BECKHOFF New Automation Technology

Documentation | EN

EP92x4-0023

Power Distribution for EtherCAT Box modules

2022-04-05 | Version: 2.7

Table of contents

1 Foreword

1.1 Notes on the documentation

Intended audience

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

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

Disclaimer

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

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

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

Trademarks

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

Patent Pending

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

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

Copyright

1.2 Safety instructions

Safety regulations

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

Exclusion of liability

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

Personnel qualification

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

Description of instructions

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

⚠ DANGER

Serious risk of injury!

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

⚠ WARNING

Risk of injury!

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

⚠ CAUTION

Personal injuries!

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

NOTE

Damage to environment/equipment or data loss

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

Tip or pointer

This symbol indicates information that contributes to better understanding.

1.3 Documentation issue status

Version	Comment
2.7	• English translation updated • Structure update
2.6	• English translation updated • Structure update
2.5	• Front page updated • Scope of delivery added • Technical data updated • Structure update
2.4	• Safety instructions adapted to IEC 82079-1. • EP9224-0023: specification of the measured values added. • Structure update
2.3.1	• Nut torques for connectors updated • Chapter *Switch-off behavior* updated
2.3.0	• Cabling added
2.2.0	• Operation with or without EtherCAT master updated
2.1.0	• Power Connection updated
2.0.0	• Migration • Chapter *Mounting and Cabling* updated • Chapter *Tightening torques for connectors* extended • Chapter *Switch-off behavior* updated • Object descriptions updated
1.1.0	• EP9224-0023 added
1.0.0	• First release
0.1	• Preliminary version (internal only)

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	EP9214-0023		EP9224-0023	
	Firmware	Hardware	Firmware	Hardware
2.7	12	15	05	15
2.6	12	14	05	14
2.5	12	14	05	14
2.4	12	14	05	14
2.3.1	12	14	05	13
2.3.0	10	11	04	11
2.2.0	10	11	04	11
2.1.0	09	11	04	10
2.0.0	09	10	04	10
1.1.0	09	06	04	06
1.0.0	07	03	-	-
0.1	07	03	-	-

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

Syntax of the batch number (D-number)

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

Further information on this topic: Version identification of EtherCAT devices [▶ 100].

