (called "online") and
- by manual inserting/appending [▶ 39] of fieldbus devices, couplers and slaves.

Automatic scanning in of the box

- The EtherCAT system must be in a safe, de-energized state before the EtherCAT modules are connected to the EtherCAT network!
- Switch on the operating voltage, open the TwinCAT System Manager [▶ 42] (Config mode), and scan in the devices (see Fig. 1). Acknowledge all dialogs with "*OK*", so that the configuration is in "FreeRun" mode.

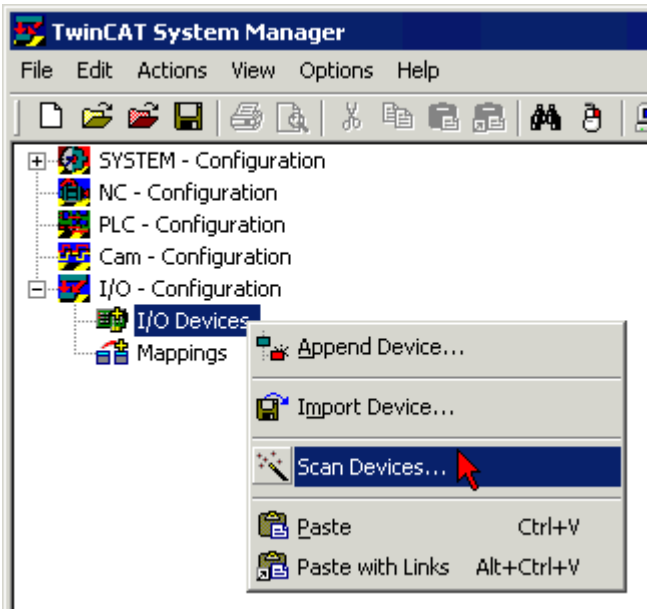

Fig. 34: Scanning in the configuration (I/O Devices -> right-click -> Scan Devices...)

Appending a module manually

- The EtherCAT system must be in a safe, de-energized state before the EtherCAT modules are connected to the EtherCAT network!
- Switch on the operating voltage, open the TwinCAT System Manager [▶ 42] (Config mode)
- Append a new I/O device. In the dialog that appears select the device *EtherCAT (Direct Mode),* and confirm with *OK*.

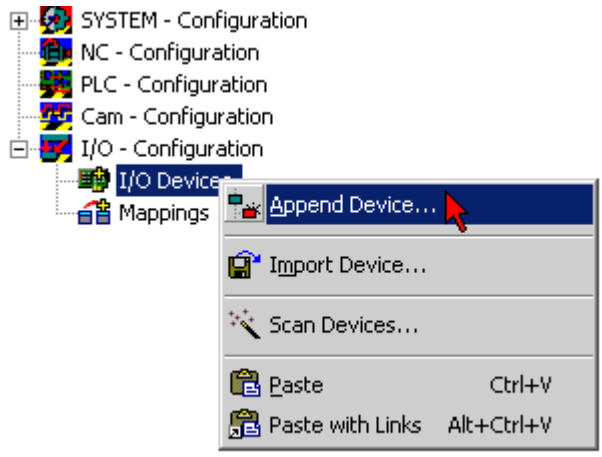

Fig. 35: Appending a new I/O device (I/O Devices -> right-click -> Append Device...)

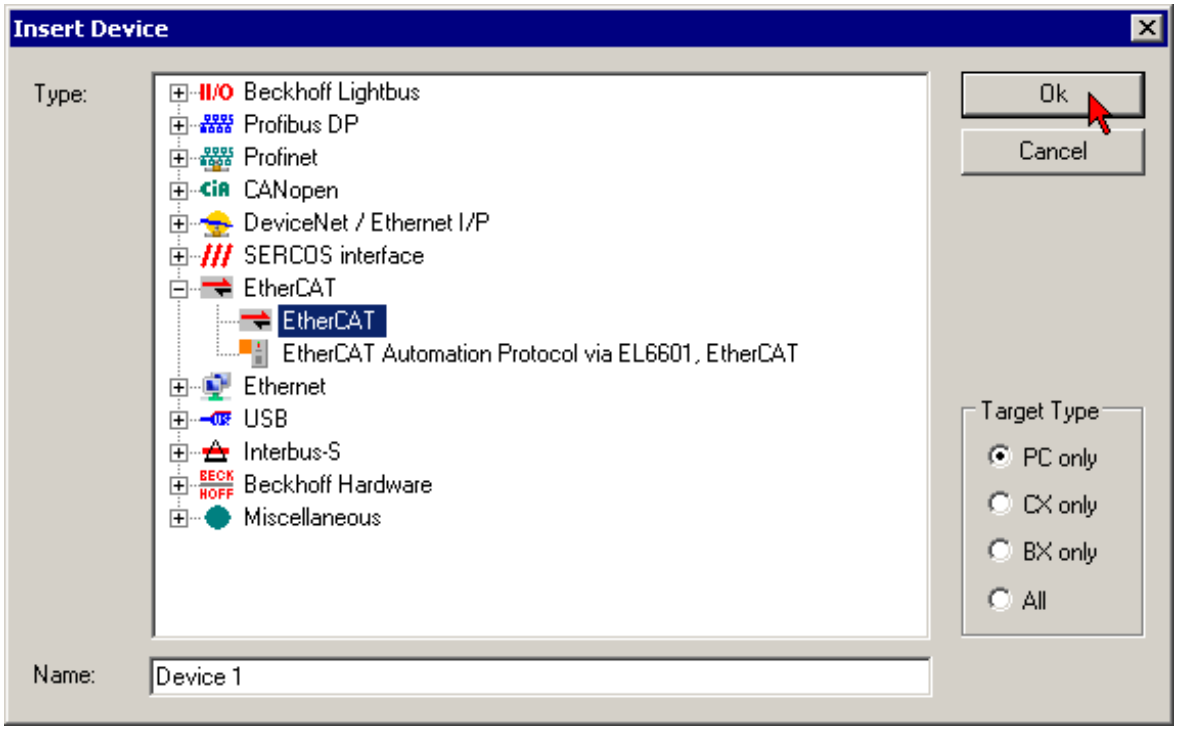

Fig. 36: Selecting the device EtherCAT

- Append a new box.

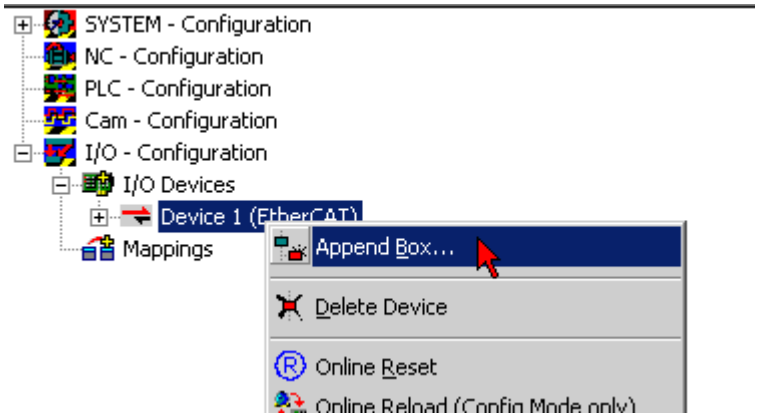

Fig. 37: Appending a new box (Device -> right-click -> Append Box...)

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

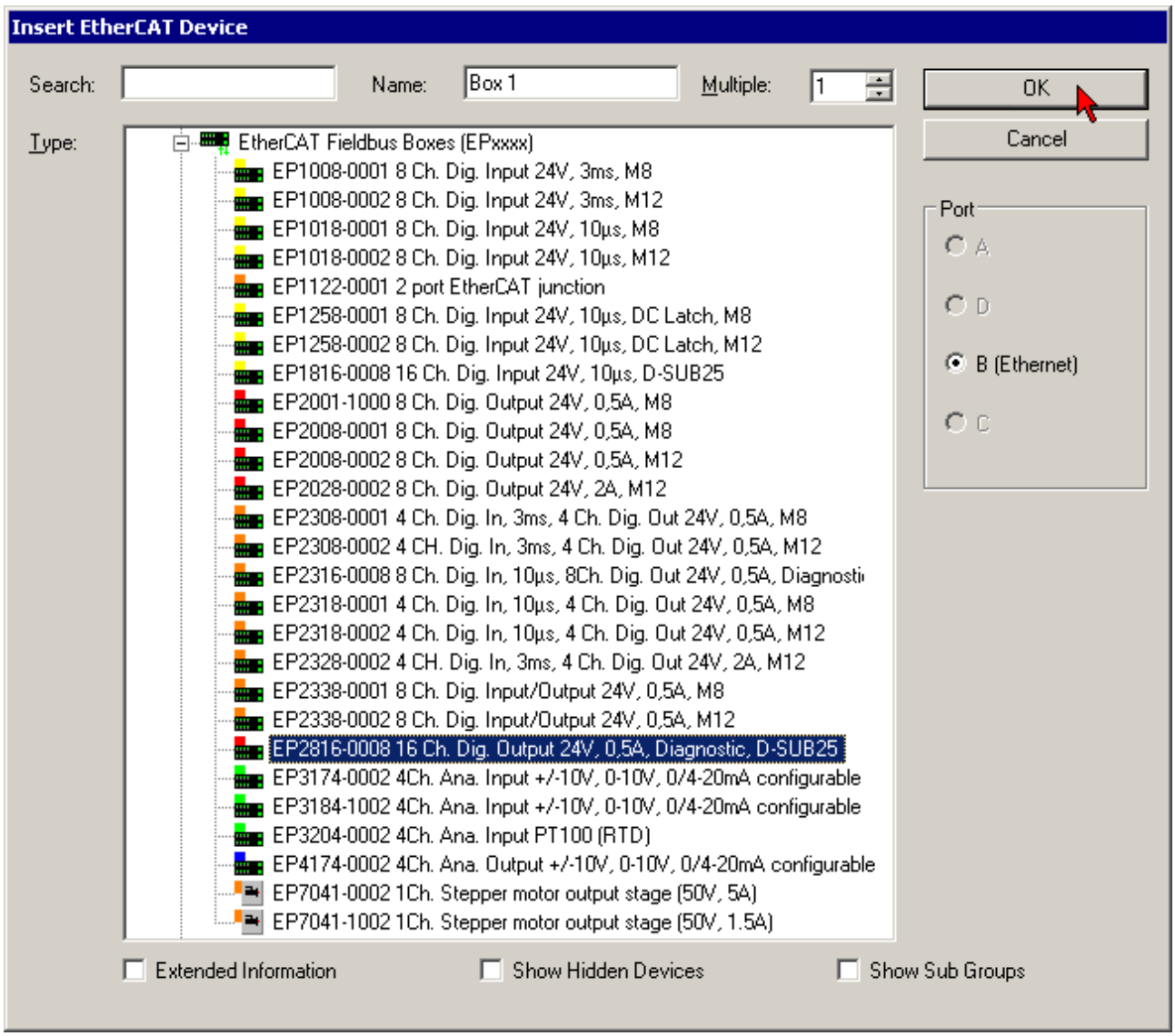

Fig. 38: Selecting a Box (e.g. EP2816-0008)

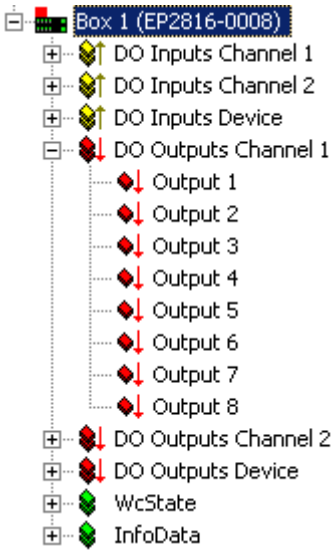

Fig. 39: Appended Box in the TwinCAT tree

6.2 Configuration via TwinCAT

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

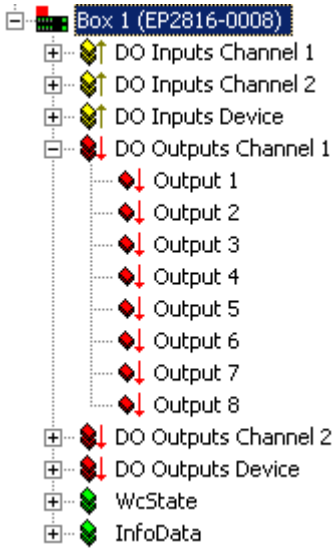

Fig. 40: Branch of the EtherCAT box to be configured

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

General tab

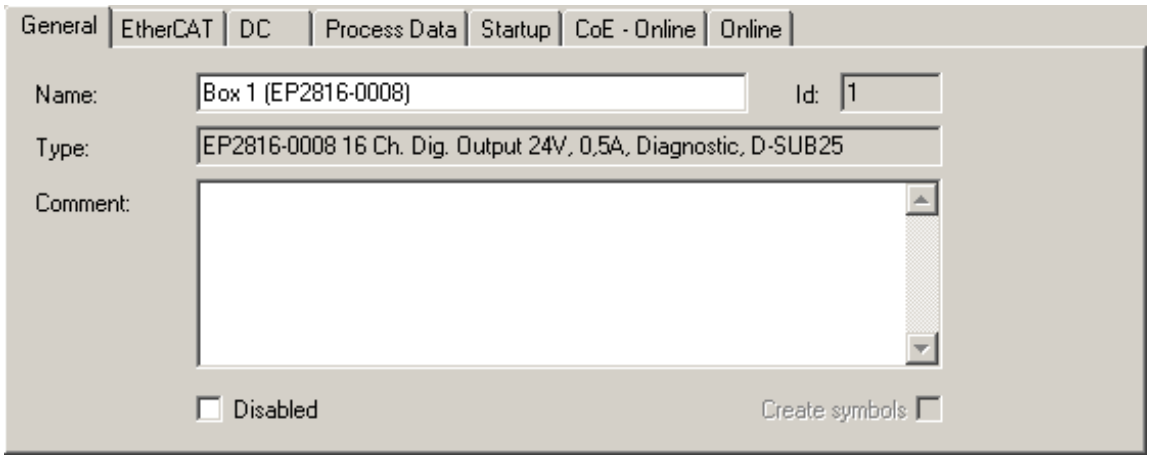

Fig. 41: General tab

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

EtherCAT tab

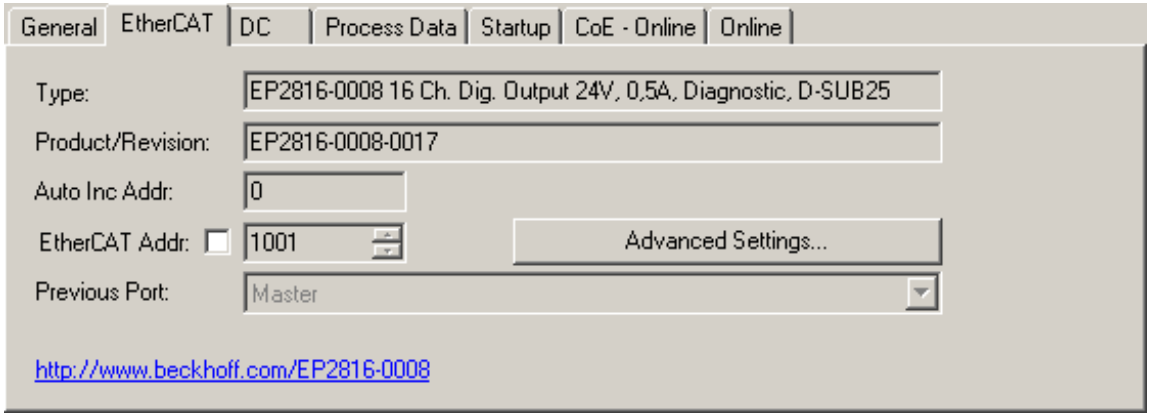

Fig. 42: EtherCAT tab

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

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

Process Data tab

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

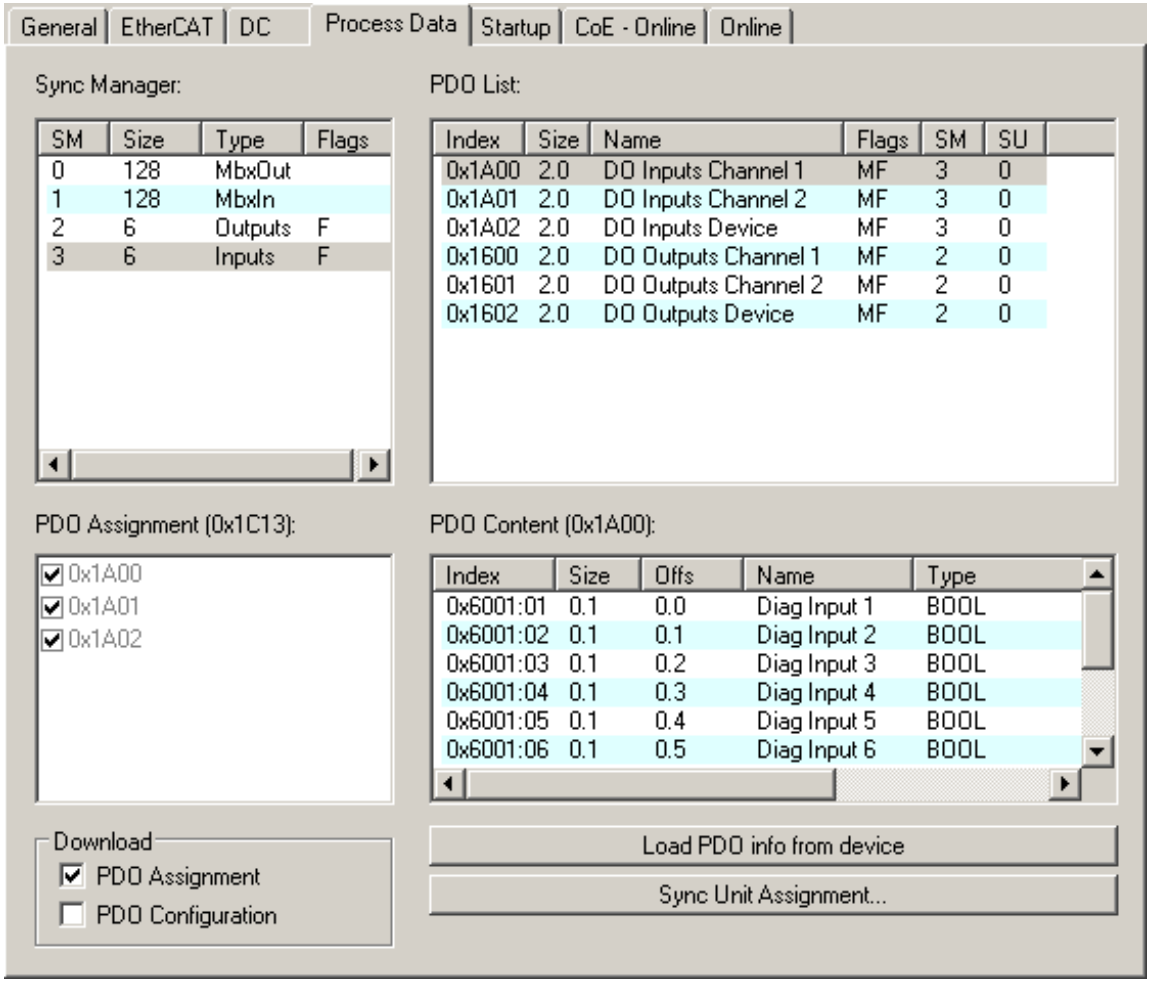

Fig. 43: Process Data tab

Sync Manager

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

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

PDO Assignment

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

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

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

Activation of PDO assignment

- the EtherCAT slave has to run through the PS status transition cycle (from pre-operational to safe-operational) once (see Online tab [▶ 48]),
- and the System Manager has to reload the EtherCAT slaves ( button)

PDO list

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

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

PDO Content

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

Download

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

PDO Assignment

If this check box is selected, the PDO assignment that is configured in the PDO Assignment list is downloaded to the device on startup. The required commands to be sent to the device can be viewed in the Startup [▶ 45] tab.

PDO Configuration

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

Startup tab

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

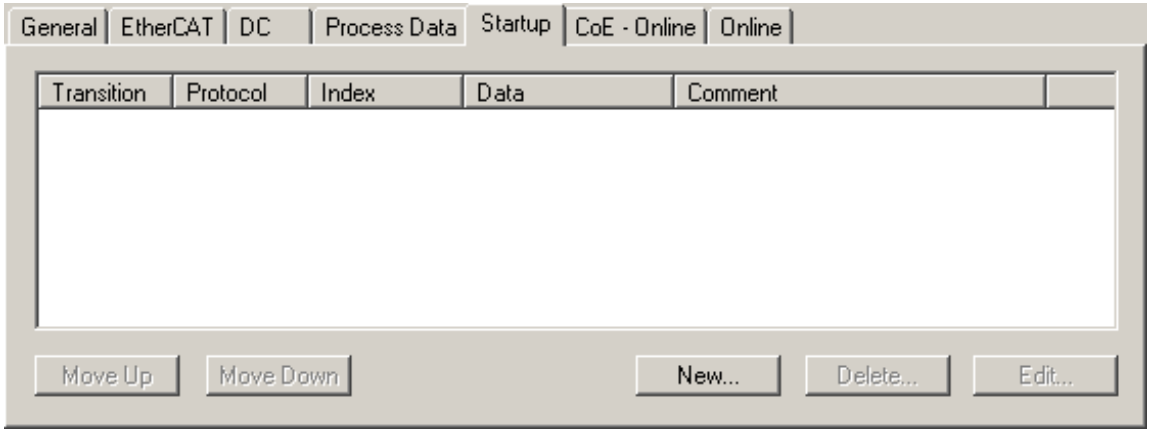

Fig. 44: Startup tab

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

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

CoE - Online tab

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

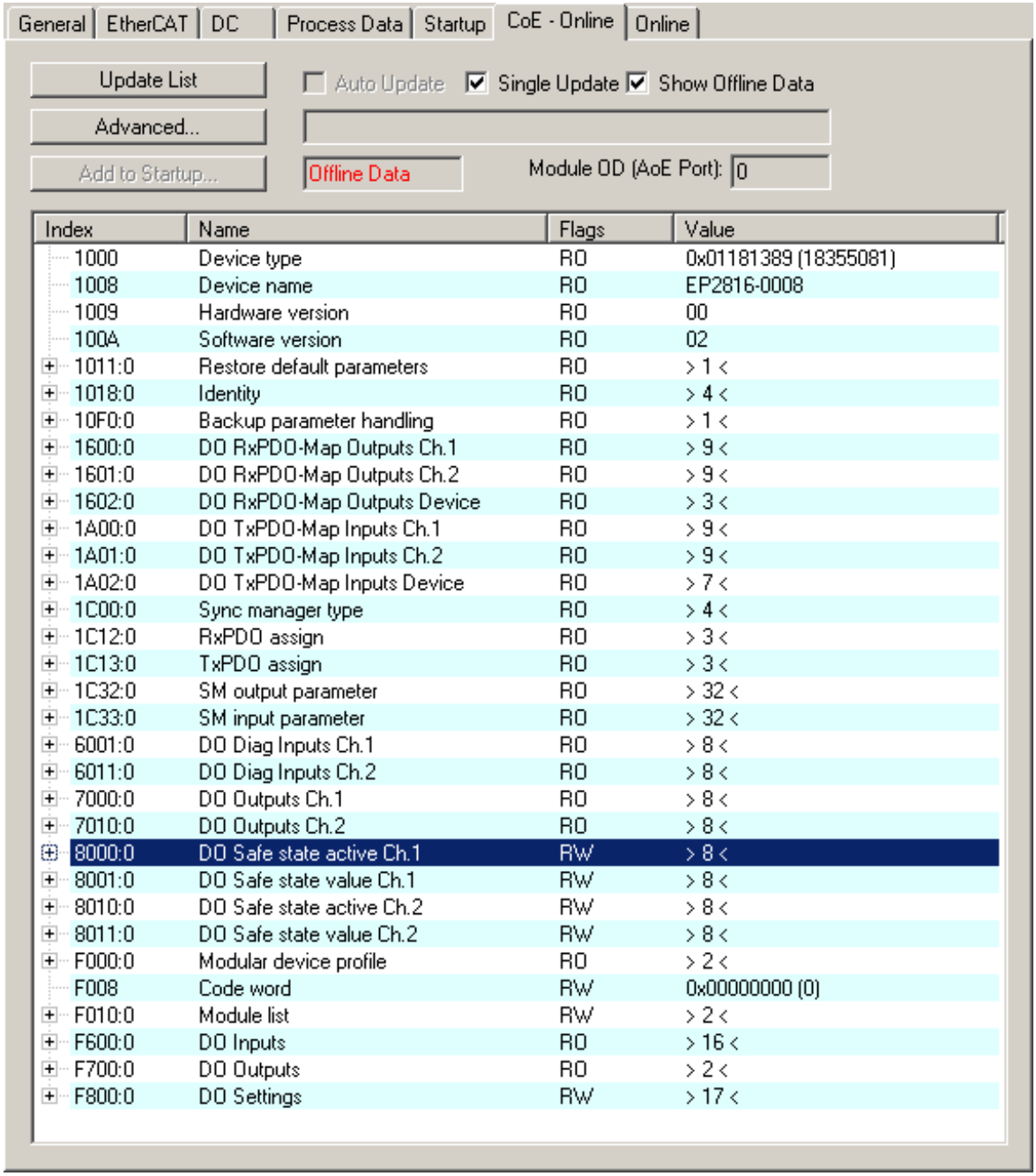

Fig. 45: CoE - Online tab

Object list display

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

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

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

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

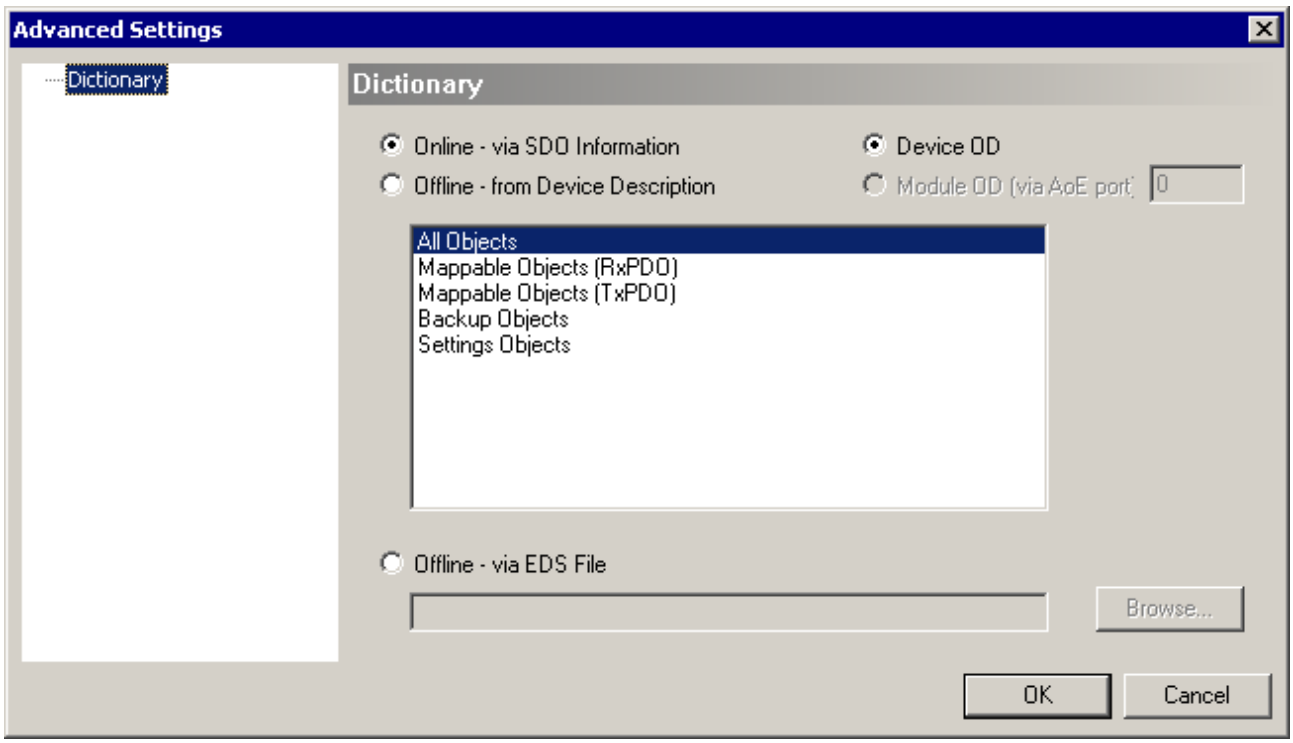

Fig. 46: Advanced settings

Online - via SDO information	If this option button is selected, the list of the objects included in the object directory of the slave is uploaded from the slave via SDO information. The list below can be used to specify which object types are to be uploaded.
Offline - via EDS file	If this option button is selected, the list of the objects included in the object directory is read from an EDS file provided by the user.

Online tab

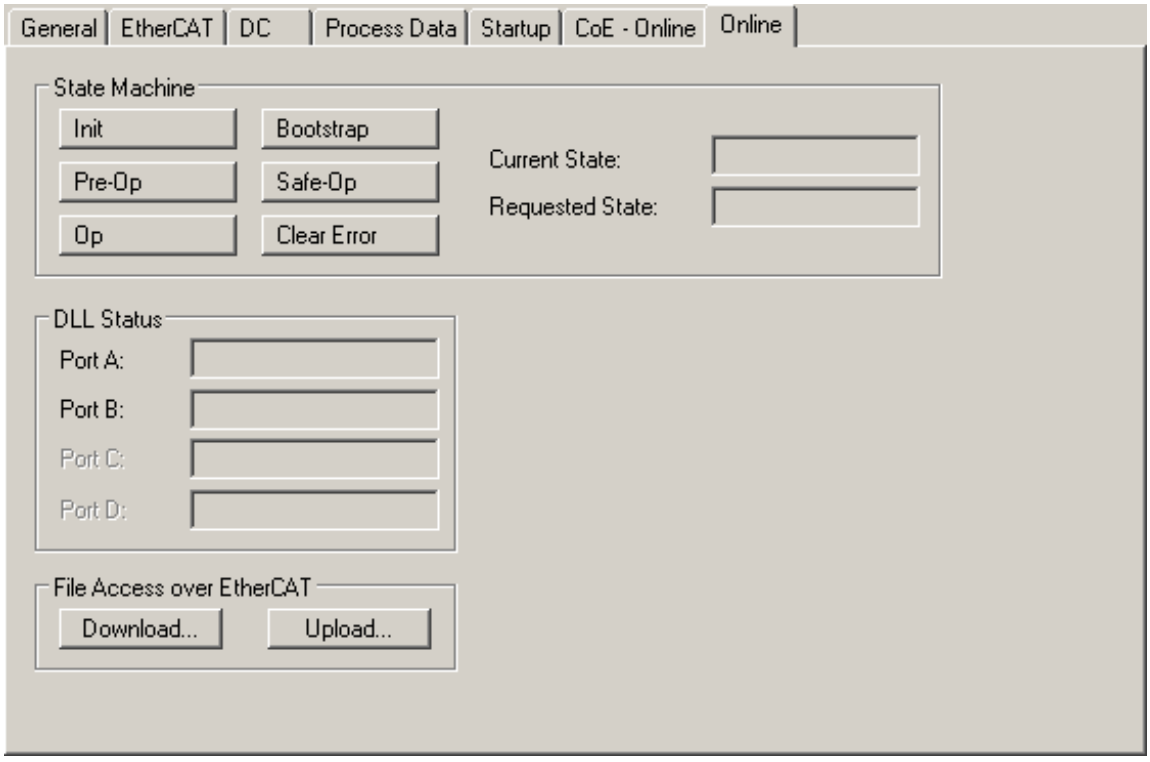

Fig. 47: Online tab

State Machine

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

DLL Status

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

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

File Access over EtherCAT

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

6.3 EP3204 – Data stream and calculation of the process data

6.3.1 Vendor calibration

6.3.1.1 2 and 4-wire resistance measurement

Whether a measurement is executed as a 2 or 4-wire measurement is determined by the connection points at which the measurement takes place. A comparison value is stored in the firmware for both measuring methods.

- **With the 2-wire measurement**
  - a current is applied between the contact points RL+ und RL- and the voltage drop is measured in order to determine the resistance.
  - The parasitic line resistance cannot be determined by the box itself, but must be entered as a correction value in the CoE register 0x80n0:1B.
- **With the 4-wire measurement**
  - the sensor current is applied between the contact points RL+ und RL- of the M12 socket and the voltage drop at the contact points R+ and R- is used to measure the resistance.
  - The conducting wire is thus not part of the measuring circuit and is not incorporated into the measurement as a source of error.

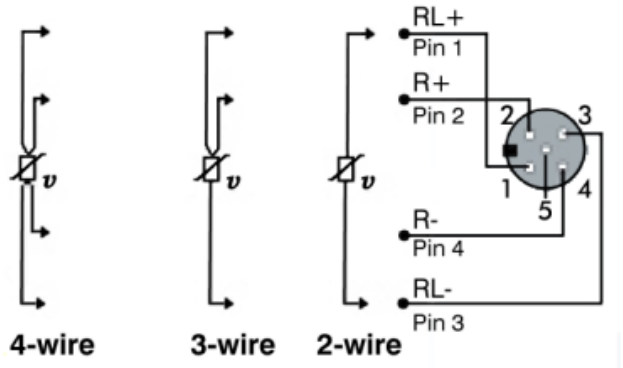

Fig. 48: EP3204 - resistance measurement with a 4-wire, 3-wire and 2-wire connection technique

The box uses the following calculation rule:

$$Y_R = \frac{(X+O_V)}{2^2} \cdot \frac{G_V}{2^{14}}$$

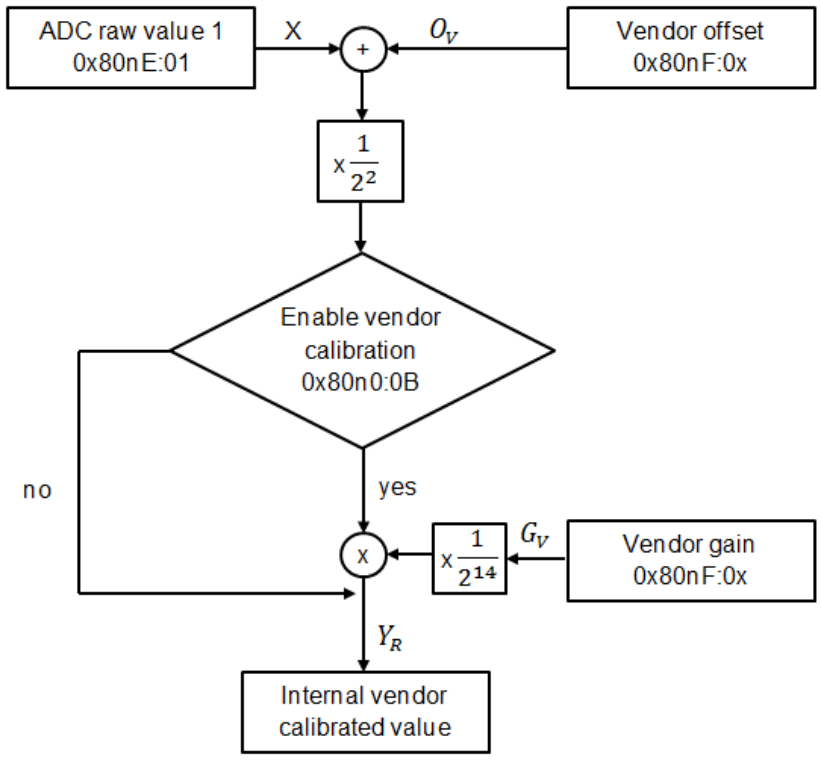

Fig. 49: EP3204 - data flow: resistance measurement with a 2 and 4-wire connection technique

With the values:

	Index in the CoE directory with n: channel number with 0 ≤ n ≤ 3 (channel 1 - 4)			
X: Raw value	0x80nE:01			
	PT100		PT1000	
	2-wire	4-wire	2-wire	4-wire
Gv: Vendor Gain	0x80nF:04	0x80nF:06	0x80nF:0A	0x80nF:0C
Ov: Vendor Offset	0x80nF:03	0x80nF:05	0x80nF:09	0x80nF:0B
Y_R: Output value in 1/256 Ω	0x80nE:02			

Overflow Y_R after 16 bits

This value is only for fault finding. The register overflows after 16 bits, i.e. at 65536.

6.3.1.2 3-wire resistance measurement

- **With the 3-wire measurement**
  - a defined current is initially applied between the contact points RL+ und RL- and the resistance between them is determined on the basis of the voltage drop.
  - The same procedure is subsequently carried out at the contact points RL+ und R-.
  - The difference between the two measurements is the line resistance of one of the cores of the sensor cable. By knowing the line resistance the resulting measuring error can be compensated.
  - The cores of the sensor cable must have the same resistance in order for the method to work.

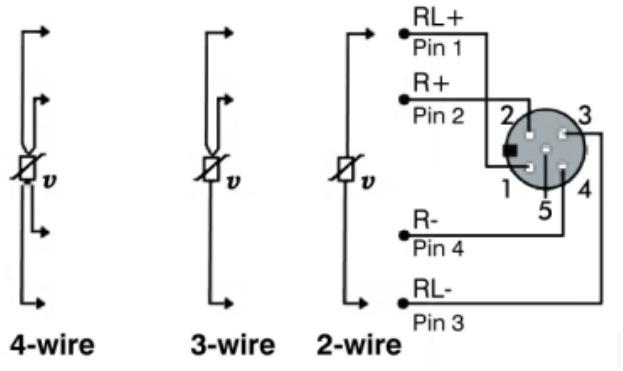

Fig. 50: EP3204 - resistance measurement with a 4-wire, 3-wire and 2-wire connection technique

The box uses the following calculation rule

$$Y_{R1} = \frac{(X_1 + O_{V1})}{2^2} \cdot \frac{G_{V1}}{2^{14}}, Y_{R2} = \frac{(X_2 + O_{V2})}{2^2} \cdot \frac{G_{V2}}{2^{14}}$$

$$Y_R = Y_{R2} - (Y_{R1} - Y_{R2}) = 2Y_{R2} - Y_{R1}$$

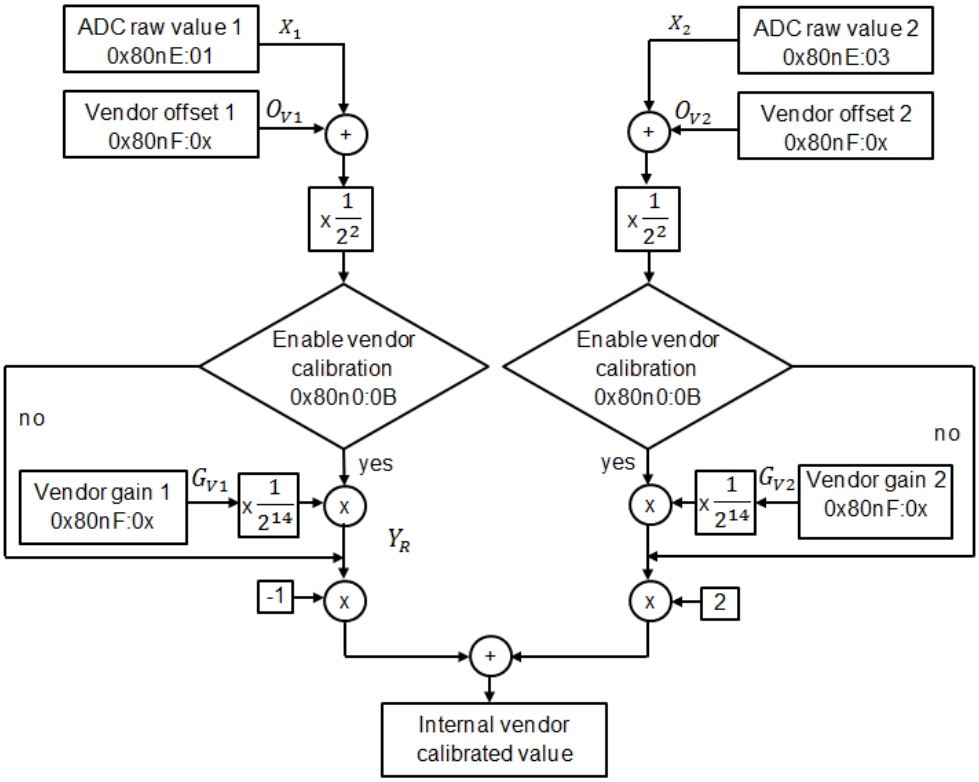

Fig. 51: EP3204 - data flow: resistance measurement with a 3-wire connection technique

With the values:

	Index in the CoE directory with n: channel number with 0 ≤ n ≤ 3 (channel 1 - 4)	
X_1: raw value of the 1st measurement	0x80nE:01	
X_2: raw value of the 2nd measurement	0x80nE:03	
	PT100	PT1000
Gv_1: Vendor gain, 1st measurement	0x80nF:04	0x80nF:0A
Ov_1: Vendor offset, 1st measurement	0x80nF:03	0x80nF:09
Gv_2: Vendor gain, 2nd measurement	0x80nF:02	0x80nF:08
Ov_2: Vendor offset, 2nd measurement	0x80nF:01	0x80nF:07
Y_{R1}: Output value in 1/256 Ω	0x80nE:02	
Y_{R2}: Output value in 1/256 Ω	0x80nE:04	
Y_R: Output value in 1/256 Ω		

Overflow Y_{R1} and Y_{R2} after 16 bits

These values are only for fault finding. The registers overflow after 16 bits, i.e. at 65536.

6.3.2 User calibration and linearization

- The calibrated measured value may also be modified by the user calibration values.
- The result of the resistance measurement is mapped onto a temperature value. The fundamental linearization function cannot be modified by the user.
- The user scaling is only included after the linearization.

The box uses the following calculation rule

$$Y_{int} = X_V \cdot \frac{G_U}{2^{14}} + O_U$$

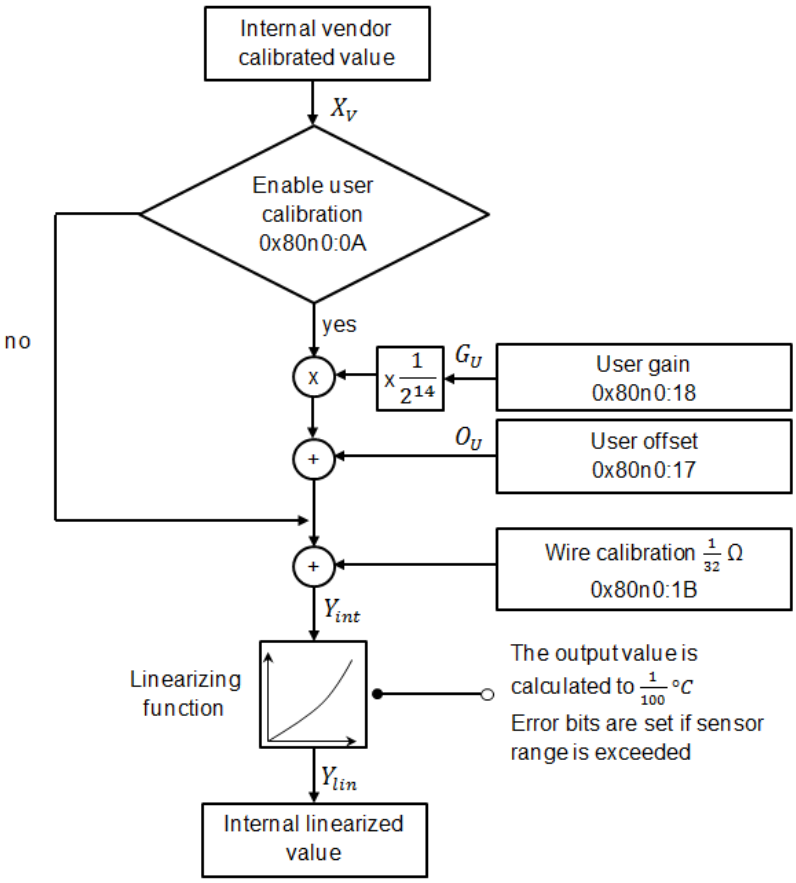

Fig. 52: EP3204 - data flow: user compensation and linearization

With the values:

	Index in the CoE directory with n: channel number with 0 ≤ n ≤ 3 (channel 1 - 4)
X_V: Output value of the vendor calibration	
G_U: User Gain	0x80n0:18
O_U: User Offset	0x80n0:17
Y_{int}: Output value in 1/256 Ω prior to the linearization	

6.3.3 Scaling, limits and formatting

- Following the calculation of the resistance value, the scaling and the limit bits are evaluated.
- The result is formatted in accordance with the set presentation and copied into the process image.