2 Product overview

2.1 EtherCAT Box - Introduction

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

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

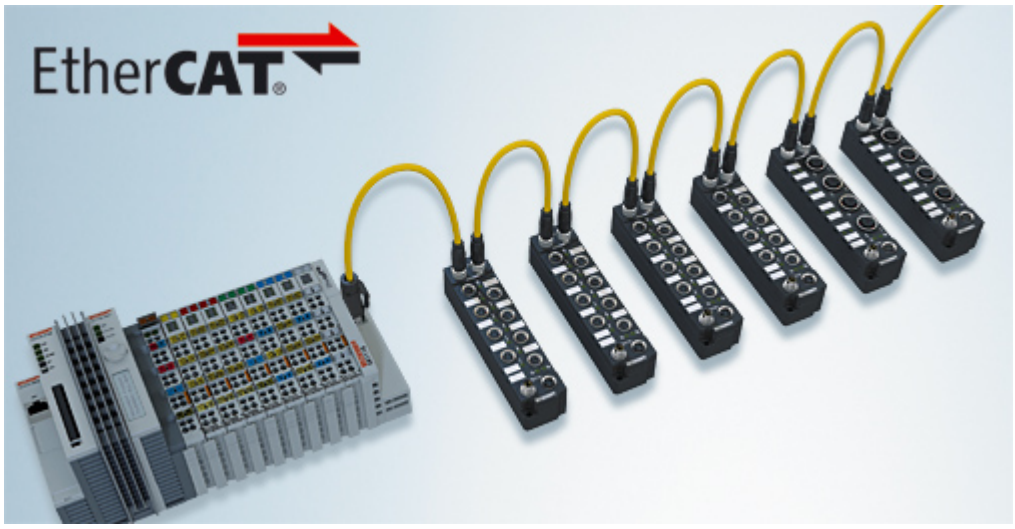


Fig. 1: EtherCAT Box Modules within an EtherCAT network

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

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

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

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

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

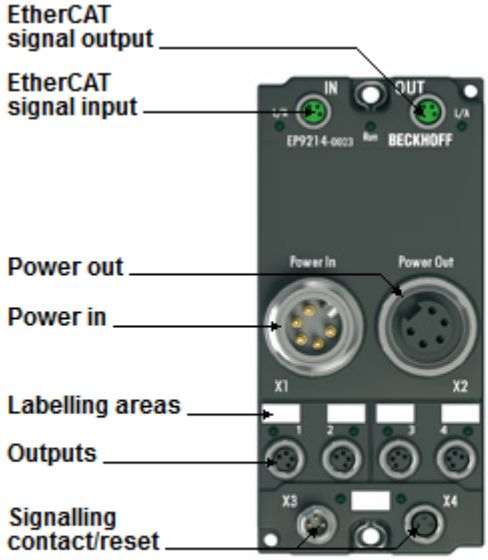
Fig. 2: EtherCAT Box with M8 connections for sensors/actuators

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

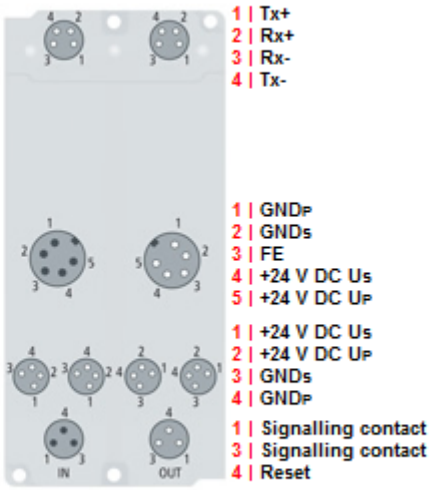
Basic EtherCAT documentation

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

2.2 EP9214 - Introduction



EP9214-0023



Connector assignment

Power distribution for EtherCAT Box modules

The EP9214-0023 enables connection of four power supply branches. In each branch the current consumption for the control voltage U_S and the peripheral voltage U_P is monitored, limited, and, if necessary, switched off.

The power distribution is supplied via a 7/8" connector with up to 16 A (per voltage supply U_S/U_P). Several modules can be configured in a cascade arrangement. In the event of a short-circuit in one of the four outputs, the affected output is switched off. The supply for the other branches remains active. The switch-off and control is done in such a way that the input voltage does not fall below 21 V or other modules are going down, caused by undervoltage. During startup consumers with large capacities can be added without problem.

The master can read diagnostic messages from the individual channels via the EtherCAT interface. Independent switching of individual consumer branches is also possible via the EtherCAT master.

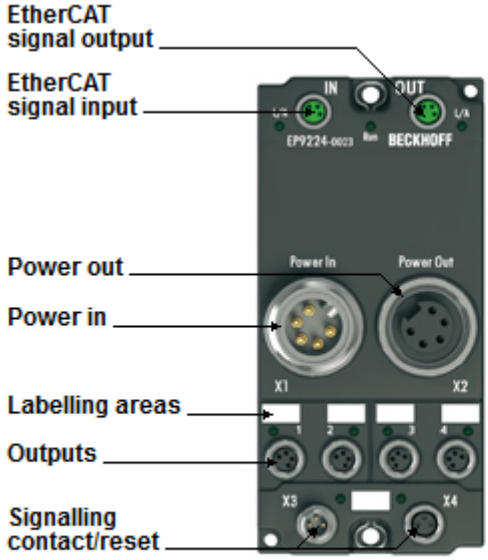
In delivery state the eight outputs of the box (4 times U_S, 4 times U_P) are activated to enable operation without EtherCAT.

After an error caused the switch off of a channel, this channel remains switched of when you try to switch it on again and has to be set back actively by the EtherCAT master or a hardware reset at the box (lower M8 socket).

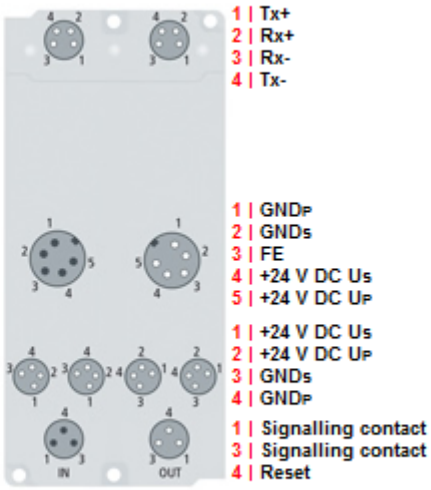
Quick links

Installation [▶ 15]
Configuration [▶ 29]

2.3 EP9224 - Introduction



EP9224-0023



Connector assignment

Power distribution for EtherCAT Box modules with current measurement/data logging

The EP9224-0023 enables connection of four power supply branches. In each branch the current consumption for the control voltage U_S and the peripheral voltage U_P is monitored, limited, and, if necessary, switched off.