The box uses the following calculation rule

$$Y = Y_{lin} \cdot \frac{G_S}{2^{16}} + O_S$$

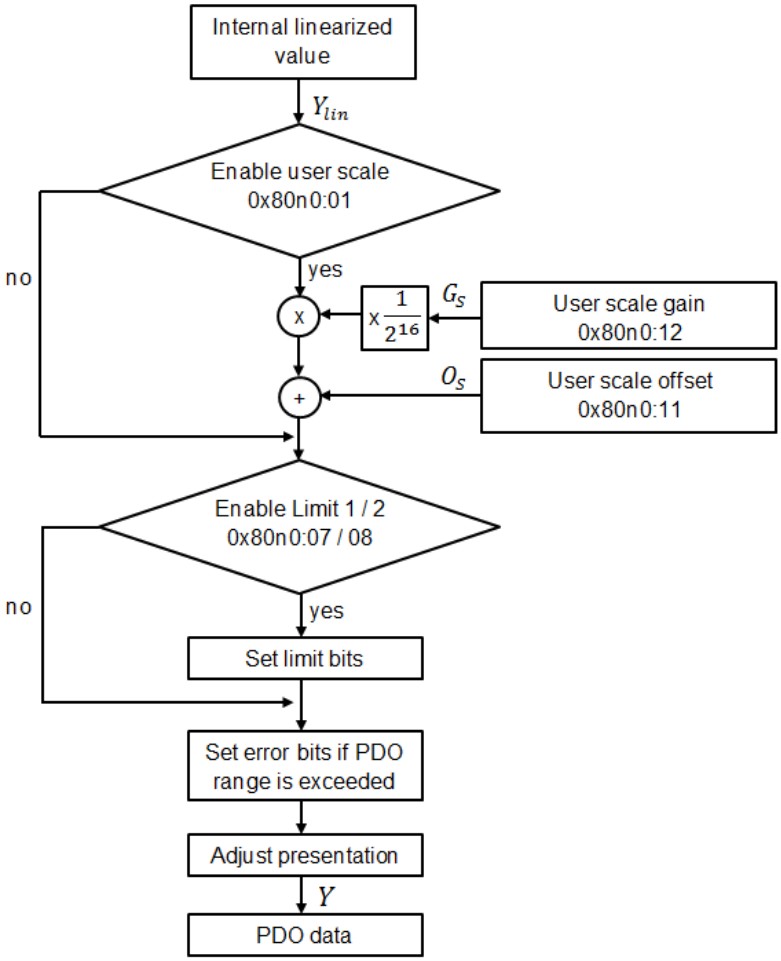

Fig. 53: EP3204 - data flow: user scaling, limit evaluation, error bits and formatting

With the values:

	Index in the CoE directory with n: channel number with 0 ≤ n ≤ 3 (channel 1 - 4)
Y_{lin}: Output value in 1/100 °C	
G_S: User Scale Gain	0x80n0:12
O_S: User Scale Offset	0x80n0:11
Y: Output value PDO	

6.3.4 Summary

Summary of the calculation rules:

Vendor calibration **2- and 4-wire** measurement	$Y_R = \frac{(X_1+O_V)}{2^2} \cdot \frac{G_V}{2^{14}}$
Vendor calibration **3-wire** measurement	$Y_{R1} = \frac{(X_1+O_{V1})}{2^2} \cdot \frac{G_{V1}}{2^{14}}, Y_{R2} = \frac{(X_2+O_{V2})}{2^2} \cdot \frac{G_{V2}}{2^{14}}$ $Y_R = 2Y_{R2} - Y_{R1}$
User calibration and linearization	$Y_{int} = X_V \cdot \frac{G_U}{2^{14}} + O_U$
User scale, limits and presentation	$Y = Y_{lin} \cdot \frac{G_S}{2^{16}} + O_S$
Summary **2-, 4-wire** measurement	$Y = f_{pres}\left(\frac{G_s}{2^{16}} \cdot f_{lin}\left(\frac{(X_1 + O_V)}{2^2} \cdot \frac{G_V}{2^{14}} \cdot \frac{G_U}{2^{14}} + O_U\right) + O_S\right)$
Summary **3-wire** measurement	$Y = f_{pres}\left(\frac{G_s}{2^{16}} \cdot f_{lin}\left((2Y_{R2} - Y_{R1}) \cdot \frac{G_V}{2^{14}} \cdot \frac{G_U}{2^{14}} + O_U\right) + O_S\right)$

With the values:

	Index in the CoE directory with n: channel number with 0 ≤ n ≤ 3 (channel 1 - 4)			
X_1: Raw value of the 1st measurement	0x80nE:01			
X_2: Raw value of the 2nd measurement	0x80nE:03			
	PT100		**PT1000**	
	2-wire	**4-wire**	**2-wire**	**4-wire**
Gv: Vendor Gain	0x80nF:04	0x80nF:06	0x80nF:0A	0x80nF:0C
Ov: Vendor Offset	0x80nF:03	0x80nF:05	0x80nF:09	0x80nF:0B
	3-wire			
Gv_1: Vendor gain, 1st measurement	0x80nF:04		0x80nF:0A	
Ov_1: Vendor offset, 1st measurement	0x80nF:03		0x80nF:09	
Gv_2: Vendor gain, 2nd measurement	0x80nF:02		0x80nF:08	
Ov_2: Vendor offset, 2nd measurement	0x80nF:01		0x80nF:07	
G_U: User Gain	0x80n0:18			
O_U: User Scale Offset	0x80n0:17			
G_S: User Scale Gain	0x80n0:12			
O_S: User Scale Offset	0x80n0:11			
f_{lin}: Function for mapping to the selected method of representation				
f_{pres}: Linearization function				
Y_{R1}: Output value in 1/256 Ω	0x80nE:02			
Y_{R2}: Output value in 1/256 Ω	0x80nE:04			
Y: Output value PDO				

Overflow Y_{R1} and Y_{R2} after 16 bits

These values are only for fault finding. The registers overflow after 16 bits, i.e. at 65536.

6.3.5 Two-point user calibration

The vendor calibration is to be deactivated via index (0x80n0:0B).

Up to FW version 07 the deactivation of the vendor calibration only results in the vendor gain being set to 2^{14} (fixed-point representation for 1.0). The vendor offset remains unchanged and is still included. This results in the following with vendor calibration deactivated:

$$Y_{int} = (X + O_V) \cdot G_U \cdot \frac{1}{2^{16}} + O_U$$

$$Y_{int} = X \cdot G_U \cdot \frac{1}{2^{16}} + \underbrace{O_V \cdot G_U \cdot \frac{1}{2^{16}} + O_U}_{constant}$$

Since the last part of the term is constant, a user calibration can be performed despite the unavoidable influence of the vendor offset. The influence of the vendor offset can thereby be fully compensated.
The following method is to be applied:

Carry out two reference measurements with $Y_1(X_1)$ and $Y_2(X_2)$. Then the following applies:

$$g_f = \frac{X_2 - X_1}{Y_2 - Y_1} \qquad (1)$$

$$G_U = g_f \cdot 2^{16} \qquad (2)$$

$$O_U = X_1 - (Y_1 + O_V) \cdot g_f \qquad (3)$$

G_U and O_U are to be rounded to the nearest whole number and entered in index 0x80n0:18 and index 0x80n0:17.

X	Raw value (0x80nE:01)
O_V:	Vendor Offset (index depends on the mode, see chapter Vendor calibration [▶ 50])
G_U:	User Gain (0x80n0:18)
O_U:	User Offset (0x80n0:17)
g_f:	Gain as a floating value
O_R:	Offset as a raw value
X_n:	Measured raw value with reference measurement *n*
Y_n:	Reference value in 1/256 Ω
Y_{int}:	Output value in 1/256 Ω prior to the linearization

NOTE

Y_n: Use of the raw value

Since the resistance value in index 0x8xxE:02 overflows, the raw value in index 0x8xxE:01 is used for Y_n.

6.3.5.1 Example of a two-point calibration

An EP3204 is to be calibrated on channel 1 with two-point measurement at two points with 100 Ω and 350 Ω. The vendor offset for the 2-wire calibration is -2607 (taken from index 0x800F:03).

The following measured values are recorded:

100 Ω through precision resistor	X_1 = 25600 (1/256 Ω)
171125, read in index 0x800E:01	Y_1 = 171125
350 Ω through precision resistor	X_2 = 89600 (1/256 Ω)
592224, read in index 0x800E:01	Y_2 = 592224

With the equations (1) - (3):

$$g_f = \frac{X_2 - X_1}{Y_2 - Y_1} \qquad (1)$$

$$G_U = g_f \cdot 2^{16} \qquad (2)$$

$$O_U = X_1 - (Y_1 + O_V) \cdot g_f \qquad (3)$$

the resulting values for g_f, G_U and O_U are:

$$g_f = \frac{89600 - 25600}{592224 - 171125} = 0.15198326 \qquad (1)$$

$$G_U = 0.15198326 \cdot 2^{16} = 9960.375114 \qquad (2)$$

$$O_U = 25600 - (171125 + 2607) \cdot 0.15198326 = -11.915 \qquad (3)$$

The indices accept only integer values. The following entries are to be made in the CoE:
Index 0x8000:17 = -12
Index 0x8000:18 = 9960

Subsequently the vendor calibration is to be deactivated (0x8000:0B) and the user calibration activated (0x8000:0A).

6.4 EP3204 - 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 [▶ 70]		Device type	RO	0x01401389 (20976521$_{dec}$)
1008 [▶ 70]		Device name	RO	EP3204-0002
1009 [▶ 70]		Hardware version	RO	01
100A [▶ 70]		Software version	RO	03
1011:0 [▶ 64]	**Subindex**	Restore default parameters	RO	0x01 (1$_{dec}$)
	1011:01	SubIndex 001	RW	0x00000000 (0$_{dec}$)
1018:0 [▶ 70]	**Subindex**	Identity	RO	0x04 (4$_{dec}$)
	1018:01	Vendor ID	RO	0x00000002 (2$_{dec}$)
	1018:02	Product code	RO	0x0C844052 (209993810$_{dec}$)
	1018:03	Revision	RO	0x00120002 (1179650$_{dec}$)
	1018:04	Serial number	RO	0x00000000 (0$_{dec}$)
10F0:0 [▶ 70]	**Subindex**	Backup parameter handling	RO	0x01 (1$_{dec}$)
	10F0:01	Checksum	RO	0x00000000 (0$_{dec}$)
1A00:0 [▶ 71]	**Subindex**	RTD TxPDO-Map RTDInputs 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	0x1800:07, 1
	1A00:09	SubIndex 009	RO	0x1800:09, 1
	1A00:0A	SubIndex 010	RO	0x6000:11, 16
1A01:0 [▶ 71]	**Subindex**	RTD TxPDO-Map RTDInputs 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	0x1801:07, 1
	1A01:09	SubIndex 009	RO	0x1801:09, 1
	1A01:0A	SubIndex 010	RO	0x6010:11, 16
1A02:0 [▶ 72]	**Subindex**	RTD TxPDO-Map RTDInputs Ch.3	RO	0x0A (10$_{dec}$)
	1A02:01	SubIndex 001	RO	0x6020:01, 1
	1A02:02	SubIndex 002	RO	0x6020:02, 1
	1A02:03	SubIndex 003	RO	0x6020:03, 2
	1A02:04	SubIndex 004	RO	0x6020:05, 2
	1A02:05	SubIndex 005	RO	0x6020:07, 1
	1A02:06	SubIndex 006	RO	0x0000:00, 6
	1A02:07	SubIndex 007	RO	0x6020:0E, 1
	1A02:08	SubIndex 008	RO	0x1802:07, 1
	1A02:09	SubIndex 009	RO	0x1802:09, 1
	1A02:0A	SubIndex 010	RO	0x6020:11, 16

Index (hex)		Name	Flags	Default value
1A03:0 [▶ 72]	**Subindex**	RTD TxPDO-Map RTDInputs Ch.4	RO	0x0A (10_{dec})
	1A03:01	SubIndex 001	RO	0x6030:01, 1
	1A03:02	SubIndex 002	RO	0x6030:02, 1
	1A03:03	SubIndex 003	RO	0x6030:03, 2
	1A03:04	SubIndex 004	RO	0x6030:05, 2
	1A03:05	SubIndex 005	RO	0x6030:07, 1
	1A03:06	SubIndex 006	RO	0x0000:00, 6
	1A03:07	SubIndex 007	RO	0x6030:0E, 1
	1A03:08	SubIndex 008	RO	0x1803:07, 1
	1A03:09	SubIndex 009	RO	0x1803:09, 1
	1A03:0A	SubIndex 010	RO	0x6030:11, 16
1C00:0 [▶ 72]	**Subindex**	Sync manager type	RO	0x04 (4_{dec})
	1C00:01	SubIndex 001	RO	0x01 (1_{dec})
	1C00:02	SubIndex 002	RO	0x02 (2_{dec})
	1C00:03	SubIndex 003	RO	0x03 (3_{dec})
	1C00:04	SubIndex 004	RO	0x04 (4_{dec})
1C12:0 [▶ 72]	**Subindex**	RxPDO assign	RW	0x00 (0_{dec})
1C13:0 [▶ 73]	**Subindex**	TxPDO assign	RW	0x04 (4_{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	0x1A03 (6659_{dec})
1C33:0 [▶ 73]	**Subindex**	SM input parameter	RO	0x20 (32_{dec})
	1C33:01	Sync mode	RW	0x0000 (0_{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	0x00002710 (10000_{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})
6000:0 [▶ 74]	**Subindex**	RTD 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})
6010:0 [▶ 74]	**Subindex**	RTD 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})

Index (hex)		Name	Flags	Default value
6020:0 [▶ 75]	**Subindex**	RTD Inputs Ch.3	RO	0x11 (17_{dec})
	6020:01	Underrange	RO	0x00 (0_{dec})
	6020:02	Overrange	RO	0x00 (0_{dec})
	6020:03	Limit 1	RO	0x00 (0_{dec})
	6020:05	Limit 2	RO	0x00 (0_{dec})
	6020:07	Error	RO	0x00 (0_{dec})
	6020:0E	Sync error	RO	0x00 (0_{dec})
	6020:0F	TxPDO State	RO	0x00 (0_{dec})
	6020:10	TxPDO Toggle	RO	0x00 (0_{dec})
	6020:11	Value	RO	0x0000 (0_{dec})
6030:0 [▶ 75]	**Subindex**	RTD Inputs Ch.4	RO	0x11 (17_{dec})
	6030:01	Underrange	RO	0x00 (0_{dec})
	6030:02	Overrange	RO	0x00 (0_{dec})
	6030:03	Limit 1	RO	0x00 (0_{dec})
	6030:05	Limit 2	RO	0x00 (0_{dec})
	6030:07	Error	RO	0x00 (0_{dec})
	6030:0E	Sync error	RO	0x00 (0_{dec})
	6030:0F	TxPDO State	RO	0x00 (0_{dec})
	6030:10	TxPDO Toggle	RO	0x00 (0_{dec})
	6030:11	Value	RO	0x0000 (0_{dec})
8000:0 [▶ 65]	**Subindex**	RTD Settings Ch.1	RW	0x1B (27_{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})
	8000:16	Calibration interval	RW	0x0000 (0_{dec})
	8000:17	User calibration offset	RW	0x0000 (0_{dec})
	8000:18	User calibration gain	RW	0x4000 (16384_{dec})
	8000:19	RTD element	RW	0x0000 (0_{dec})
	8000:1A	Connection technology	RW	0x0000 (0_{dec})
	8000:1B	Wire calibration 1/32 Ohm	RW	0x0000 (0_{dec})
800E:0 [▶ 76]	**Subindex**	RTD Internal data Ch.1	RO	0x04 (4_{dec})
	800E:01	ADC raw value 1	RO	0x00000000 (0_{dec})
	800E:02	Resistor 1	RO	0x0000 (0_{dec})
	800E:03	ADC raw value 2	RO	0x00000000 (0_{dec})
	800E:04	Resistor 2	RO	0x0000 (0_{dec})
800F:0 [▶ 76]	**Subindex**	RTD Vendor data Ch.1	RW	0x07 (7_{dec})
	800F:01	Calibration offset 3-wire	RW	0x0000 (0_{dec})
	800F:02	Calibration gain 3-wire	RW	0x4000 (16384_{dec})
	800F:03	Calibration offset 2-wire	RW	0x0000 (0_{dec})
	800F:04	Calibration gain 2-wire	RW	0x4000 (16384_{dec})
	800F:05	Calibration offset 4-wire	RW	0x0000 (0_{dec})
	800F:06	Calibration gain 4-wire	RW	0x4000 (16384_{dec})
	800F:07	PGA Gain Correction	RW	0x0000 (0_{dec})

Index (hex)		Name	Flags	Default value
8010:0 [▶ 66]	**Subindex**	RTD Settings Ch.2	RW	0x1B (27_{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})
	8010:16	Calibration interval	RW	0x0000 (0_{dec})
	8010:17	User calibration offset	RW	0x0000 (0_{dec})
	8010:18	User calibration gain	RW	0x4000 (16384_{dec})
	8010:19	RTD element	RW	0x0000 (0_{dec})
	8010:1A	Connection technology	RW	0x0000 (0_{dec})
	8010:1B	Wire calibration 1/32 Ohm	RW	0x0000 (0_{dec})
801E:0 [▶ 76]	**Subindex**	RTD Internal data Ch.2	RO	0x04 (4_{dec})
	801E:01	ADC raw value 1	RO	0x00000000 (0_{dec})
	801E:02	Resistor 1	RO	0x0000 (0_{dec})
	801E:03	ADC raw value 2	RO	0x00000000 (0_{dec})
	801E:04	Resistor 2	RO	0x0000 (0_{dec})
801F [▶ 76]	**Subindex**	RTD Vendor data Ch.2	RW	0x07 (7_{dec})
	801F:01	Calibration offset 3-wire	RW	0x0000 (0_{dec})
	801F:02	Calibration gain 3-wire	RW	0x4000 (16384_{dec})
	801F:03	Calibration offset 2-wire	RW	0x0000 (0_{dec})
	801F:04	Calibration gain 2-wire	RW	0x4000 (16384_{dec})
	801F:05	Calibration offset 4-wire	RW	0x0000 (0_{dec})
	801F:06	Calibration gain 4-wire	RW	0x4000 (16384_{dec})
	801F:07	PGA Gain Correction	RW	0x0000 (0_{dec})
8020:0 [▶ 67]	**Subindex**	RTD Settings Ch.3	RW	0x1B (27_{dec})
	8020:01	Enable user scale	RW	0x00 (0_{dec})
	8020:02	Presentation	RW	0x00 (0_{dec})
	8020:05	Siemens bits	RW	0x00 (0_{dec})
	8020:06	Enable filter	RW	0x00 (0_{dec})
	8020:07	Enable limit 1	RW	0x00 (0_{dec})
	8020:08	Enable limit 2	RW	0x00 (0_{dec})
	8020:0A	Enable user calibration	RW	0x00 (0_{dec})
	8020:0B	Enable vendor calibration	RW	0x01 (1_{dec})
	8020:0E	Swap limit bits	RW	0x00 (0_{dec})
	8020:11	User scale offset	RW	0x0000 (0_{dec})
	8020:12	User scale gain	RW	0x00010000 (65536_{dec})
	8020:13	Limit 1	RW	0x0000 (0_{dec})
	8020:14	Limit 2	RW	0x0000 (0_{dec})
	8020:15	Filter settings	RW	0x0000 (0_{dec})
	8020:16	Calibration interval	RW	0x0000 (0_{dec})
	8020:17	User calibration offset	RW	0x0000 (0_{dec})
	8020:18	User calibration gain	RW	0x4000 (16384_{dec})
	8020:19	RTD element	RW	0x0000 (0_{dec})
	8020:1A	Connection technology	RW	0x0000 (0_{dec})
	8020:1B	Wire calibration 1/32 Ohm	RW	0x0000 (0_{dec})

Index (hex)		Name	Flags	Default value
802E:0 [▶ 77]	**Subindex**	RTD Internal data Ch.3	RO	0x04 (4_{dec})
	802E:01	ADC raw value 1	RO	0x00000000 (0_{dec})
	802E:02	Resistor 1	RO	0x0000 (0_{dec})
	802E:03	ADC raw value 2	RO	0x00000000 (0_{dec})
	802E:04	Resistor 2	RO	0x0000 (0_{dec})
802F:0 [▶ 77]	**Subindex**	RTD Vendor data Ch.3	RW	0x07 (7_{dec})
	802F:01	Calibration offset 3-wire	RW	0x0000 (0_{dec})
	802F:02	Calibration gain 3-wire	RW	0x4000 (16384_{dec})
	802F:03	Calibration offset 2-wire	RW	0x0000 (0_{dec})
	802F:04	Calibration gain 2-wire	RW	0x4000 (16384_{dec})
	802F:05	Calibration offset 4-wire	RW	0x0000 (0_{dec})
	802F:06	Calibration gain 4-wire	RW	0x4000 (16384_{dec})
	802F:07	PGA Gain Correction	RW	0x0000 (0_{dec})
8030:0 [▶ 68]	**Subindex**	RTD Settings Ch.4	RW	0x1B (27_{dec})
	8030:01	Enable user scale	RW	0x00 (0_{dec})
	8030:02	Presentation	RW	0x00 (0_{dec})
	8030:05	Siemens bits	RW	0x00 (0_{dec})
	8030:06	Enable filter	RW	0x00 (0_{dec})
	8030:07	Enable limit 1	RW	0x00 (0_{dec})
	8030:08	Enable limit 2	RW	0x00 (0_{dec})
	8030:0A	Enable user calibration	RW	0x00 (0_{dec})
	8030:0B	Enable vendor calibration	RW	0x01 (1_{dec})
	8030:0E	Swap limit bits	RW	0x00 (0_{dec})
	8030:11	User scale offset	RW	0x0000 (0_{dec})
	8030:12	User scale gain	RW	0x00010000 (65536_{dec})
	8030:13	Limit 1	RW	0x0000 (0_{dec})
	8030:14	Limit 2	RW	0x0000 (0_{dec})
	8030:15	Filter settings	RW	0x0000 (0_{dec})
	8030:16	Calibration interval	RW	0x0000 (0_{dec})
	8030:17	User calibration offset	RW	0x0000 (0_{dec})
	8030:18	User calibration gain	RW	0x4000 (16384_{dec})
	8030:19	RTD element	RW	0x0000 (0_{dec})
	8030:1A	Connection technology	RW	0x0000 (0_{dec})
	8030:1B	Wire calibration 1/32 Ohm	RW	0x0000 (0_{dec})
803E:0 [▶ 77]	**Subindex**	RTD Internal data Ch.4	RO	0x04 (4_{dec})
	803E:01	ADC raw value 1	RO	0x00000000 (0_{dec})
	803E:02	Resistor 1	RO	0x0000 (0_{dec})
	803E:03	ADC raw value 2	RO	0x00000000 (0_{dec})
	803E:04	Resistor 2	RO	0x0000 (0_{dec})
803F:0 [▶ 77]	**Subindex**	RTD Vendor data Ch.4	RW	0x07 (7_{dec})
	803F:01	Calibration offset 3-wire	RW	0x0000 (0_{dec})
	803F:02	Calibration gain 3-wire	RW	0x4000 (16384_{dec})
	803F:03	Calibration offset 2-wire	RW	0x0000 (0_{dec})
	803F:04	Calibration gain 2-wire	RW	0x4000 (16384_{dec})
	803F:05	Calibration offset 4-wire	RW	0x0000 (0_{dec})
	803F:06	Calibration gain 4-wire	RW	0x4000 (16384_{dec})
	803F:07	PGA Gain Correction	RW	0x0000 (0_{dec})
F000:0 [▶ 78]	**Subindex**	Modular device profile	RO	0x02 (2_{dec})
	F000:01	Module index distance	RO	0x0010 (16_{dec})
	F000:02	Maximum number of modules	RO	0x0004 (4_{dec})
F008 [▶ 78]		Code word	RW	0x00000000 (0_{dec})
F010:0 [▶ 78]	**Subindex**	Module list	RW	0x04 (4_{dec})
	F010:01	SubIndex 001	RW	0x00000140 (320_{dec})
	F010:02	SubIndex 002	RW	0x00000140 (320_{dec})
	F010:03	SubIndex 003	RW	0x00000140 (320_{dec})
	F010:04	SubIndex 004	RW	0x00000140 (320_{dec})

Index (hex)		Name	Flags	Default value
F080:0 [▶ 78]	**Subindex**	Channel Enable	RO	0x04 (4_{dec})
	F080:01	SubIndex 001	RW	0xFF (255_{dec})
	F080:02	SubIndex 002	RW	0xFF (255_{dec})
	F080:03	SubIndex 003	RW	0xFF (255_{dec})
	F080:04	SubIndex 004	RW	0xFF (255_{dec})

Key

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

6.5 EP3204 - object description and parameterization

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.

Parameterization via the CoE list (CAN over EtherCAT)

The EtherCAT device is parameterized via the CoE - Online tab [▶ 46] (double-click on the respective object) or via the Process Data [▶ 43] tab (allocation of PDOs).

Introduction

The CoE overview contains objects for different intended applications:

- Objects required for parameterization [▶ 64] during commissioning
- Objects intended for regular operation [▶ 69], e.g. through ADS access.
- Objects for indicating internal settings [▶ 70] (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.

6.5.1 Objects to be parameterized during commissioning

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 8000: RTD Settings Ch.1

Index (hex)	Name	Meaning		Data type	Flags	Default
8000:0	RTD Settings Ch.1	Maximum subindex		UINT8	RO	0x1B (27_{dec})
8000:01	Enable user scale	Activates user scaling		BOOLEAN	RW	0x00 (0_{dec})
8000:02	Presentation	Presentation of the measured value		BIT3	RW	0x00 (0_{dec})
		0	Signed, in two's complement			
		1	Most significant bit as sign			
		2	High-resolution (1/100 °C steps)			
8000:05	Siemens bits	The S5 bits are displayed in the three low-order bits		BOOLEAN	RW	0x00 (0_{dec})
8000:06	Enable filter	Enable filter, which makes PLC-cycle-synchronous data exchange unnecessary		BOOLEAN	RW	0x00 (0_{dec})
8000:07	Enable limit 1	Activates limit check for limit 1		BOOLEAN	RW	0x00 (0_{dec})
8000:08	Enable limit 2	Activates limit check for limit 2		BOOLEAN	RW	0x00 (0_{dec})
8000:0A	Enable user calibration	Activates user calibration		BOOLEAN	RW	0x00 (0_{dec})
8000:0B	Enable vendor calibration	Activates vendor calibration		BOOLEAN	RW	0x01 (1_{dec})
8000:0E	Swap limit bits	Swaps the two limit bits, in order to achieve compatibility with older hardware versions.		BOOLEAN	RW	0x00 (0_{dec})
8000:11	User scale offset	User scaling offset		INT16	RW	0x0000 (0_{dec})
8000:12	User scale gain	Gain of the user scaling		INT32	RW	0x00010000 (65536_{dec})
8000:13	Limit 1	Value for limit 1		INT16	RW	0x0000 (0_{dec})
8000:14	Limit 2	Value for limit 2		INT16	RW	0x0000 (0_{dec})
8000:15	Filter settings	Filter settings		UINT16	RW	0x0000 (0_{dec})
		0	50 Hz			
		1	60 Hz			
		2	100 Hz			
		3	500 Hz			
		4	1 kHz,			
		5	2 kHz			
		6	3.75 kHz			
		7	7.5 kHz			
		8	15 kHz			
		9	30 kHz			
		10	5 Hz			
		11	10 Hz			
8000:16	Calibration interval	reserved		UINT16	RW	0x0000 (0_{dec})
8000:17	User calibration offset	User calibration offset		INT16	RW	0x0000 (0_{dec})
8000:18	User calibration gain	Gain of the user calibration		UINT16	RW	0x4000 (16384_{dec})
8000:19	RTD element	Sensor type		UINT16	RW	0x0000 (0_{dec})
		0	PT100			
		1	Ni100			
		2	PT1000			
		3	PT500			
		4	PT200			
		5	Ni1000			
		6	Ni1000 (Siemens)			
		7	Ni120			
		8	Resistance measurement with 1/16 ohm resolution			
		9	Resistance measurement with 1/64 ohm resolution			

Index 8000: RTD Settings Ch.1

Index (hex)	Name	Meaning		Data type	Flags	Default
8000:1A	Connection technology	Connection technology:		UINT16	RW	0x0000 (0_{dec})
		0	2-wire			
		1	3-wire			
		2	4-wire			
		3	No sensor connected (only supported by hardware version 00): This setting skips the whole measurement, thus speeding up the data acquisition for the other channels. The green status LED of the respective channel remains lit. The error bit of a deactivated channel is canceled and no longer set.			
8000:1B	Wire calibration 1/32 Ohm	Only for 2-wire measurements: contains the resistance of the supply line for the temperature sensor (in 1/32 ohm).		INT16	RW	0x0000 (0_{dec})

Index 8010: RTD Settings Ch.2

Index (hex)	Name	Meaning		Data type	Flags	Default
8010:0	RTD Settings Ch.2	Maximum subindex		UINT8	RO	0x1B (27_{dec})
8010:01	Enable user scale	Activates user scaling		BOOLEAN	RW	0x00 (0_{dec})
8010:02	Presentation	Presentation of the measured value		BIT3	RW	0x00 (0_{dec})
		0	Signed, in two's complement			
		1	Most significant bit as sign			
		2	High-resolution (1/100 °C steps)			
8010:05	Siemens bits	The S5 bits are displayed in the three low-order bits		BOOLEAN	RW	0x00 (0_{dec})
8010:06	Enable filter	Enable filter, which makes PLC-cycle-synchronous data exchange unnecessary		BOOLEAN	RW	0x00 (0_{dec})
8010:07	Enable limit 1	Activates limit check for limit 1		BOOLEAN	RW	0x00 (0_{dec})
8010:08	Enable limit 2	Activates limit check for limit 2		BOOLEAN	RW	0x00 (0_{dec})
8010:0A	Enable user calibration	Activates user calibration		BOOLEAN	RW	0x00 (0_{dec})
8010:0B	Enable vendor calibration	Activates manufacturer calibration		BOOLEAN	RW	0x01 (1_{dec})
8010:0E	Swap limit bits	Swaps the two limit bits, in order to achieve compatibility with older hardware versions.		BOOLEAN	RW	0x00 (0_{dec})
8010:11	User scale offset	User scaling offset		INT16	RW	0x0000 (0_{dec})
8010:12	User scale gain	Gain of the user scaling		INT32	RW	0x00010000 (65536_{dec})
8010:13	Limit 1	Value for limit 1		INT16	RW	0x0000 (0_{dec})
8010:14	Limit 2	Value for limit 2		INT16	RW	0x0000 (0_{dec})
8010:15	Filter settings	Filter settings		UINT16	RW	0x0000 (0_{dec})
		0	50 Hz			
		1	60 Hz			
		2	100 Hz			
		3	500 Hz			
		4	1 kHz,			
		5	2 kHz			
		6	3.75 kHz			
		7	7.5 kHz			
		8	15 kHz			
		9	30 kHz			
		10	5 Hz			
		11	10 Hz			
8010:16	Calibration interval	reserved		UINT16	RW	0x0000 (0_{dec})
8010:17	User calibration offset	User calibration offset		INT16	RW	0x0000 (0_{dec})
8010:18	User calibration gain	Gain of the user calibration		UINT16	RW	0x4000 (16384_{dec})

Index 8010: RTD Settings Ch.2

Index (hex)	Name	Meaning		Data type	Flags	Default
8010:19	RTD element	Sensor type		UINT16	RW	0x0000 (0_{dec})
		0	PT100			
		1	Ni100			
		2	PT1000			
		3	PT500			
		4	PT200			
		5	Ni1000			
		6	Ni1000 (Siemens)			
		7	Ni120			
		8	Resistance measurement with 1/16 ohm resolution			
		9	Resistance measurement with 1/64 ohm resolution			
8010:1A	Connection technology	Connection technology:		UINT16	RW	0x0000 (0_{dec})
		0	2-wire			
		1	3-wire			
		2	4-wire			
		3	No sensor connected (only supported by hardware version 00): This setting skips the whole measurement, thus speeding up the data acquisition for the other channels. The green status LED of the respective channel remains lit. The error bit of a deactivated channel is cancelled and no longer set.			
8010:1B	Wire calibration 1/32 Ohm	Only for 2-wire measurements: contains the resistance of the supply line for the temperature sensor (in 1/32 ohm).		INT16	RW	0x0000 (0_{dec})

Index 8020: RTD Settings Ch.3

Index (hex)	Name	Meaning		Data type	Flags	Default
8020:0	RTD Settings Ch.3	Maximum subindex		UINT8	RO	0x1B (27_{dec})
8020:01	Enable user scale	Activates user scaling		BOOLEAN	RW	0x00 (0_{dec})
8020:02	Presentation	Presentation of the measured value		BIT3	RW	0x00 (0_{dec})
		0	Signed, in two's complement			
		1	Most significant bit as sign			
		2	High-resolution (1/100 °C steps)			
8020:05	Siemens bits	The S5 bits are displayed in the three low-order bits		BOOLEAN	RW	0x00 (0_{dec})
8020:06	Enable filter	Enable filter, which makes PLC-cycle-synchronous data exchange unnecessary		BOOLEAN	RW	0x00 (0_{dec})
8020:07	Enable limit 1	Activates limit check for limit 1		BOOLEAN	RW	0x00 (0_{dec})
8020:08	Enable limit 2	Activates limit check for limit 2		BOOLEAN	RW	0x00 (0_{dec})
8020:0A	Enable user calibration	Activates user calibration		BOOLEAN	RW	0x00 (0_{dec})
8020:0B	Enable vendor calibration	Activates vendor calibration		BOOLEAN	RW	0x01 (1_{dec})
8020:0E	Swap limit bits	Swaps the two limit bits, in order to achieve compatibility with older hardware versions.		BOOLEAN	RW	0x00 (0_{dec})
8020:11	User scale offset	User scaling offset		INT16	RW	0x0000 (0_{dec})
8020:12	User scale gain	Gain of the user scaling		INT32	RW	0x00010000 (65536_{dec})
8020:13	Limit 1	Value for limit 1		INT16	RW	0x0000 (0_{dec})
8020:14	Limit 2	Value for limit 2		INT16	RW	0x0000 (0_{dec})

Index 8020: RTD Settings Ch.3

Index (hex)	Name	Meaning		Data type	Flags	Default
8020:15	Filter settings	Filter settings		UINT16	RW	0x0000 (0_{dec})
		0	50 Hz			
		1	60 Hz			
		2	100 Hz			
		3	500 Hz			
		4	1 kHz,			
		5	2 kHz			
		6	3.75 kHz			
		7	7.5 kHz			
		8	15 kHz			
		9	30 kHz			
		10	5 Hz			
		11	10 Hz			
8020:16	Calibration interval	reserved		UINT16	RW	0x0000 (0_{dec})
8020:17	User calibration offset	User calibration offset		INT16	RW	0x0000 (0_{dec})
8020:18	User calibration gain	Gain of the user calibration		UINT16	RW	0x4000 (16384_{dec})
8020:19	RTD element	Sensor type		UINT16	RW	0x0000 (0_{dec})
		0	PT100			
		1	Ni100			
		2	PT1000			
		3	PT500			
		4	PT200			
		5	Ni1000			
		6	Ni1000 (Siemens)			
		7	Ni120			
		8	Resistance measurement with 1/16 ohm resolution			
		9	Resistance measurement with 1/64 ohm resolution			
8020:1A	Connection technology	Connection technology:		UINT16	RW	0x0000 (0_{dec})
		0	2-wire			
		1	3-wire			
		2	4-wire			
		3	No sensor connected (only supported by hardware version 00): This setting skips the whole measurement, thus speeding up the data acquisition for the other channels. The green status LED of the respective channel remains lit. The error bit of a deactivated channel is canceled and no longer set.			
8020:1B	Wire calibration 1/32 Ohm	Only for 2-wire measurements: contains the resistance of the supply line for the temperature sensor (in 1/32 ohm).		INT16	RW	0x0000 (0_{dec})

Index 8030: RTD Settings Ch.4

Index (hex)	Name	Meaning		Data type	Flags	Default
8030:0	RTD Settings Ch.4	Maximum subindex		UINT8	RO	0x1B (27_{dec})
8030:01	Enable user scale	Activates user scaling		BOOLEAN	RW	0x00 (0_{dec})
8030:02	Presentation	Presentation of the measured value		BIT3	RW	0x00 (0_{dec})
		0	Signed, in two's complement			
		1	Most significant bit as sign			
		2	High-resolution (1/100 °C steps)			
8030:05	Siemens bits	The S5 bits are displayed in the three low-order bits		BOOLEAN	RW	0x00 (0_{dec})
8030:06	Enable filter	Enable filter, which makes PLC-cycle-synchronous data exchange unnecessary		BOOLEAN	RW	0x00 (0_{dec})
8030:07	Enable limit 1	Activates limit check for limit 1		BOOLEAN	RW	0x00 (0_{dec})
8030:08	Enable limit 2	Activates limit check for limit 2		BOOLEAN	RW	0x00 (0_{dec})

Index 8030: RTD Settings Ch.4

Index (hex)	Name	Meaning		Data type	Flags	Default
8030:0A	Enable user calibration	Activates user calibration		BOOLEAN	RW	0x00 (0_{dec})
8030:0B	Enable vendor calibration	Activates vendor calibration		BOOLEAN	RW	0x01 (1_{dec})
8030:0E	Swap limit bits	Swaps the two limit bits, in order to achieve compatibility with older hardware versions.		BOOLEAN	RW	0x00 (0_{dec})
8030:11	User scale offset	User scaling offset		INT16	RW	0x0000 (0_{dec})
8030:12	User scale gain	Gain of the user scaling		INT32	RW	0x00010000 (65536_{dec})
8030:13	Limit 1	Value for limit 1		INT16	RW	0x0000 (0_{dec})
8030:14	Limit 2	Value for limit 2		INT16	RW	0x0000 (0_{dec})
8030:15	Filter settings	Filter settings		UINT16	RW	0x0000 (0_{dec})
		0	50 Hz			
		1	60 Hz			
		2	100 Hz			
		3	500 Hz			
		4	1 kHz,			
		5	2 kHz			
		6	3.75 kHz			
		7	7.5 kHz			
		8	15 kHz			
		9	30 kHz			
		10	5 Hz			
		11	10 Hz			
8030:16	Calibration interval	reserved		UINT16	RW	0x0000 (0_{dec})
8030:17	User calibration offset	User calibration offset		INT16	RW	0x0000 (0_{dec})
8030:18	User calibration gain	Gain of the user calibration		UINT16	RW	0x4000 (16384_{dec})
8030:19	RTD element	Sensor type		UINT16	RW	0x0000 (0_{dec})
		0	PT100			
		1	Ni100			
		2	PT1000			
		3	PT500			
		4	PT200			
		5	Ni1000			
		6	Ni1000 (Siemens)			
		7	Ni120			
		8	Resistance measurement with 1/16 ohm resolution			
		9	Resistance measurement with 1/64 ohm resolution			
8030:1A	Connection technology	Connection technology:		UINT16	RW	0x0000 (0_{dec})
		0	2-wire			
		1	3-wire			
		2	4-wire			
		3	No sensor connected (only supported by hardware version 00): This setting skips the whole measurement, thus speeding up the data acquisition for the other channels. The green status LED of the respective channel remains lit. The error bit of a deactivated channel is canceled and no longer set.			
8030:1B	Wire calibration 1/32 Ohm	Only for 2-wire measurements: contains the resistance of the supply line for the temperature sensor (in 1/32 ohm).		INT16	RW	0x0000 (0_{dec})

6.5.2 Objects for regular operation

The EP3204 has no such objects.

6.5.3 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	0x01401389 (20976521_{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	EP3204-0002

Index 1009: Hardware version

Index (hex)	Name	Meaning	Data type	Flags	Default
1009:0	Hardware version	Hardware version of the EtherCAT slave	STRING	RO	01

Index 100A: Software version

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

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	0x0C844052 (209993810_{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	0x00120002 (1179650_{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 1A00: RTD TxPDO-Map RTDInputs Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
1A00:0	RTD TxPDO-Map RTDInputs Ch.1	PDO Mapping TxPDO 1	UINT8	RO	0x0A (10_{dec})
1A00:01	SubIndex 001	1. PDO Mapping entry (object 0x6000 (RTD Inputs Ch.1), entry 0x01 (Underrange))	UINT32	RO	0x6000:01, 1
1A00:02	SubIndex 002	2. PDO Mapping entry (object 0x6000 (RTD Inputs Ch.1), entry 0x02 (Overrange))	UINT32	RO	0x6000:02, 1
1A00:03	SubIndex 003	3. PDO Mapping entry (object 0x6000 (RTD Inputs Ch.1), entry 0x03 (Limit 1))	UINT32	RO	0x6000:03, 2
1A00:04	SubIndex 004	4. PDO Mapping entry (object 0x6000 (RTD Inputs Ch.1), entry 0x05 (Limit 2))	UINT32	RO	0x6000:05, 2
1A00:05	SubIndex 005	5. PDO Mapping entry (object 0x6000 (RTD 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 0x1C33 (SM input parameter), entry 0x20 (Sync error))	UINT32	RO	0x6000:0E, 1
1A00:08	SubIndex 008	8. PDO Mapping entry (object 0x1800, entry 0x07)	UINT32	RO	0x1800:07, 1
1A00:09	SubIndex 009	9. PDO Mapping entry (object 0x1800, entry 0x09)	UINT32	RO	0x1800:09, 1
1A00:0A	SubIndex 010	10. PDO Mapping entry (object 0x6000 (RTD Inputs Ch.1), entry 0x11 (Value))	UINT32	RO	0x6000:11, 16

Index 1A01: RTD TxPDO-Map RTDInputs Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
1A01:0	RTD TxPDO-Map RTDInputs Ch.2	PDO Mapping TxPDO 2	UINT8	RO	0x0A (10_{dec})
1A01:01	SubIndex 001	1. PDO Mapping entry (object 0x6010 (RTD Inputs Ch.2), entry 0x01 (Underrange))	UINT32	RO	0x6010:01, 1
1A01:02	SubIndex 002	2. PDO Mapping entry (object 0x6010 (RTD Inputs Ch.2), entry 0x02 (Overrange))	UINT32	RO	0x6010:02, 1
1A01:03	SubIndex 003	3. PDO Mapping entry (object 0x6010 (RTD Inputs Ch.2), entry 0x03 (Limit 1))	UINT32	RO	0x6010:03, 2
1A01:04	SubIndex 004	4. PDO Mapping entry (object 0x6010 (RTD Inputs Ch.2), entry 0x05 (Limit 2))	UINT32	RO	0x6010:05, 2
1A01:05	SubIndex 005	5. PDO Mapping entry (object 0x6010 (RTD Inputs Ch.2), 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 0x1C33 (SM input parameter), entry 0x20 (Sync error))	UINT32	RO	0x6010:0E, 1
1A01:08	SubIndex 008	8. PDO Mapping entry (object 0x1801, entry 0x07)	UINT32	RO	0x1801:07, 1
1A01:09	SubIndex 009	9. PDO Mapping entry (object 0x1801, entry 0x09)	UINT32	RO	0x1801:09, 1
1A01:0A	SubIndex 010	10. PDO Mapping entry (object 0x6010 (RTD Inputs Ch.2), entry 0x11 (Value))	UINT32	RO	0x6010:11, 16

Index 1A02: RTD TxPDO-Map RTDInputs Ch.3

Index (hex)	Name	Meaning	Data type	Flags	Default
1A02:0	RTD TxPDO-Map RTDInputs Ch.3	PDO Mapping TxPDO 3	UINT8	RO	0x0A (10_{dec})
1A02:01	SubIndex 001	1. PDO Mapping entry (object 0x6020 (RTD Inputs Ch.3), entry 0x01 (Underrange))	UINT32	RO	0x6020:01, 1
1A02:02	SubIndex 002	2. PDO Mapping entry (object 0x6020 (RTD Inputs Ch.3), entry 0x02 (Overrange))	UINT32	RO	0x6020:02, 1
1A02:03	SubIndex 003	3. PDO Mapping entry (object 0x6020 (RTD Inputs Ch.3), entry 0x03 (Limit 1))	UINT32	RO	0x6020:03, 2
1A02:04	SubIndex 004	4. PDO Mapping entry (object 0x6020 (RTD Inputs Ch.3), entry 0x05 (Limit 2))	UINT32	RO	0x6020:05, 2
1A02:05	SubIndex 005	5. PDO Mapping entry (object 0x6020 (RTD Inputs Ch.3), entry 0x07 (Error))	UINT32	RO	0x6020:07, 1
1A02:06	SubIndex 006	6. PDO Mapping entry (6 bits align)	UINT32	RO	0x0000:00, 6
1A02:07	SubIndex 007	7. PDO Mapping entry (object 0x1C33 (SM input parameter), entry 0x20 (Sync error))	UINT32	RO	0x6020:0E, 1
1A02:08	SubIndex 008	8. PDO Mapping entry (object 0x1802, entry 0x07)	UINT32	RO	0x1802:07, 1
1A02:09	SubIndex 009	9. PDO Mapping entry (object 0x1802, entry 0x09)	UINT32	RO	0x1802:09, 1
1A02:0A	SubIndex 010	10. PDO Mapping entry (object 0x6020 (RTD Inputs Ch.3), entry 0x11 (Value))	UINT32	RO	0x6020:11, 16

Index 1A03: RTD TxPDO-Map RTDInputs Ch.4

Index (hex)	Name	Meaning	Data type	Flags	Default
1A03:0	RTD TxPDO-Map RTDInputs Ch.4	PDO Mapping TxPDO 4	UINT8	RO	0x0A (10_{dec})
1A03:01	SubIndex 001	1. PDO Mapping entry (object 0x6030 (RTD Inputs Ch.4), entry 0x01 (Underrange))	UINT32	RO	0x6030:01, 1
1A03:02	SubIndex 002	2. PDO Mapping entry (object 0x6030 (RTD Inputs Ch.4), entry 0x02 (Overrange))	UINT32	RO	0x6030:02, 1
1A03:03	SubIndex 003	3. PDO Mapping entry (object 0x6030 (RTD Inputs Ch.4), entry 0x03 (Limit 1))	UINT32	RO	0x6030:03, 2
1A03:04	SubIndex 004	4. PDO Mapping entry (object 0x6030 (RTD Inputs Ch.4), entry 0x05 (Limit 2))	UINT32	RO	0x6030:05, 2
1A03:05	SubIndex 005	5. PDO Mapping entry (object 0x6030 (RTD Inputs Ch.4), entry 0x07 (Error))	UINT32	RO	0x6030:07, 1
1A03:06	SubIndex 006	6. PDO Mapping entry (6 bits align)	UINT32	RO	0x0000:00, 6
1A03:07	SubIndex 007	7. PDO Mapping entry (object 0x1C33 (SM input parameter), entry 0x20 (Sync error))	UINT32	RO	0x6030:0E, 1
1A03:08	SubIndex 008	8. PDO Mapping entry (object 0x1803, entry 0x07)	UINT32	RO	0x1803:07, 1
1A03:09	SubIndex 009	9. PDO Mapping entry (object 0x1803, entry 0x09)	UINT32	RO	0x1803:09, 1
1A03:0A	SubIndex 010	10. PDO Mapping entry (object 0x6030 (RTD Inputs Ch.4), entry 0x11 (Value))	UINT32	RO	0x6030:11, 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	0x00 (0_{dec})

Index 1C13: TxPDO assign

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

Index 1C33: SM input parameter

Index (hex)	Name	Meaning	Data type	Flags	Default
1C33:0	SM input parameter	Maximum subindex	UINT8	RO	0x20 (32_{dec})
1C33:01	Sync mode		UINT16	RW	0x0000 (0_{dec})
1C33:02	Cycle time		UINT32	RW	0x000F4240 (1000000_{dec})
1C33:03	Shift time		UINT32	RO	0x00000000 (0_{dec})
1C33:04	Sync modes supported		UINT16	RO	0xC007 (49159_{dec})
1C33:05	Minimum cycle time		UINT32	RO	0x00002710 (10000_{dec})
1C33:06	Calc and copy time		UINT32	RO	0x00000000 (0_{dec})
1C33:07	Minimum delay time		UINT32	RO	0x00000000 (0_{dec})
1C33:08	Command		UINT16	RW	0x0000 (0_{dec})
1C33:09	Maximum Delay time		UINT32	RO	0x00000000 (0_{dec})
1C33:0B	SM event missed counter		UINT16	RO	0x0000 (0_{dec})
1C33:0C	Cycle exceeded counter		UINT16	RO	0x0000 (0_{dec})
1C33:0D	Shift too short counter		UINT16	RO	0x0000 (0_{dec})
1C33:20	Sync error		BOOLEAN	RO	0x00 (0_{dec})

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

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

Index 6000: RTD Inputs Ch.1

Index (hex)	Name	Meaning		Data type	Flags	Default
6000:0	RTD Inputs Ch.1	Maximum subindex		UINT8	RO	0x11 (17_{dec})
6000:01	Underrange	Is set if the value falls below the operating range of the sensor or the process record contains the lowest possible value.		BOOLEAN	RO	0x00 (0_{dec})
6000:02	Overrange	Is set if the value exceeds the operating range of the sensor or the process record contains the highest possible value.		BOOLEAN	RO	0x00 (0_{dec})
6000:03	Limit 1	Only when limit check is active		BIT2	RO	0x00 (0_{dec})
		1	Value below set limit			
		2	Set limit exceeded			
		3	Set limit reached			
6000:05	Limit 2	Only when limit check is active		BIT2	RO	0x00 (0_{dec})
		1	Value below set limit			
		2	Set limit exceeded			
		3	Set limit reached			
6000:07	Error	The error bit is set if the process data is invalid (wire breakage, overrange, underrange).		BOOLEAN	RO	0x00 (0_{dec})
6000:0E	Sync error	Only in DC: bit is set if the slave is not able to operate synchronous with master, because it cannot keep up with the cycle time.		BOOLEAN	RO	0x00 (0_{dec})
6000:0F	TxPDO State	Validity of the data of the associated TxPDO		BOOLEAN	RO	0x00 (0_{dec})
		0	valid			
		1	invalid			
6000:10	TxPDO Toggle	TxPDO toggle is toggled by the slave when the data of the associated TxPDO is updated.		BOOLEAN	RO	0x00 (0_{dec})
6000:11	Value	Analog input date		INT16	RO	0x0000 (0_{dec})

Index 6010: RTD Inputs Ch.2

Index (hex)	Name	Meaning		Data type	Flags	Default
6010:0	RTD Inputs Ch.2	Maximum subindex		UINT8	RO	0x11 (17_{dec})
6010:01	Underrange	Is set if the value falls below the operating range of the sensor or the process record contains the lowest possible value.		BOOLEAN	RO	0x00 (0_{dec})
6010:02	Overrange	Is set if the value exceeds the operating range of the sensor or the process record contains the highest possible value.		BOOLEAN	RO	0x00 (0_{dec})
6010:03	Limit 1	Only when limit check is active		BIT2	RO	0x00 (0_{dec})
		1	Value below set limit			
		2	Set limit exceeded			
		3	Set limit reached			
6010:05	Limit 2	Only when limit check is active		BIT2	RO	0x00 (0_{dec})
		1	Value below set limit			
		2	Set limit exceeded			
		3	Set limit reached			
6010:07	Error	The error bit is set if the process data is invalid (wire breakage, overrange, underrange).		BOOLEAN	RO	0x00 (0_{dec})
6010:0E	Sync error	Only in DC: bit is set if the slave is not able to operate synchronous with master, because it cannot keep up with the cycle time.		BOOLEAN	RO	0x00 (0_{dec})
6010:0F	TxPDO State	Validity of the data of the associated TxPDO		BOOLEAN	RO	0x00 (0_{dec})
		0	valid			
		1	invalid			
6010:10	TxPDO Toggle	TxPDO toggle is toggled by the slave when the data of the associated TxPDO is updated.		BOOLEAN	RO	0x00 (0_{dec})
6010:11	Value	Analog input date		INT16	RO	0x0000 (0_{dec})

Index 6020: RTD Inputs Ch.3

Index (hex)	Name	Meaning		Data type	Flags	Default
6020:0	RTD Inputs Ch.3	Maximum subindex		UINT8	RO	0x11 (17_{dec})
6020:01	Underrange	Is set if the value falls below the operating range of the sensor or the process record contains the lowest possible value.		BOOLEAN	RO	0x00 (0_{dec})
6020:02	Overrange	Is set if the value exceeds the operating range of the sensor or the process record contains the highest possible value.		BOOLEAN	RO	0x00 (0_{dec})
6020:03	Limit 1	Only when limit check is active		BIT2	RO	0x00 (0_{dec})
		1	Value below set limit			
		2	Set limit exceeded			
		3	Set limit reached			
6020:05	Limit 2	Only when limit check is active		BIT2	RO	0x00 (0_{dec})
		1	Value below set limit			
		2	Set limit exceeded			
		3	Set limit reached			
6020:07	Error	The error bit is set if the process data is invalid (cable break, overrange, underrange)		BOOLEAN	RO	0x00 (0_{dec})
6020:0E	Sync error	Only in DC: bit is set if the slave is not able to operate synchronous with master, because it cannot keep up with the cycle time.		BOOLEAN	RO	0x00 (0_{dec})
6020:0F	TxPDO State	Validity of the data of the associated TxPDO		BOOLEAN	RO	0x00 (0_{dec})
		0	valid			
		1	invalid			
6020:10	TxPDO Toggle	TxPDO toggle is toggled by the slave when the data of the associated TxPDO is updated.		BOOLEAN	RO	0x00 (0_{dec})
6020:11	Value	Analog input date		INT16	RO	0x0000 (0_{dec})

Index 6030: RTD Inputs Ch.4

Index (hex)	Name	Meaning		Data type	Flags	Default
6030:0	RTD Inputs Ch.4	Maximum subindex		UINT8	RO	0x11 (17_{dec})
6030:01	Underrange	Is set if the value falls below the operating range of the sensor or the process record contains the lowest possible value.		BOOLEAN	RO	0x00 (0_{dec})
6030:02	Overrange	Is set if the value exceeds the operating range of the sensor or the process record contains the highest possible value.		BOOLEAN	RO	0x00 (0_{dec})
6030:03	Limit 1	Only when limit check is active		BIT2	RO	0x00 (0_{dec})
		1	Value below set limit			
		2	Set limit exceeded			
		3	Set limit reached			
6030:05	Limit 2	Only when limit check is active		BIT2	RO	0x00 (0_{dec})
		1	Value below set limit			
		2	Set limit exceeded			
		3	Set limit reached			
6030:07	Error	The error bit is set if the process data is invalid (wire breakage, overrange, underrange).		BOOLEAN	RO	0x00 (0_{dec})
6030:0E	Sync error	Only in DC: bit is set if the slave is not able to operate synchronous with master, because it cannot keep up with the cycle time.		BOOLEAN	RO	0x00 (0_{dec})
6030:0F	TxPDO State	Validity of the data of the associated TxPDO		BOOLEAN	RO	0x00 (0_{dec})
		0	valid			
		1	invalid			
6030:10	TxPDO Toggle	TxPDO toggle is toggled by the slave when the data of the associated TxPDO is updated.		BOOLEAN	RO	0x00 (0_{dec})
6030:11	Value	Analog input date		INT16	RO	0x0000 (0_{dec})

Index 800E: RTD Internal data Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
800E:0	RTD Internal data Ch.1	Maximum subindex	UINT8	RO	0x04 (4_{dec})
800E:01	ADC raw value 1	Raw value of the analog/digital converter	INT32	RO	0x00000000 (0_{dec})
800E:02	Resistor 1	Resistance value of the first measurement	UINT16	RO	0x0000 (0_{dec})
800E:03	ADC raw value 2	Raw value of the analog/digital converter	INT32	RO	0x00000000 (0_{dec})
800E:04	Resistor 2	Resistance value of the second measurement	UINT16	RO	0x0000 (0_{dec})

Index 800F: RTD Vendor data Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
800F:0	RTD Vendor data Ch.1	Maximum subindex	UINT8	RO	0x07 (7_{dec})
800F:01	Calibration offset 3-wire	Calibration for 3-wire measurement: Offset	INT16	RW	0x0000 (0_{dec})
800F:02	Calibration gain 3-wire	Calibration for 3-wire measurement: Gain	UINT16	RW	0x4000 (16384_{dec})
800F:03	Calibration offset 2-wire	Calibration for 2-wire measurement: Offset	INT16	RW	0x0000 (0_{dec})
800F:04	Calibration gain 2-wire	Calibration for 2-wire measurement: Gain	UINT16	RW	0x4000 (16384_{dec})
800F:05	Calibration offset 4-wire	Calibration for 4-wire measurement: Offset	INT16	RW	0x0000 (0_{dec})
800F:06	Calibration gain 4-wire	Calibration for 4-wire measurement: Gain	UINT16	RW	0x4000 (16384_{dec})
800F:07	PGA Gain Correction	Gain correction for PT1000 measurement	INT16	RW	0x0000 (0_{dec})

Index 801E: RTD Internal data Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
801E:0	RTD Internal data Ch.2	Maximum subindex	UINT8	RO	0x04 (4_{dec})
801E:01	ADC raw value 1	Raw value of the analog/digital converter	INT32	RO	0x00000000 (0_{dec})
801E:02	Resistor 1	Resistance value of the first measurement	UINT16	RO	0x0000 (0_{dec})
801E:03	ADC raw value 2	Raw value of the analog/digital converter	INT32	RO	0x00000000 (0_{dec})
801E:04	Resistor 2	Resistance value of the second measurement	UINT16	RO	0x0000 (0_{dec})

Index 801F: RTD Vendor data Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
801F:0	RTD Vendor data Ch.2	Maximum subindex	UINT8	RO	0x07 (7_{dec})
801F:01	Calibration offset 3-wire	Calibration for 3-wire measurement: Offset	INT16	RW	0x0000 (0_{dec})
801F:02	Calibration gain 3-wire	Calibration for 3-wire measurement: Gain	UINT16	RW	0x4000 (16384_{dec})
801F:03	Calibration offset 2-wire	Calibration for 2-wire measurement: Offset	INT16	RW	0x0000 (0_{dec})
801F:04	Calibration gain 2-wire	Calibration for 2-wire measurement: Gain	UINT16	RW	0x4000 (16384_{dec})
801F:05	Calibration offset 4-wire	Calibration for 4-wire measurement: Offset	INT16	RW	0x0000 (0_{dec})
801F:06	Calibration gain 4-wire	Calibration for 4-wire measurement: Gain	UINT16	RW	0x4000 (16384_{dec})
801F:07	PGA Gain Correction	Gain correction for PT1000 measurement	INT16	RW	0x0000 (0_{dec})

Index 802E: RTD Internal data Ch.3

Index (hex)	Name	Meaning	Data type	Flags	Default
802E:0	RTD Internal data Ch.3	Maximum subindex	UINT8	RO	0x04 (4_{dec})
802E:01	ADC raw value 1	Raw value of the analog/digital converter	INT32	RO	0x00000000 (0_{dec})
802E:02	Resistor 1	Resistance value of the first measurement	UINT16	RO	0x0000 (0_{dec})
802E:03	ADC raw value 2	Raw value of the analog/digital converter	INT32	RO	0x00000000 (0_{dec})
802E:04	Resistor 2	Resistance value of the second measurement	UINT16	RO	0x0000 (0_{dec})

Index 802F: RTD Vendor data Ch.3

Index (hex)	Name	Meaning	Data type	Flags	Default
802F:0	RTD Vendor data Ch.3	Maximum subindex	UINT8	RO	0x07 (7_{dec})
802F:01	Calibration offset 3-wire	Calibration for 3-wire measurement: Offset	INT16	RW	0x0000 (0_{dec})
802F:02	Calibration gain 3-wire	Calibration for 3-wire measurement: Gain	UINT16	RW	0x4000 (16384_{dec})
802F:03	Calibration offset 2-wire	Calibration for 2-wire measurement: Offset	INT16	RW	0x0000 (0_{dec})
802F:04	Calibration gain 2-wire	Calibration for 2-wire measurement: Gain	UINT16	RW	0x4000 (16384_{dec})
802F:05	Calibration offset 4-wire	Calibration for 4-wire measurement: Offset	INT16	RW	0x0000 (0_{dec})
802F:06	Calibration gain 4-wire	Calibration for 4-wire measurement: Gain	UINT16	RW	0x4000 (16384_{dec})
802F:07	PGA Gain Correction	Gain correction for PT1000 measurement	INT16	RW	0x0000 (0_{dec})

Index 803E: RTD Internal data Ch.4

Index (hex)	Name	Meaning	Data type	Flags	Default
803E:0	RTD Internal data Ch.4	Maximum subindex	UINT8	RO	0x04 (4_{dec})
803E:01	ADC raw value 1	Raw value of the analog/digital converter	INT32	RO	0x00000000 (0_{dec})
803E:02	Resistor 1	Resistance value of the first measurement	UINT16	RO	0x0000 (0_{dec})
803E:03	ADC raw value 2	Raw value of the analog/digital converter	INT32	RO	0x00000000 (0_{dec})
803E:04	Resistor 2	Resistance value of the second measurement	UINT16	RO	0x0000 (0_{dec})

Index 803F: RTD Vendor data Ch.4

Index (hex)	Name	Meaning	Data type	Flags	Default
803F:0	RTD Vendor data Ch.4		UINT8	RO	0x07 (7_{dec})
803F:01	Calibration offset 3-wire	Calibration for 3-wire measurement: Offset	INT16	RW	0x0000 (0_{dec})
803F:02	Calibration gain 3-wire	Calibration for 3-wire measurement: Gain	UINT16	RW	0x4000 (16384_{dec})
803F:03	Calibration offset 2-wire	Calibration for 2-wire measurement: Offset	INT16	RW	0x0000 (0_{dec})
803F:04	Calibration gain 2-wire	Calibration for 2-wire measurement: Gain	UINT16	RW	0x4000 (16384_{dec})
803F:05	Calibration offset 4-wire	Calibration for 4-wire measurement: Offset	INT16	RW	0x0000 (0_{dec})
803F:06	Calibration gain 4-wire	Calibration for 4-wire measurement: Gain	UINT16	RW	0x4000 (16384_{dec})
803F:07	PGA Gain Correction	Gain correction for PT1000 measurement	INT16	RW	0x0000 (0_{dec})

Index F000: Modular device profile

Index (hex)	Name	Meaning	Data type	Flags	Default
F000:0	Modular device profile	Maximum subindex	UINT8	RO	0x02 (2_{dec})
F000:01	Module index distance	Index spacing for the objects of the individual channels	UINT16	RO	0x0010 (16_{dec})
F000:02	Maximum number of modules	Number of channels	UINT16	RO	0x0004 (4_{dec})

Index F008: Code word

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

Index F010: Module list

Index (hex)	Name	Meaning	Data type	Flags	Default
F010:0	Module list	Maximum subindex	UINT8	RW	0x04 (4_{dec})
F010:01	SubIndex 001		UINT32	RW	0x00000140 (320_{dec})
F010:02	SubIndex 002		UINT32	RW	0x00000140 (320_{dec})
F010:03	SubIndex 003		UINT32	RW	0x00000140 (320_{dec})
F010:04	SubIndex 004		UINT32	RW	0x00000140 (320_{dec})

Index F080: Channel Enable

Index (hex)	Name	Meaning			Data type	Flags	Default
F080:0	Channel Enable	Maximum subindex			UINT8	RO	0x04 (4_{dec})
F080:01	SubIndex 001	0	Channel 1 disabled	(from hardware version 01 deactivated channels are not measured, and the green LED R for these channels goes out)	BOOLEAN	RW	0x01 (1_{dec})
		1	Channel 1 enabled				
F080:02	SubIndex 002	0	Channel 2 disabled		BOOLEAN	RW	0x01 (1_{dec})
		1	Channel 2 enabled				
F080:03	SubIndex 003	0	Channel 3 disabled		BOOLEAN	RW	0x01 (1_{dec})
		1	Channel 3 enabled				
F080:04	SubIndex 004	0	Channel 4 disabled		BOOLEAN	RW	0x01 (1_{dec})
		1	Channel 5 enabled				

6.6 EP3314 - 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 [▶ 92]		Device type	RO	0x014A1389 (21631881$_{dec}$)
1008 [▶ 92]		Device name	RO	EP3314-0002
1009 [▶ 92]		Hardware version	RO	00
100A [▶ 92]		Software version	RO	01
1011:0 [▶ 86]	**Subindex**	Restore default parameters	RO	0x01 (1$_{dec}$)
	1011:01	SubIndex 001	RW	0x00000000 (0$_{dec}$)
1018:0 [▶ 93]	**Subindex**	Identity	RO	0x04 (4$_{dec}$)
	1018:01	Vendor ID	RO	0x00000002 (2$_{dec}$)
	1018:02	Product code	RO	0x0CF24052 (217202770$_{dec}$)
	1018:03	Revision	RO	0x00100002 (1048578$_{dec}$)
	1018:04	Serial number	RO	0x00000000 (0$_{dec}$)
10F0:0 [▶ 93]	**Subindex**	Backup parameter handling	RO	0x01 (1$_{dec}$)
	10F0:01	Checksum	RO	0x00000000 (0$_{dec}$)
1600:0 [▶ 93]	**Subindex**	TC RxPDO-Map Outputs Ch.1	RO	0x01 (1$_{dec}$)
	1600:01	SubIndex 001	RO	0x7000:11, 16
1601:0 [▶ 93]	**Subindex**	TC RxPDO-Map Outputs Ch.2	RO	0x01 (1$_{dec}$)
	1601:01	SubIndex 001	RO	0x7010:11, 16
1602:0 [▶ 93]	**Subindex**	TC RxPDO-Map Outputs Ch.3	RO	0x01 (1$_{dec}$)
	1602:01	SubIndex 001	RO	0x7020:11, 16
1603:0 [▶ 93]	**Subindex**	TC RxPDO-Map Outputs Ch.4	RO	0x01 (1$_{dec}$)
	1603:01	SubIndex 001	RO	0x7030:11, 16
1A00:0 [▶ 94]	**Subindex**	TC TxPDO-Map TCInputs 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	0x1800:07, 1
	1A00:09	SubIndex 009	RO	0x1800:09, 1
	1A00:0A	SubIndex 010	RO	0x6000:11, 16

Index (hex)		Name	Flags	Default value
1A01:0 [▶ 94]	**Subindex**	TC TxPDO-Map TCInputs 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	0x1801:07, 1
	1A01:09	SubIndex 009	RO	0x1801:09, 1
	1A01:0A	SubIndex 010	RO	0x6010:11, 16
1A02:0 [▶ 95]	**Subindex**	TC TxPDO-Map TCInputs Ch.3	RO	0x0A (10_{dec})
	1A02:01	SubIndex 001	RO	0x6020:01, 1
	1A02:02	SubIndex 002	RO	0x6020:02, 1
	1A02:03	SubIndex 003	RO	0x6020:03, 2
	1A02:04	SubIndex 004	RO	0x6020:05, 2
	1A02:05	SubIndex 005	RO	0x6020:07, 1
	1A02:06	SubIndex 006	RO	0x0000:00, 6
	1A02:07	SubIndex 007	RO	0x6020:0E, 1
	1A02:08	SubIndex 008	RO	0x1802:07, 1
	1A02:09	SubIndex 009	RO	0x1802:09, 1
	1A02:0A	SubIndex 010	RO	0x6020:11, 16
1A03:0 [▶ 95]	**Subindex**	TC TxPDO-Map TCInputs Ch.4	RO	0x0A (10_{dec})
	1A03:01	SubIndex 001	RO	0x6030:01, 1
	1A03:02	SubIndex 002	RO	0x6030:02, 1
	1A03:03	SubIndex 003	RO	0x6030:03, 2
	1A03:04	SubIndex 004	RO	0x6030:05, 2
	1A03:05	SubIndex 005	RO	0x6030:07, 1
	1A03:06	SubIndex 006	RO	0x0000:00, 6
	1A03:07	SubIndex 007	RO	0x6030:0E, 1
	1A03:08	SubIndex 008	RO	0x1803:07, 1
	1A03:09	SubIndex 009	RO	0x1803:09, 1
	1A03:0A	SubIndex 010	RO	0x6030:11, 16
1C00:0 [▶ 95]	**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
1C12:0 [▶ 96]	**Subindex**	RxPDO assign	RW	0x00 (0_{dec})
	1C12:01	SubIndex 001	RW	0x0000 (0_{dec})
	1C12:02	SubIndex 002	RW	0x0000 (0_{dec})
	1C12:03	SubIndex 003	RW	0x0000 (0_{dec})
	1C12:04	SubIndex 004	RW	0x0000 (0_{dec})
1C13:0 [▶ 96]	**Subindex**	TxPDO assign	RW	0x04 (4_{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	0x1A03 (6659_{dec})
1C32:0 [▶ 97]	**Subindex**	SM output parameter	RO	0x20 (32_{dec})
	1C32:01	Sync mode	RW	0x0000 (0_{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	0x00002710 (10000_{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})
1C33:0 [▶ 98]	**Subindex**	SM input parameter	RO	0x20 (32_{dec})
	1C33:01	Sync mode	RW	0x0000 (0_{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	0x00002710 (10000_{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})
6000:0 [▶ 99]	**Subindex**	TC 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})

Index (hex)		Name	Flags	Default value
6010:0 [▶ 99]	**Subindex**	TC 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})
6020:0 [▶ 100]	**Subindex**	TC Inputs Ch.3	RO	0x11 (17_{dec})
	6020:01	Underrange	RO	0x00 (0_{dec})
	6020:02	Overrange	RO	0x00 (0_{dec})
	6020:03	Limit 1	RO	0x00 (0_{dec})
	6020:05	Limit 2	RO	0x00 (0_{dec})
	6020:07	Error	RO	0x00 (0_{dec})
	6020:0E	Sync error	RO	0x00 (0_{dec})
	6020:0F	TxPDO State	RO	0x00 (0_{dec})
	6020:10	TxPDO Toggle	RO	0x00 (0_{dec})
	6020:11	Value	RO	0x0000 (0_{dec})
6030:0 [▶ 100]	**Subindex**	TC Inputs Ch.4	RO	0x11 (17_{dec})
	6030:01	Underrange	RO	0x00 (0_{dec})
	6030:02	Overrange	RO	0x00 (0_{dec})
	6030:03	Limit 1	RO	0x00 (0_{dec})
	6030:05	Limit 2	RO	0x00 (0_{dec})
	6030:07	Error	RO	0x00 (0_{dec})
	6030:0E	Sync error	RO	0x00 (0_{dec})
	6030:0F	TxPDO State	RO	0x00 (0_{dec})
	6030:10	TxPDO Toggle	RO	0x00 (0_{dec})
	6030:11	Value	RO	0x0000 (0_{dec})
7000:0 [▶ 101]	**Subindex**	TC Outputs Ch.1	RO	0x11 (17_{dec})
	7000:11	CJCompensation	RO	0x0000 (0_{dec})
7010:0 [▶ 101]	**Subindex**	TC Outputs Ch.2	RO	0x11 (17_{dec})
	7010:11	CJCompensation	RO	0x0000 (0_{dec})
7020:0 [▶ 101]	**Subindex**	TC Outputs Ch.3	RO	0x11 (17_{dec})
	7020:11	CJCompensation	RO	0x0000 (0_{dec})
7030:0 [▶ 101]	**Subindex**	TC Outputs Ch.4	RO	0x11 (17_{dec})
	7030:11	CJCompensation	RO	0x0000 (0_{dec})

Index (hex)		Name	Flags	Default value
8000:0 [▶ 87]	**Subindex**	TC Settings Ch.1	RW	0x1B (27_{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})
	8000:0C	Coldjunction compensation	RW	0x00 (0_{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})
	8000:16	Calibration interval	RW	0x0000 (0_{dec})
	8000:17	User calibration offset	RW	0x0000 (0_{dec})
	8000:18	User calibration gain	RW	0x4000 (16384_{dec})
	8000:19	Sensor type	RW	0x0000 (0_{dec})
	8000:1B	Wire calibration 1/32 Ohm	RW	0x0000 (0_{dec})
800E:0 [▶ 101]	**Subindex**	TC Internal data Ch.1	RO	0x05 (5_{dec})
	800E:01	ADC raw value TC	RO	0x00000000 (0_{dec})
	800E:02	ADC raw value PT1000	RO	0x00000000 (0_{dec})
	800E:03	CJ temperature	RO	0x0000 (0_{dec})
	800E:04	CJ voltage	RO	0x0000 (0_{dec})
	800E:05	CJ resistor	RO	0x0000 (0_{dec})
800F:0 [▶ 101]	**Subindex**	TC Vendor data Ch.1	RW	0x04 (4_{dec})
	800F:01	Calibration offset TC	RW	0x0000 (0_{dec})
	800F:02	Calibration gain TC	RW	0x4000 (16384_{dec})
	800F:03	Calibration offset CJ	RW	0x0000 (0_{dec})
	800F:04	Calibration gain CJ	RW	0x4000 (16384_{dec})
8010:0 [▶ 88]	**Subindex**	TC Settings Ch.2	RW	0x1B (27_{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})
	8010:0C	Coldjunction compensation	RW	0x00 (0_{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})
	8010:16	Calibration interval	RW	0x0000 (0_{dec})
	8010:17	User calibration offset	RW	0x0000 (0_{dec})
	8010:18	User calibration gain	RW	0x4000 (16384_{dec})
	8010:19	Sensor type	RW	0x0000 (0_{dec})
	8010:1B	Wire calibration 1/32 Ohm	RW	0x0000 (0_{dec})

Index (hex)		Name	Flags	Default value
801E:0 [▶ 102]	**Subindex**	TC Internal data Ch.2	RO	0x05 (5_{dec})
	801E:01	ADC raw value TC	RO	0x00000000 (0_{dec})
	801E:02	ADC raw value PT1000	RO	0x00000000 (0_{dec})
	801E:03	CJ temperature	RO	0x0000 (0_{dec})
	801E:04	CJ voltage	RO	0x0000 (0_{dec})
	801E:05	CJ resistor	RO	0x0000 (0_{dec})
801F:0 [▶ 102]	**Subindex**	TC Vendor data Ch.2	RW	0x04 (4_{dec})
	801F:01	Calibration offset TC	RW	0x0000 (0_{dec})
	801F:02	Calibration gain TC	RW	0x4000 (16384_{dec})
	801F:03	Calibration offset CJ	RW	0x0000 (0_{dec})
	801F:04	Calibration gain CJ	RW	0x4000 (16384_{dec})
8020:0 [▶ 89]	**Subindex**	TC Settings Ch.3	RW	0x1B (27_{dec})
	8020:01	Enable user scale	RW	0x00 (0_{dec})
	8020:02	Presentation	RW	0x00 (0_{dec})
	8020:05	Siemens bits	RW	0x00 (0_{dec})
	8020:06	Enable filter	RW	0x00 (0_{dec})
	8020:07	Enable limit 1	RW	0x00 (0_{dec})
	8020:08	Enable limit 2	RW	0x00 (0_{dec})
	8020:0A	Enable user calibration	RW	0x00 (0_{dec})
	8020:0B	Enable vendor calibration	RW	0x01 (1_{dec})
	8020:0C	Coldjunction compensation	RW	0x00 (0_{dec})
	8020:0E	Swap limit bits	RW	0x00 (0_{dec})
	8020:11	User scale offset	RW	0x0000 (0_{dec})
	8020:12	User scale gain	RW	0x00010000 (65536_{dec})
	8020:13	Limit 1	RW	0x0000 (0_{dec})
	8020:14	Limit 2	RW	0x0000 (0_{dec})
	8020:15	Filter settings	RW	0x0000 (0_{dec})
	8020:16	Calibration interval	RW	0x0000 (0_{dec})
	8020:17	User calibration offset	RW	0x0000 (0_{dec})
	8020:18	User calibration gain	RW	0x4000 (16384_{dec})
	8020:19	Sensor type	RW	0x0000 (0_{dec})
	8020:1B	Wire calibration 1/32 Ohm	RW	0x0000 (0_{dec})
802E:0 [▶ 102]	**Subindex**	TC Internal data Ch.3	RO	0x05 (5_{dec})
	802E:01	ADC raw value TC	RO	0x00000000 (0_{dec})
	802E:02	ADC raw value PT1000	RO	0x00000000 (0_{dec})
	802E:03	CJ temperature	RO	0x0000 (0_{dec})
	802E:04	CJ voltage	RO	0x0000 (0_{dec})
	802E:05	CJ resistor	RO	0x0000 (0_{dec})
802F:0 [▶ 102]	**Subindex**	TC Vendor data Ch.3	RW	0x04 (4_{dec})
	802F:01	Calibration offset TC	RW	0x0000 (0_{dec})
	802F:02	Calibration gain TC	RW	0x4000 (16384_{dec})
	802F:03	Calibration offset CJ	RW	0x0000 (0_{dec})
	802F:04	Calibration gain CJ	RW	0x4000 (16384_{dec})

Index (hex)		Name	Flags	Default value
8030:0 [▶ 91]	**Subindex**	TC Settings Ch.4	RW	0x1B (27_{dec})
	8030:01	Enable user scale	RW	0x00 (0_{dec})
	8030:02	Presentation	RW	0x00 (0_{dec})
	8030:05	Siemens bits	RW	0x00 (0_{dec})
	8030:06	Enable filter	RW	0x00 (0_{dec})
	8030:07	Enable limit 1	RW	0x00 (0_{dec})
	8030:08	Enable limit 2	RW	0x00 (0_{dec})
	8030:0A	Enable user calibration	RW	0x00 (0_{dec})
	8030:0B	Enable vendor calibration	RW	0x01 (1_{dec})
	8030:0C	Coldjunction compensation	RW	0x00 (0_{dec})
	8030:0E	Swap limit bits	RW	0x00 (0_{dec})
	8030:11	User scale offset	RW	0x0000 (0_{dec})
	8030:12	User scale gain	RW	0x00010000 (65536_{dec})
	8030:13	Limit 1	RW	0x0000 (0_{dec})
	8030:14	Limit 2	RW	0x0000 (0_{dec})
	8030:15	Filter settings	RW	0x0000 (0_{dec})
	8030:16	Calibration interval	RW	0x0000 (0_{dec})
	8030:17	User calibration offset	RW	0x0000 (0_{dec})
	8030:18	User calibration gain	RW	0x4000 (16384_{dec})
	8030:19	Sensor type	RW	0x0000 (0_{dec})
	8030:1B	Wire calibration 1/32 Ohm	RW	0x0000 (0_{dec})
803E:0 [▶ 102]	**Subindex**	TC Internal data Ch.4	RO	0x05 (5_{dec})
	803E:01	ADC raw value TC	RO	0x00000000 (0_{dec})
	803E:02	ADC raw value PT1000	RO	0x00000000 (0_{dec})
	803E:03	CJ temperature	RO	0x0000 (0_{dec})
	803E:04	CJ voltage	RO	0x0000 (0_{dec})
	803E:05	CJ resistor	RO	0x0000 (0_{dec})
803F:0 [▶ 103]	**Subindex**	TC Vendor data Ch.4	RW	0x04 (4_{dec})
	803F:01	Calibration offset TC	RW	0x0000 (0_{dec})
	803F:02	Calibration gain TC	RW	0x4000 (16384_{dec})
	803F:03	Calibration offset CJ	RW	0x0000 (0_{dec})
	803F:04	Calibration gain CJ	RW	0x4000 (16384_{dec})
F000:0 [▶ 103]	**Subindex**	Modular device profile	RO	0x02 (2_{dec})
	F000:01	Module index distance	RO	0x0010 (16_{dec})
	F000:02	Maximum number of modules	RO	0x0004 (4_{dec})
F008 [▶ 103]		Code word	RW	0x00000000 (0_{dec})
F010:0 [▶ 103]	**Subindex**	Module list	RW	0x04 (4_{dec})
	F010:01	SubIndex 001	RW	0x0000014A (330_{dec})
	F010:02	SubIndex 002	RW	0x0000014A (330_{dec})
	F010:03	SubIndex 003	RW	0x0000014A (330_{dec})
	F010:04	SubIndex 004	RW	0x0000014A (330_{dec})
F080:0 [▶ 103]	**Subindex**	Channel Enable	RO	0x04 (4_{dec})
	F080:01	SubIndex 001	RW	0xFF (255_{dec})
	F080:02	SubIndex 002	RW	0xFF (255_{dec})
	F080:03	SubIndex 003	RW	0xFF (255_{dec})
	F080:04	SubIndex 004	RW	0xFF (255_{dec})

Key

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

6.7 EP3314 - object description and parameterization

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.

Parameterization via the CoE list (CAN over EtherCAT)

The EtherCAT device is parameterized via the CoE - Online tab [▶ 46] (double-click on the respective object) or via the Process Data [▶ 43] tab (allocation of PDOs).

Introduction

The CoE overview contains objects for different intended applications:

- Objects required for parameterization during commissioning
- Objects intended for regular operation [▶ 92], e.g. through ADS access
- Objects for indicating internal settings [▶ 86] (may be fixed)
- Further profile-specific objects [▶ 99] 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.

6.7.1 Objects to be parameterized during commissioning

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 8000: TC Settings Ch.1

Index (hex)	Name	Meaning		Data type	Flags	Default
8000:0	TC Settings Ch.1	Maximum subindex		UINT8	RO	0x1B (27_{dec})
8000:01	Enable user scale	Activates user scaling		BOOLEAN	RW	0x00 (0_{dec})
8000:02	Presentation	Presentation of the measured value		BIT3	RW	0x00 (0_{dec})
		0	Signed, in two's complement			
		1	Most significant bit as sign			
		2	High-resolution (1/100 °C steps)			
8000:05	Siemens bits	The S5 bits are displayed in the three low-order bits		BOOLEAN	RW	0x00 (0_{dec})
8000:06	Enable filter	Enable filter, which makes PLC-cycle-synchronous data exchange unnecessary		BOOLEAN	RW	0x00 (0_{dec})
8000:07	Enable limit 1	Activates limit check for limit 1		BOOLEAN	RW	0x00 (0_{dec})
8000:08	Enable limit 2	Activates limit check for limit 2		BOOLEAN	RW	0x00 (0_{dec})
8000:0A	Enable user calibration	Activates user calibration		BOOLEAN	RW	0x00 (0_{dec})
8000:0B	Enable vendor calibration	Activates vendor calibration		BOOLEAN	RW	0x01 (1_{dec})
8000:0C	Cold junction compensation	Cold junction compensation		BIT2	RW	0x00 (0_{dec})
		0	Cold junction compensation takes place via the PT-1000 in the plug connector.			
		1	Cold junction compensation is not active.			
		2	Cold junction compensation takes place via the process data.			
8000:0E	Swap limit bits	Swaps the two limit bits, in order to achieve compatibility with older hardware versions.		BOOLEAN	RW	0x00 (0_{dec})
8000:11	User scale offset	User scaling: Offset		INT16	RW	0x0000 (0_{dec})
8000:12	User scale gain	User scaling: Gain		INT32	RW	0x00010000 (65536_{dec})
8000:13	Limit 1	Value for limit 1		INT16	RW	0x0000 (0_{dec})
8000:14	Limit 2	Value for limit 2		INT16	RW	0x0000 (0_{dec})
8000:15	Filter settings	Filter settings (Ch1. applies to all channels)		UINT16	RW	0x0000 (0_{dec})
		0	50 Hz			
		1	60 Hz			
		2	100 Hz			
		3	500 Hz			
		4	1 kHz,			
		5	2 kHz			
		6	3.75 kHz			
		7	7.5 kHz			
		8	15 kHz			
		9	30 kHz			
		10	5 Hz			
		11	10 Hz			
8000:16	Calibration interval	reserved		UINT16	RW	0x0000 (0_{dec})
8000:17	User calibration offset	User calibration: Offset		INT16	RW	0x0000 (0_{dec})
8000:18	User calibration gain	User calibration: Gain		UINT16	RW	0x4000 (16384_{dec})

Index 8000: TC Settings Ch.1

Index (hex)	Name	Meaning		Data type	Flags	Default
8000:19	Sensor type	Thermocouple		UINT16	RW	0x0000 (0_{dec})
		0	Type K -200 °C to 1370 °C			
		1	Type J -100°C to 1200°C			
		2	Type L 0°C to 900°C			
		3	Type E -100°C to 1000°C			
		4	Type T -200°C to 400°C			
		5	Type N -100°C to 1300°C			
		6	Type U 0°C to 600°C			
		7	Type B 600°C to 1800°C			
		8	Type R 0°C to 1767°C			
		9	Type S 0°C to 1760°C			
		10	Type C 0°C to 2320°C			
		100	± 30 mV (1 µV resolution)			
		101	± 60 mV (2 µV resolution)			
		102	± 75 mV (4 µV resolution)			
8000:1B	Wire calibration 1/32 ohm	Only for 2-wire measurements: contains the resistance of the supply line for the temperature sensor (in 1/32 ohm).		INT16	RW	0x0000 (0_{dec})

Index 8010: TC Settings Ch.2

Index (hex)	Name	Meaning		Data type	Flags	Default
8010:0	TC Settings Ch.2	Maximum subindex		UINT8	RO	0x1B (27_{dec})
8010:01	Enable user scale	Activates user scaling		BOOLEAN	RW	0x00 (0_{dec})
8010:02	Presentation	Presentation of the measured value		BIT3	RW	0x00 (0_{dec})
		0	Signed, in two's complement			
		1	Most significant bit as sign			
		2	High-resolution (1/100 °C steps)			
8010:05	Siemens bits	The S5 bits are displayed in the three low-order bits		BOOLEAN	RW	0x00 (0_{dec})
8010:06	Enable filter	Enable filter, which makes PLC-cycle-synchronous data exchange unnecessary		BOOLEAN	RW	0x00 (0_{dec})
8010:07	Enable limit 1	Activates limit check for limit 1		BOOLEAN	RW	0x00 (0_{dec})
8010:08	Enable limit 2	Activates limit check for limit 2		BOOLEAN	RW	0x00 (0_{dec})
8010:0A	Enable user calibration	Activates user calibration		BOOLEAN	RW	0x00 (0_{dec})
8010:0B	Enable vendor calibration	Activates vendor calibration		BOOLEAN	RW	0x01 (1_{dec})
8010:0C	Cold junction compensation	Cold junction compensation		BIT2	RW	0x00 (0_{dec})
		0	Cold junction compensation takes place via the PT-1000 in the plug connector.			
		1	Cold junction compensation is not active.			
		2	Cold junction compensation takes place via the process data.			
8010:0E	Swap limit bits	Swaps the two limit bits, in order to achieve compatibility with older hardware versions.		BOOLEAN	RW	0x00 (0_{dec})
8010:11	User scale offset	User scaling: Offset		INT16	RW	0x0000 (0_{dec})
8010:12	User scale gain	User scaling: Gain		INT32	RW	0x00010000 (65536_{dec})
8010:13	Limit 1	Value for limit 1		INT16	RW	0x0000 (0_{dec})
8010:14	Limit 2	Value for limit 2		INT16	RW	0x0000 (0_{dec})

Index 8010: TC Settings Ch.2

Index (hex)	Name	Meaning		Data type	Flags	Default
8010:15	Filter settings	Filter settings (Ch1. applies to all channels)		UINT16	RW	0x0000 (0_{dec})
		0	50 Hz			
		1	60 Hz			
		2	100 Hz			
		3	500 Hz			
		4	1 kHz,			
		5	2 kHz			
		6	3.75 kHz			
		7	7.5 kHz			
		8	15 kHz			
		9	30 kHz			
		10	5 Hz			
		11	10 Hz			
8010:16	Calibration interval	reserved		UINT16	RW	0x0000 (0_{dec})
8010:17	User calibration offset	User calibration: Offset		INT16	RW	0x0000 (0_{dec})
8010:18	User calibration gain	User calibration: Gain		UINT16	RW	0x4000 (16384_{dec})
8010:19	Sensor type	Thermocouple		UINT16	RW	0x0000 (0_{dec})
		0	Type K -200 °C to 1370 °C			
		1	Type J -100°C to 1200°C			
		2	Type L 0°C to 900°C			
		3	Type E -100°C to 1000°C			
		4	Type T -200°C to 400°C			
		5	Type N -100°C to 1300°C			
		6	Type U 0°C to 600°C			
		7	Type B 600°C to 1800°C			
		8	Type R 0°C to 1767°C			
		9	Type S 0°C to 1760°C			
		10	Type C 0°C to 2320°C			
		100	± 30 mV (1 µV resolution)			
		101	± 60 mV (2 µV resolution)			
		102	± 75 mV (4 µV resolution)			
8010:1B	Wire calibration 1/32 Ohm	Only for 2-wire measurements: contains the resistance of the supply line for the temperature sensor (in 1/32 ohm).		INT16	RW	0x0000 (0_{dec})

Index 8020: TC Settings Ch.3

Index (hex)	Name	Meaning		Data type	Flags	Default
8020:0	TC Settings Ch.3	Maximum subindex		UINT8	RO	0x1B (27_{dec})
8020:01	Enable user scale	Activates user scaling		BOOLEAN	RW	0x00 (0_{dec})
8020:02	Presentation	Presentation of the measured value		BIT3	RW	0x00 (0_{dec})
		0	Signed, in two's complement			
		1	Most significant bit as sign			
		2	High-resolution (1/100 °C steps)			
8020:05	Siemens bits	The S5 bits are displayed in the three low-order bits		BOOLEAN	RW	0x00 (0_{dec})
8020:06	Enable filter	Enable filter, which makes PLC-cycle-synchronous data exchange unnecessary		BOOLEAN	RW	0x00 (0_{dec})
8020:07	Enable limit 1	Activates limit check for limit 1		BOOLEAN	RW	0x00 (0_{dec})
8020:08	Enable limit 2	Activates limit check for limit 2		BOOLEAN	RW	0x00 (0_{dec})
8020:0A	Enable user calibration	Activates user calibration		BOOLEAN	RW	0x00 (0_{dec})
8020:0B	Enable vendor calibration	Activates vendor calibration		BOOLEAN	RW	0x01 (1_{dec})

Index 8020: TC Settings Ch.3

Index (hex)	Name	Meaning		Data type	Flags	Default
8020:0C	Cold junction compensation	Cold junction compensation		BIT2	RW	0x00 (0_{dec})
		0	Cold junction compensation takes place via the PT-1000 in the plug connector.			
		1	Cold junction compensation is not active.			
		2	Cold junction compensation takes place via the process data.			
8020:0E	Swap limit bits	Swaps the two limit bits, in order to achieve compatibility with older hardware versions.		BOOLEAN	RW	0x00 (0_{dec})
8020:11	User scale offset	User scaling: Offset		INT16	RW	0x0000 (0_{dec})
8020:12	User scale gain	User scaling: Gain		INT32	RW	0x00010000 (65536_{dec})
8020:13	Limit 1	Value for limit 1		INT16	RW	0x0000 (0_{dec})
8020:14	Limit 2	Value for limit 2		INT16	RW	0x0000 (0_{dec})
8020:15	Filter settings	Filter settings (Ch1. applies to all channels)		UINT16	RW	0x0000 (0_{dec})
		0	50 Hz			
		1	60 Hz			
		2	100 Hz			
		3	500 Hz			
		4	1 kHz,			
		5	2 kHz			
		6	3.75 kHz			
		7	7.5 kHz			
		8	15 kHz			
		9	30 kHz			
		10	5 Hz			
		11	10 Hz			
8020:16	Calibration interval	reserved		UINT16	RW	0x0000 (0_{dec})
8020:17	User calibration offset	User calibration: Offset		INT16	RW	0x0000 (0_{dec})
8020:18	User calibration gain	User calibration: Gain		UINT16	RW	0x4000 (16384_{dec})
8020:19	Sensor type	Thermocouple		UINT16	RW	0x0000 (0_{dec})
		0	Type K -200 °C to 1370 °C			
		1	Type J -100°C to 1200°C			
		2	Type L 0°C to 900°C			
		3	Type E -100°C to 1000°C			
		4	Type T -200°C to 400°C			
		5	Type N -100°C to 1300°C			
		6	Type U 0°C to 600°C			
		7	Type B 600°C to 1800°C			
		8	Type R 0°C to 1767°C			
		9	Type S 0°C to 1760°C			
		10	Type C 0°C to 2320°C			
		100	± 30 mV (1 µV resolution)			
		101	± 60 mV (2 µV resolution)			
		102	± 75 mV (4 µV resolution)			
8020:1B	Wire calibration 1/32 ohm	Only for 2-wire measurements: contains the resistance of the supply line for the temperature sensor (in 1/32 ohm).		INT16	RW	0x0000 (0_{dec})

Index 8030: TC Settings Ch.4

Index (hex)	Name	Meaning		Data type	Flags	Default
8030:0	TC Settings Ch.4	Maximum subindex		UINT8	RO	0x1B (27_{dec})
8030:01	Enable user scale	Activates user scaling		BOOLEAN	RW	0x00 (0_{dec})
8030:02	Presentation	Presentation of the measured value		BIT3	RW	0x00 (0_{dec})
		0	Signed, in two's complement			
		1	Most significant bit as sign			
		2	High-resolution (1/100 °C steps)			
8030:05	Siemens bits	The S5 bits are displayed in the three low-order bits		BOOLEAN	RW	0x00 (0_{dec})
8030:06	Enable filter	Enable filter, which makes PLC-cycle-synchronous data exchange unnecessary		BOOLEAN	RW	0x00 (0_{dec})
8030:07	Enable limit 1	Activates limit check for limit 1		BOOLEAN	RW	0x00 (0_{dec})
8030:08	Enable limit 2	Activates limit check for limit 2		BOOLEAN	RW	0x00 (0_{dec})
8030:0A	Enable user calibration	Activates user calibration		BOOLEAN	RW	0x00 (0_{dec})
8030:0B	Enable vendor calibration	Activates vendor calibration		BOOLEAN	RW	0x01 (1_{dec})
8030:0C	Cold junction compensation	Cold junction compensation		BIT2	RW	0x00 (0_{dec})
		0	Cold junction compensation takes place via the PT-1000 in the plug connector.			
		1	Cold junction compensation is not active.			
		2	Cold junction compensation takes place via the process data.			
8030:0E	Swap limit bits	Swaps the two limit bits, in order to achieve compatibility with older hardware versions.		BOOLEAN	RW	0x00 (0_{dec})
8030:11	User scale offset	User scaling: Offset		INT16	RW	0x0000 (0_{dec})
8030:12	User scale gain	User scaling: Gain		INT32	RW	0x00010000 (65536_{dec})
8030:13	Limit 1	Value for limit 1		INT16	RW	0x0000 (0_{dec})
8030:14	Limit 2	Value for limit 2		INT16	RW	0x0000 (0_{dec})
8030:15	Filter settings	Filter settings (Ch1. applies to all channels)		UINT16	RW	0x0000 (0_{dec})
		0	50 Hz			
		1	60 Hz			
		2	100 Hz			
		3	500 Hz			
		4	1 kHz,			
		5	2 kHz			
		6	3.75 kHz			
		7	7.5 kHz			
		8	15 kHz			
		9	30 kHz			
		10	5 Hz			
		11	10 Hz			
8030:16	Calibration interval	reserved		UINT16	RW	0x0000 (0_{dec})
8030:17	User calibration offset	User calibration: Offset		INT16	RW	0x0000 (0_{dec})
8030:18	User calibration gain	User calibration: Gain		UINT16	RW	0x4000 (16384_{dec})

Index 8030: TC Settings Ch.4

Index (hex)	Name	Meaning		Data type	Flags	Default
8030:19	Sensor type	Thermocouple		UINT16	RW	0x0000 (0_{dec})
		0	Type K -200 °C to 1370 °C			
		1	Type J -100°C to 1200°C			
		2	Type L 0°C to 900°C			
		3	Type E -100°C to 1000°C			
		4	Type T -200°C to 400°C			
		5	Type N -100°C to 1300°C			
		6	Type U 0°C to 600°C			
		7	Type B 600°C to 1800°C			
		8	Type R 0°C to 1767°C			
		9	Type S 0°C to 1760°C			
		10	Type C 0°C to 2320°C			
		100	± 30 mV (1 µV resolution)			
		101	± 60 mV (2 µV resolution)			
		102	± 75 mV (4 µV resolution)			
8030:1B	Wire calibration 1/32 ohm	Only for 2-wire measurements: contains the resistance of the supply line for the temperature sensor (in 1/32 ohm).		INT16	RW	0x0000 (0_{dec})

6.7.2 Objects for regular operation

The EP3314 has no such objects.

6.7.3 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	0x014A1389 (21631881_{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	EP3314-0002

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	01

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	0x0CF24052 (217202770_{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	0x00100002 (1048578_{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 1600: TC RxPDO-Map Outputs Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
1600:0	TC RxPDO-Map Outputs Ch.1	PDO Mapping RxPDO 1	UINT8	RO	0x01 (1_{dec})
1600:01	SubIndex 001	1. PDO Mapping entry (object 0x7000 (TC Outputs Ch.1), entry 0x11 (CJCompensation))	UINT32	RO	0x7000:11, 16

Index 1601: TC RxPDO-Map Outputs Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
1601:0	TC RxPDO-Map Outputs Ch.2	PDO Mapping RxPDO 2	UINT8	RO	0x01 (1_{dec})
1601:01	SubIndex 001	1. PDO Mapping entry (object 0x7010 (TC Outputs Ch.2), entry 0x11 (CJCompensation))	UINT32	RO	0x7010:11, 16

Index 1602: TC RxPDO-Map Outputs Ch.3

Index (hex)	Name	Meaning	Data type	Flags	Default
1602:0	TC RxPDO-Map Outputs Ch.3	PDO Mapping RxPDO 3	UINT8	RO	0x01 (1_{dec})
1602:01	SubIndex 001	1. PDO Mapping entry (object 0x7020 (TC Outputs Ch.3), entry 0x11 (CJCompensation))	UINT32	RO	0x7020:11, 16

Index 1603: TC RxPDO-Map Outputs Ch.4

Index (hex)	Name	Meaning	Data type	Flags	Default
1603:0	TC RxPDO-Map Outputs Ch.4	PDO Mapping RxPDO 4	UINT8	RO	0x01 (1_{dec})
1603:01	SubIndex 001	1. PDO Mapping entry (object 0x7030 (TC Outputs Ch.4), entry 0x11 (CJCompensation))	UINT32	RO	0x7030:11, 16

Index 1A00: TC TxPDO-Map TCInputs Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
1A00:0	TC TxPDO-Map TCInputs Ch.1	PDO Mapping TxPDO 1	UINT8	RO	0x0A (10_{dec})
1A00:01	SubIndex 001	1. PDO Mapping entry (object 0x6000 (TC Inputs Ch.1), entry 0x01 (Underrange))	UINT32	RO	0x6000:01, 1
1A00:02	SubIndex 002	2. PDO Mapping entry (object 0x6000 (TC Inputs Ch.1), entry 0x02 (Overrange))	UINT32	RO	0x6000:02, 1
1A00:03	SubIndex 003	3. PDO Mapping entry (object 0x6000 (TC Inputs Ch.1), entry 0x03 (Limit 1))	UINT32	RO	0x6000:03, 2
1A00:04	SubIndex 004	4. PDO Mapping entry (object 0x6000 (TC Inputs Ch.1), entry 0x05 (Limit 2))	UINT32	RO	0x6000:05, 2
1A00:05	SubIndex 005	5. PDO Mapping entry (object 0x6000 (TC 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 (TC Inputs Ch.1), entry 0x0E (Sync error))	UINT32	RO	0x6000:0E, 1
1A00:08	SubIndex 008	8. PDO Mapping entry (object 0x1800, entry 0x07)	UINT32	RO	0x1800:07, 1
1A00:09	SubIndex 009	9. PDO Mapping entry (object 0x1800, entry 0x09)	UINT32	RO	0x1800:09, 1
1A00:0A	SubIndex 010	10. PDO Mapping entry (object 0x6000 (TC Inputs Ch.1), entry 0x11 (Value))	UINT32	RO	0x6000:11, 16

Index 1A01: TC TxPDO-Map TCInputs Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
1A01:0	TC TxPDO-Map TCInputs Ch.2	PDO Mapping TxPDO 2	UINT8	RO	0x0A (10_{dec})
1A01:01	SubIndex 001	1. PDO Mapping entry (object 0x6010 (TC Inputs Ch.2), entry 0x01 (Underrange))	UINT32	RO	0x6010:01, 1
1A01:02	SubIndex 002	2. PDO Mapping entry (object 0x6010 (TC Inputs Ch.2), entry 0x02 (Overrange))	UINT32	RO	0x6010:02, 1
1A01:03	SubIndex 003	3. PDO Mapping entry (object 0x6010 (TC Inputs Ch.2), entry 0x03 (Limit 1))	UINT32	RO	0x6010:03, 2
1A01:04	SubIndex 004	4. PDO Mapping entry (object 0x6010 (TC Inputs Ch.2), entry 0x05 (Limit 2))	UINT32	RO	0x6010:05, 2
1A01:05	SubIndex 005	5. PDO Mapping entry (object 0x6010 (TC Inputs Ch.2), 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 0x6010 (TC Inputs Ch.2), entry 0x0E (Sync error))	UINT32	RO	0x6010:0E, 1
1A01:08	SubIndex 008	8. PDO Mapping entry (object 0x1801, entry 0x07)	UINT32	RO	0x1801:07, 1
1A01:09	SubIndex 009	9. PDO Mapping entry (object 0x1801, entry 0x09)	UINT32	RO	0x1801:09, 1
1A01:0A	SubIndex 010	10. PDO Mapping entry (object 0x6010 (TC Inputs Ch.2), entry 0x11 (Value))	UINT32	RO	0x6010:11, 16

Index 1A02: TC TxPDO-Map TCInputs Ch.3

Index (hex)	Name	Meaning	Data type	Flags	Default
1A02:0	TC TxPDO-Map TCInputs Ch.3	PDO Mapping TxPDO 3	UINT8	RO	0x0A (10_{dec})
1A02:01	SubIndex 001	1. PDO Mapping entry (object 0x6020 (TC Inputs Ch.3), entry 0x01 (Underrange))	UINT32	RO	0x6020:01, 1
1A02:02	SubIndex 002	2. PDO Mapping entry (object 0x6020 (TC Inputs Ch.3), entry 0x02 (Overrange))	UINT32	RO	0x6020:02, 1
1A02:03	SubIndex 003	3. PDO Mapping entry (object 0x6020 (TC Inputs Ch.3), entry 0x03 (Limit 1))	UINT32	RO	0x6020:03, 2
1A02:04	SubIndex 004	4. PDO Mapping entry (object 0x6020 (TC Inputs Ch.3), entry 0x05 (Limit 2))	UINT32	RO	0x6020:05, 2
1A02:05	SubIndex 005	5. PDO Mapping entry (object 0x6020 (TC Inputs Ch.3), entry 0x07 (Error))	UINT32	RO	0x6020:07, 1
1A02:06	SubIndex 006	6. PDO Mapping entry (6 bits align)	UINT32	RO	0x0000:00, 6
1A02:07	SubIndex 007	7. PDO Mapping entry (object 0x6020 (TC Inputs Ch.3), entry 0x0E (Sync error))	UINT32	RO	0x6020:0E, 1
1A02:08	SubIndex 008	8. PDO Mapping entry (object 0x1802, entry 0x07)	UINT32	RO	0x1802:07, 1
1A02:09	SubIndex 009	9. PDO Mapping entry (object 0x1802, entry 0x09)	UINT32	RO	0x1802:09, 1
1A02:0A	SubIndex 010	10. PDO Mapping entry (object 0x6020 (TC Inputs Ch.3), entry 0x11 (Value))	UINT32	RO	0x6020:11, 16

Index 1A03: TC TxPDO-Map TCInputs Ch.4

Index (hex)	Name	Meaning	Data type	Flags	Default
1A03:0	TC TxPDO-Map TCInputs Ch.4	PDO Mapping TxPDO 4	UINT8	RO	0x0A (10_{dec})
1A03:01	SubIndex 001	1. PDO Mapping entry (object 0x6030 (TC Inputs Ch.4), entry 0x01 (Underrange))	UINT32	RO	0x6030:01, 1
1A03:02	SubIndex 002	2. PDO Mapping entry (object 0x6030 (TC Inputs Ch.4), entry 0x02 (Overrange))	UINT32	RO	0x6030:02, 1
1A03:03	SubIndex 003	3. PDO Mapping entry (object 0x6030 (TC Inputs Ch.4), entry 0x03 (Limit 1))	UINT32	RO	0x6030:03, 2
1A03:04	SubIndex 004	4. PDO Mapping entry (object 0x6030 (TC Inputs Ch.4), entry 0x05 (Limit 2))	UINT32	RO	0x6030:05, 2
1A03:05	SubIndex 005	5. PDO Mapping entry (object 0x6030 (TC Inputs Ch.4), entry 0x07 (Error))	UINT32	RO	0x6030:07, 1
1A03:06	SubIndex 006	6. PDO Mapping entry (6 bits align)	UINT32	RO	0x0000:00, 6
1A03:07	SubIndex 007	7. PDO Mapping entry (object 0x6030 (TC Inputs Ch.4), entry 0x0E (Sync error))	UINT32	RO	0x6030:0E, 1
1A03:08	SubIndex 008	8. PDO Mapping entry (object 0x1803, entry 0x07)	UINT32	RO	0x1803:07, 1
1A03:09	SubIndex 009	9. PDO Mapping entry (object 0x1803, entry 0x09)	UINT32	RO	0x1803:09, 1
1A03:0A	SubIndex 010	10. PDO Mapping entry (object 0x6030 (TC Inputs Ch.4), entry 0x11 (Value))	UINT32	RO	0x6030:11, 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	0x00 (0_{dec})
1C12:01	Subindex 001	1. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x0000 (0_{dec})
1C12:02	Subindex 002	2. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x0000 (0_{dec})
1C12:03	Subindex 003	3. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x0000 (0_{dec})
1C12:04	Subindex 004	4. 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	0x04 (4_{dec})
1C13:01	Subindex 001	1. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x1A00 (6656_{dec})
1C13:02	Subindex 002	2. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x1A01 (6657_{dec})
1C13:03	Subindex 003	3. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x1A02 (6658_{dec})
1C13:04	Subindex 004	4. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x1A03 (6659_{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	0x0000 (0_{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 [▶ 97])	UINT16	RO	0xC007 (49159_{dec})
1C32:05	Minimum cycle time	Minimum cycle time (in ns)	UINT32	RO	0x00002710 (10000_{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 [▶ 97], 0x1C32:05 [▶ 97], 0x1C32:06 [▶ 97], 0x1C32:09 [▶ 97], 0x1C33:03 [▶ 98], 0x1C33:06 [▶ 97], 0x1C33:09 [▶ 98] 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 - Synchron with SYNC1 Event • 34: Synchron with SM 2 Event (outputs available)	UINT16	RW	0x0000 (0_{dec})
1C33:02	Cycle time	as 0x1C32:02 [▶ 97]	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: Synchron with SM 2 Event is supported (outputs available) • Bit 1: Synchron with SM 3 Event is supported (no outputs available) • Bit 2-3 = 01: DC mode is supported • Bit 4-5 = 01: input shift through local event (outputs available) • Bit 4-5 = 10: input shift with SYNC1 event (no outputs available) • Bit 14 = 1: dynamic times (measurement through writing of 0x1C32:08 [▶ 97] or 0x1C33:08 [▶ 98])	UINT16	RO	0xC007 (49159_{dec})
1C33:05	Minimum cycle time	as 0x1C32:05 [▶ 97]	UINT32	RO	0x00002710 (10000_{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 [▶ 97]	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 [▶ 97]	UINT16	RO	0x0000 (0_{dec})
1C33:0C	Cycle exceeded counter	as 0x1C32:12 [▶ 97]	UINT16	RO	0x0000 (0_{dec})
1C33:0D	Shift too short counter	as 0x1C32:13 [▶ 97]	UINT16	RO	0x0000 (0_{dec})
1C33:20	Sync error	as 0x1C32:32 [▶ 97]	BOOLEAN	RO	0x00 (0_{dec})

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

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

Index 6000: TC Inputs Ch.1

Index (hex)	Name	Meaning		Data type	Flags	Default
6000:0	TC Inputs Ch.1	Maximum subindex		UINT8	RO	0x11 (17_{dec})
6000:01	Underrange	Is set if the value falls below the operating range of the sensor or the process record contains the lowest possible value.		BOOLEAN	RO	0x00 (0_{dec})
6000:02	Overrange	Is set if the value exceeds the operating range of the sensor or the process record contains the highest possible value.		BOOLEAN	RO	0x00 (0_{dec})
6000:03	Limit 1	Only when limit check is active		BIT2	RO	0x00 (0_{dec})
		1	Value below set limit			
		2	Set limit exceeded			
		3	Set limit reached			
6000:05	Limit 2	Only when limit check is active		BIT2	RO	0x00 (0_{dec})
		1	Value below set limit			
		2	Set limit exceeded			
		3	Set limit reached			
6000:07	Error	The error bit is set if the process data is invalid (cable break, overrange, underrange)		BOOLEAN	RO	0x00 (0_{dec})
6000:0E	Sync error	Only in DC: bit is set if the slave is not able to operate synchronous with master, because it cannot keep up with the cycle time.		BOOLEAN	RO	0x00 (0_{dec})
6000:0F	TxPDO State	Validity of the data of the associated TxPDO		BOOLEAN	RO	0x00 (0_{dec})
		0	valid			
		1	invalid			
6000:10	TxPDO Toggle	TxPDO toggle is toggled by the slave when the data of the associated TxPDO is updated.		BOOLEAN	RO	0x00 (0_{dec})
6000:11	Value	Analog input value (resolution in 1/10 °C)		INT16	RO	0x0000 (0_{dec})

Index 6010: TC Inputs Ch.2

Index (hex)	Name	Meaning		Data type	Flags	Default
6010:0	TC Inputs Ch.2	Maximum subindex		UINT8	RO	0x11 (17_{dec})
6010:01	Underrange	Is set if the value falls below the operating range of the sensor or the process record contains the lowest possible value.		BOOLEAN	RO	0x00 (0_{dec})
6010:02	Overrange	Is set if the value exceeds the operating range of the sensor or the process record contains the highest possible value.		BOOLEAN	RO	0x00 (0_{dec})
6010:03	Limit 1	Only when limit check is active		BIT2	RO	0x00 (0_{dec})
		1	Value below set limit			
		2	Set limit exceeded			
		3	Set limit reached			
6010:05	Limit 2	Only when limit check is active		BIT2	RO	0x00 (0_{dec})
		1	Value below set limit			
		2	Set limit exceeded			
		3	Set limit reached			
6010:07	Error	The error bit is set if the process data is invalid (cable break, overrange, underrange)		BOOLEAN	RO	0x00 (0_{dec})
6010:0E	Sync error	Only in DC: bit is set if the slave is not able to operate synchronous with master, because it cannot keep up with the cycle time.		BOOLEAN	RO	0x00 (0_{dec})
6010:0F	TxPDO State	Validity of the data of the associated TxPDO		BOOLEAN	RO	0x00 (0_{dec})
		0	valid			
		1	invalid			
6010:10	TxPDO Toggle	TxPDO toggle is toggled by the slave when the data of the associated TxPDO is updated.		BOOLEAN	RO	0x00 (0_{dec})
6010:11	Value	Analog input value (resolution in 1/10 °C)		INT16	RO	0x0000 (0_{dec})

Index 6020: TC Inputs Ch.3

Index (hex)	Name	Meaning		Data type	Flags	Default
6020:0	TC Inputs Ch.3	Maximum subindex		UINT8	RO	0x11 (17_{dec})
6020:01	Underrange	Is set if the value falls below the operating range of the sensor or the process record contains the lowest possible value.		BOOLEAN	RO	0x00 (0_{dec})
6020:02	Overrange	Is set if the value exceeds the operating range of the sensor or the process record contains the highest possible value.		BOOLEAN	RO	0x00 (0_{dec})
6020:03	Limit 1	Only when limit check is active		BIT2	RO	0x00 (0_{dec})
		1	Value below set limit			
		2	Set limit exceeded			
		3	Set limit reached			
6020:05	Limit 2	Only when limit check is active		BIT2	RO	0x00 (0_{dec})
		1	Value below set limit			
		2	Set limit exceeded			
		3	Set limit reached			
6020:07	Error	The error bit is set if the process data is invalid (cable break, overrange, underrange)		BOOLEAN	RO	0x00 (0_{dec})
6020:0E	Sync error	Only in DC: bit is set if the slave is not able to operate synchronous with master, because it cannot keep up with the cycle time.		BOOLEAN	RO	0x00 (0_{dec})
6020:0F	TxPDO State	Validity of the data of the associated TxPDO		BOOLEAN	RO	0x00 (0_{dec})
		0	valid			
		1	invalid			
6020:10	TxPDO Toggle	TxPDO toggle is toggled by the slave when the data of the associated TxPDO is updated.		BOOLEAN	RO	0x00 (0_{dec})
6020:11	Value	Analog input value (resolution in 1/10°C)		INT16	RO	0x0000 (0_{dec})

Index 6030: TC Inputs Ch.4

Index (hex)	Name	Meaning		Data type	Flags	Default
6030:0	TC Inputs Ch.4	Maximum subindex		UINT8	RO	0x11 (17_{dec})
6030:01	Underrange	Is set if the value falls below the operating range of the sensor or the process record contains the lowest possible value.		BOOLEAN	RO	0x00 (0_{dec})
6030:02	Overrange	Is set if the value exceeds the operating range of the sensor or the process record contains the highest possible value.		BOOLEAN	RO	0x00 (0_{dec})
6030:03	Limit 1	Only when limit check is active		BIT2	RO	0x00 (0_{dec})
		1	Value below set limit			
		2	Set limit reached			
		3	Set limit exceeded			
6030:05	Limit 2	Only when limit check is active		BIT2	RO	0x00 (0_{dec})
		1	Value below set limit			
		2	Set limit reached			
		3	Set limit exceeded			
6030:07	Error	The error bit is set if the process data is invalid (cable break, overrange, underrange)		BOOLEAN	RO	0x00 (0_{dec})
6030:0E	Sync error	Only in DC: bit is set if the slave is not able to operate synchronous with master, because it cannot keep up with the cycle time.		BOOLEAN	RO	0x00 (0_{dec})
6030:0F	TxPDO State	Validity of the data of the associated TxPDO		BOOLEAN	RO	0x00 (0_{dec})
		0	valid			
		1	invalid			
6030:10	TxPDO Toggle	TxPDO toggle is toggled by the slave when the data of the associated TxPDO is updated.		BOOLEAN	RO	0x00 (0_{dec})
6030:11	Value	Analog input value (resolution in 1/10°C)		INT16	RO	0x0000 (0_{dec})

Index 7000: TC Outputs Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
7000:0	TC Outputs Ch.1	Maximum subindex	UINT8	RO	0x11 (17_{dec})
7000:11	CJCompensation	Temperature of the cold junction (resolution in 1/10°C) (index 0x8000:0C [▶ 87], comparison via the process data))	INT16	RO	0x0000 (0_{dec})

Index 7010: TC Outputs Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
7010:0	TC Outputs Ch.2	Maximum subindex	UINT8	RO	0x11 (17_{dec})
7010:11	CJCompensation	Temperature of the cold junction (resolution in 1/10°C) (index 0x8000:0C [▶ 88], comparison via the process data)	INT16	RO	0x0000 (0_{dec})

Index 7020: TC Outputs Ch.3

Index (hex)	Name	Meaning	Data type	Flags	Default
7020:0	TC Outputs Ch.3	Maximum subindex	UINT8	RO	0x11 (17_{dec})
7020:11	CJCompensation	Temperature of the cold junction (resolution in 1/10°C) (index 0x8020:0C [▶ 89], comparison via the process data)	INT16	RO	0x0000 (0_{dec})

Index 7030: TC Outputs Ch.4

Index (hex)	Name	Meaning	Data type	Flags	Default
7030:0	TC Outputs Ch.4	Maximum subindex	UINT8	RO	0x11 (17_{dec})
7030:11	CJCompensation	Temperature of the cold junction (resolution in 1/10°C) (index 0x8030:0C [▶ 91], comparison via the process data)	INT16	RO	0x0000 (0_{dec})

Index 800E: TC Internal data Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
800E:0	TC Internal data Ch.1	Maximum subindex	UINT8	RO	0x05 (5_{dec})
800E:01	ADC raw value TC	Raw value of the analog/digital converter for the thermo-couple	INT32	RO	0x00000000 (0_{dec})
800E:02	ADC raw value PT1000	Raw value of the analog/digital converter for the PT1000	INT32	RO	0x00000000 (0_{dec})
800E:03	CJ temperature	Cold junction temperature (resolution 1/10 °C)	INT16	RO	0x0000 (0_{dec})
800E:04	CJ voltage	Cold junction voltage (resolution 1 µV)	INT16	RO	0x0000 (0_{dec})
800E:05	CJ resistor	Cold junction resistance for PT1000 temperature sensor (resolution 1/10 ohm)	UINT16	RO	0x0000 (0_{dec})

Index 800F: TC Vendor data Ch.1

Index (hex)	Name	Meaning	Data type	Flags	Default
800F:0	TC Vendor data Ch.1	Maximum subindex	UINT8	RO	0x04 (4_{dec})
800F:01	Calibration offset TC	Manufacturer calibration for thermocouple: Offset	INT16	RW	0x0000 (0_{dec})
800F:02	Calibration gain TC	Manufacturer calibration for thermocouple: Gain	UINT16	RW	0x4000 (16384_{dec})
800F:03	Calibration offset CJ	Manufacturer calibration for cold junction (PT1000): Off-set	INT16	RW	0x0000 (0_{dec})
800F:04	Calibration gain CJ	Manufacturer calibration for cold junction (PT1000): Gain	UINT16	RW	0x4000 (16384_{dec})

Index 801E: TC Internal data Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
801E:0	TC Internal data Ch.2	Maximum subindex	UINT8	RO	0x05 (5_{dec})
801E:01	ADC raw value TC	Raw value of the analog/digital converter for the thermocouple	INT32	RO	0x00000000 (0_{dec})
801E:02	ADC raw value PT1000	Raw value of the analog/digital converter for the PT1000	INT32	RO	0x00000000 (0_{dec})
801E:03	CJ temperature	Cold junction temperature (resolution 1/10 °C)	INT16	RO	0x0000 (0_{dec})
801E:04	CJ voltage	Cold junction voltage (resolution 1 µV)	INT16	RO	0x0000 (0_{dec})
801E:05	CJ resistor	Cold junction resistance for PT1000 temperature sensor (resolution 1/10 ohm)	UINT16	RO	0x0000 (0_{dec})

Index 801F: TC Vendor data Ch.2

Index (hex)	Name	Meaning	Data type	Flags	Default
801F:0	TC Vendor data Ch.2	Maximum subindex	UINT8	RO	0x04 (4_{dec})
801F:01	Calibration offset TC	Manufacturer calibration for thermocouple: Offset	INT16	RW	0x0000 (0_{dec})
801F:02	Calibration gain TC	Manufacturer calibration for thermocouple: Gain	UINT16	RW	0x4000 (16384_{dec})
801F:03	Calibration offset CJ	Manufacturer calibration for cold junction (PT1000): Offset	INT16	RW	0x0000 (0_{dec})
801F:04	Calibration gain CJ	Manufacturer calibration for cold junction (PT1000): Gain	UINT16	RW	0x4000 (16384_{dec})

Index 802E: TC Internal data Ch.3

Index (hex)	Name	Meaning	Data type	Flags	Default
802E:0	TC Internal data Ch.3	Maximum subindex	UINT8	RO	0x05 (5_{dec})
802E:01	ADC raw value TC	Raw value of the analog/digital converter for the thermocouple	INT32	RO	0x00000000 (0_{dec})
802E:02	ADC raw value PT1000	Raw value of the analog/digital converter for the PT1000	INT32	RO	0x00000000 (0_{dec})
802E:03	CJ temperature	Cold junction temperature (resolution 1/10°C)	INT16	RO	0x0000 (0_{dec})
802E:04	CJ voltage	Cold junction voltage (resolution 1 µV)	INT16	RO	0x0000 (0_{dec})
802E:05	CJ resistor	Cold junction resistance for PT1000 temperature sensor (resolution 1/10 ohm)	UINT16	RO	0x0000 (0_{dec})

Index 802F: TC Vendor data Ch.3

Index (hex)	Name	Meaning	Data type	Flags	Default
802F:0	TC Vendor data Ch.3	Maximum subindex	UINT8	RO	0x04 (4_{dec})
802F:01	Calibration offset TC	Manufacturer calibration for thermocouple: Offset	INT16	RW	0x0000 (0_{dec})
802F:02	Calibration gain TC	Manufacturer calibration for thermocouple: Gain	UINT16	RW	0x4000 (16384_{dec})
802F:03	Calibration offset CJ	Manufacturer calibration for cold junction (PT1000): Offset	INT16	RW	0x0000 (0_{dec})
802F:04	Calibration gain CJ	Manufacturer calibration for cold junction (PT1000): Gain	UINT16	RW	0x4000 (16384_{dec})

Index 803E: TC Internal data Ch.4

Index (hex)	Name	Meaning	Data type	Flags	Default
803E:0	TC Internal data Ch.4	Maximum subindex	UINT8	RO	0x05 (5_{dec})
803E:01	ADC raw value TC	Raw value of the analog/digital converter for the thermocouple	INT32	RO	0x00000000 (0_{dec})
803E:02	ADC raw value PT1000	Raw value of the analog/digital converter for the PT1000	INT32	RO	0x00000000 (0_{dec})
803E:03	CJ temperature	Cold junction temperature (resolution 1/10°C)	INT16	RO	0x0000 (0_{dec})
803E:04	CJ voltage	Cold junction voltage (resolution 1 µV)	INT16	RO	0x0000 (0_{dec})
803E:05	CJ resistor	Cold junction resistance for PT1000 temperature sensor (resolution 1/10 ohm)	UINT16	RO	0x0000 (0_{dec})

Index 803F: TC Vendor data Ch.4

Index (hex)	Name	Meaning	Data type	Flags	Default
803F:0	TC Vendor data Ch.4	Maximum subindex	UINT8	RO	0x04 (4_{dec})
803F:01	Calibration offset TC	Manufacturer calibration for thermocouple: Offset	INT16	RW	0x0000 (0_{dec})
803F:02	Calibration gain TC	Manufacturer calibration for thermocouple: Gain	UINT16	RW	0x4000 (16384_{dec})
803F:03	Calibration offset CJ	Manufacturer calibration for cold junction (PT1000): Offset	INT16	RW	0x0000 (0_{dec})
803F:04	Calibration gain CJ	Manufacturer calibration for cold junction (PT1000): Gain	UINT16	RW	0x4000 (16384_{dec})

Index F000: Modular device profile

Index (hex)	Name	Meaning	Data type	Flags	Default
F000:0	Modular device profile	Maximum subindex	UINT8	RO	0x02 (2_{dec})
F000:01	Module index distance	Index spacing for the objects of the individual channels	UINT16	RO	0x0010 (16_{dec})
F000:02	Maximum number of modules	Number of channels	UINT16	RO	0x0004 (4_{dec})

Index F008: Code word

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

Index F010: Module list

Index (hex)	Name	Meaning	Data type	Flags	Default
F010:0	Module list	Maximum subindex	UINT8	RW	0x04 (4_{dec})
F010:01	SubIndex 001		UINT32	RW	0x0000014A (330_{dec})
F010:02	SubIndex 002		UINT32	RW	0x0000014A (330_{dec})
F010:03	SubIndex 003		UINT32	RW	0x0000014A (330_{dec})
F010:04	SubIndex 004		UINT32	RW	0x0000014A (330_{dec})

Index F080: Channel Enable

Index (hex)	Name	Meaning			Data type	Flags	Default
F080:0	Channel Enable	Maximum subindex			UINT8	RO	0x04 (4_{dec})
F080:01	SubIndex 001	0	Channel 1 disabled	(from hardware version 01 deactivated channels are not measured, and the green LED R for these channels goes out)	BOOLEAN	RW	0x01 (1_{dec})
		1	Channel 1 enabled				
F080:02	SubIndex 002	0	Channel 2 disabled		BOOLEAN	RW	0x01 (1_{dec})
		1	Channel 2 enabled				
F080:03	SubIndex 003	0	Channel 3 disabled		BOOLEAN	RW	0x01 (1_{dec})
		1	Channel 3 enabled				
F080:04	SubIndex 004	0	Channel 4 disabled		BOOLEAN	RW	0x01 (1_{dec})
		1	Channel 5 enabled				

6.8 Restoring the delivery state

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

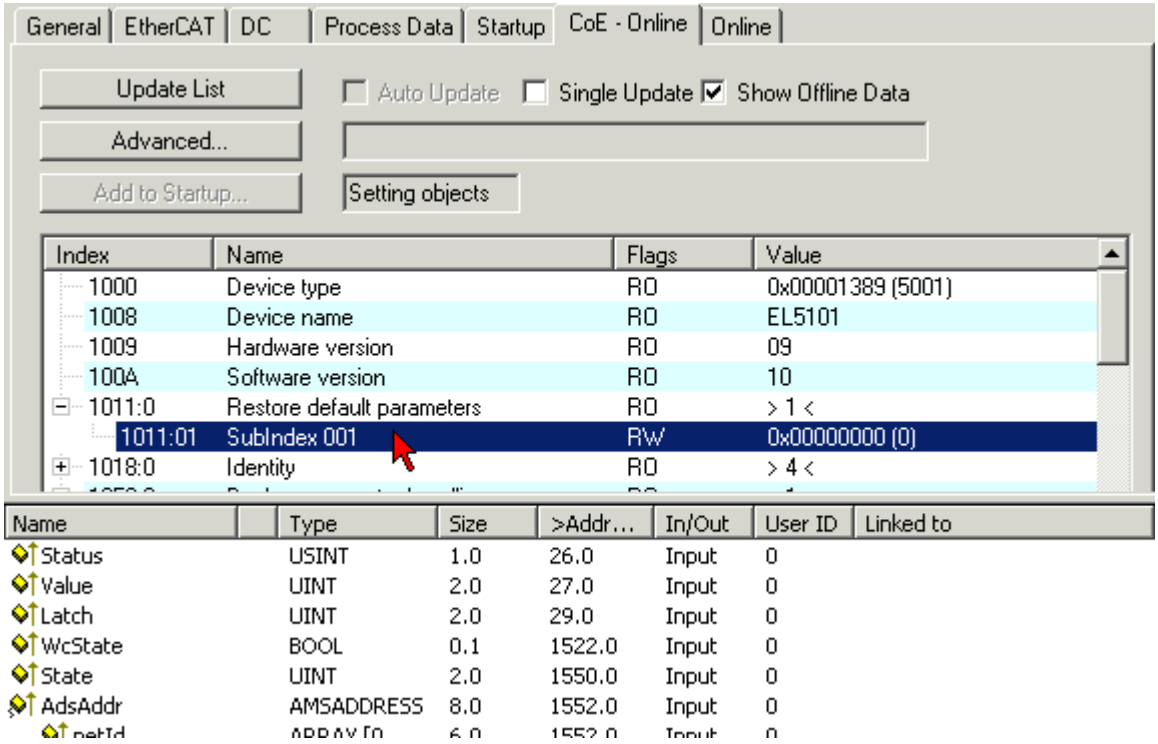

Fig. 54: Selecting the Restore default parameters PDO

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

All backup objects are reset to the delivery state.

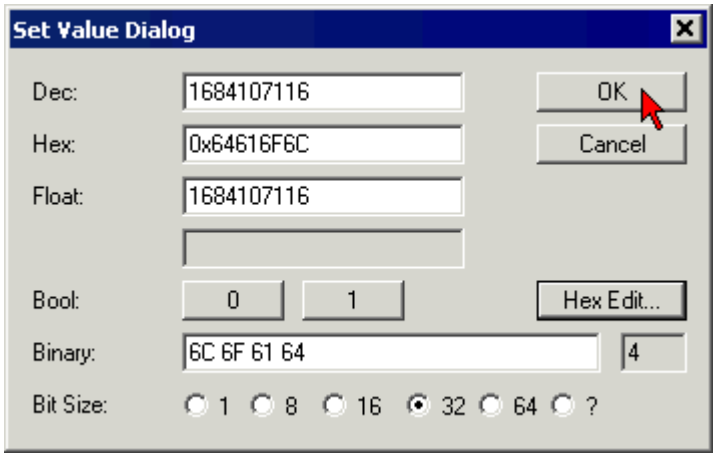

Fig. 55: Entering a restore value in the Set Value dialog

Alternative restore value

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

An incorrect entry for the restore value has no effect.

7 Appendix

7.1 General operating conditions

Protection degrees (IP-Code)

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

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

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

*) These protection classes define only protection against water!

Chemical Resistance

The Resistance relates to the Housing of the Fieldbus/EtherCAT Box and the used metal parts. In the table below you will find some typical resistance.

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

Key

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

7.2 EtherCAT Box- / EtherCAT P Box - Accessories

Fixing

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

Marking material, plugs

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

Tools

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

Further accessories

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

7.3 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

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You will also find further documentation for Beckhoff components there.

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List of illustrations