The input voltage and current values of all outputs can be evaluated via the process data. A continuous data log of the relevant data can be retrieved when an error occurs in order to localise the cause of the error.

The power distribution is supplied via a 7/8" connector with up to 16 A (per voltage supply U_S/U_P). Several modules can be configured in a cascade arrangement. In the event of a short-circuit in one of the four outputs, the affected output is switched off. The supply for the other branches remains active. The switch-off and control is done in such a way that the input voltage does not fall below 21 V or other modules are going down, caused by undervoltage. During startup consumers with large capacities can be added without problem.

The master can read diagnostic messages from the individual channels via the EtherCAT interface. Independent switching of individual consumer branches is also possible via the EtherCAT master.

In delivery state the eight outputs of the box (4 times Us, 4 times Up) are activated to enable operation without EtherCAT.

After an error caused the switch off of a channel, this channel remains switched off when you try to switch it on again and has to be set back actively by the EtherCAT master or a hardware reset at the box (lower M8 socket).

Additional to this basic functionality that is also provided by EP9214, the EP9224 displays the voltage values of PowerIn supply and all current values of inputs and outputs within the process data.

The box has got an internal log file, that is writing the system values continuously into a ring buffer. This data logging has to be activated at the startup.
In error case it is stopped, so a history of the system parameters from before the error case can be read out. This enables a much quicker error localization.

Quick links

Installation [▶ 15]
Configuration [▶ 29]

2.4 Technical data

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

EtherCAT	
Connection	2 x M8 socket, 4-pin, green
Electrical isolation	500 V

Supply voltages	
Connection	Input: 7/8" - plug, 5-pin Downstream connection: 7/8" - socket, 5-pin
U_S nominal voltage	24 V_{DC} (-15 % / +20 %)
U_S sum current [1]	max. 16 A at 40 °C
Current consumption from U_S	110 mA + sum of the output currents
Rated voltage U_P	24 V_{DC} (-15 % / +20 %)
U_P sum current [1]	max. 16 A at 40 °C
Current consumption from U_P	40 mA + sum of the output currents

[1] This value corresponds to the current carrying capacity of the connectors.

Outputs	
Number	4
Connection	4 x M8 socket, black
Output current per M8 socket	max. 4 A per U_S and U_P
Parallel switching of outputs	not permissible
Voltage drop U_{ON}	90 mV per ampere
Inrush delay [2]	adjustable: 10 ms, 100 ms, 200 ms

[2] The output voltages are switched on one after the other at the start so that the input inrush currents do not add up.

Protective functions and diagnostics	EP9214-0023	EP9224-0023
Overcurrent tripping characteristic	Individually adjustable [▶ 33] for each output.	
Temperature switch-off	85 °C internal temperature	
Internal fuse (fail-safe element)	7 A (FF)	
Data logging	-	40 entries Sample time: 1...1000 ms

Reset contact and signaling contact	
Connection	M8 connector X3: 3-pin, black M8 socket X4: 3-pin, black
Reset contact	Digital input, nominal voltage: 24 V_{DC}
Signaling contact	Potential-free NO contact

Measured values	EP9214-0023	EP9224-0023
Representation	-	Measured current values: • Output currents per channel: 1 mA / LSB • Sum currents: 10 mA / LSB Measured voltage values: 100 mV / LSB
Resolution	-	Measured current values: 10 mA Measured voltage values: 100 mV
Accuracy	-	5 % of full scale value

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

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

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

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

2.5 Scope of supply

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

- 1x EtherCAT Box EP92x4-0023
- 2x protective cap for EtherCAT socket, M8, green (pre-assembled)
- 1x protective cap for supply voltage input, M8, transparent (pre-assembled)
- 4x protective cap for supply voltage output, M8, black (pre-assembled)
- 1x Protective cap for supply voltage output, 7/8”, black (pre-fitted)
- 10x labels, blank (1 strip of 10)

Pre-assembled protective caps do not ensure IP67 protection

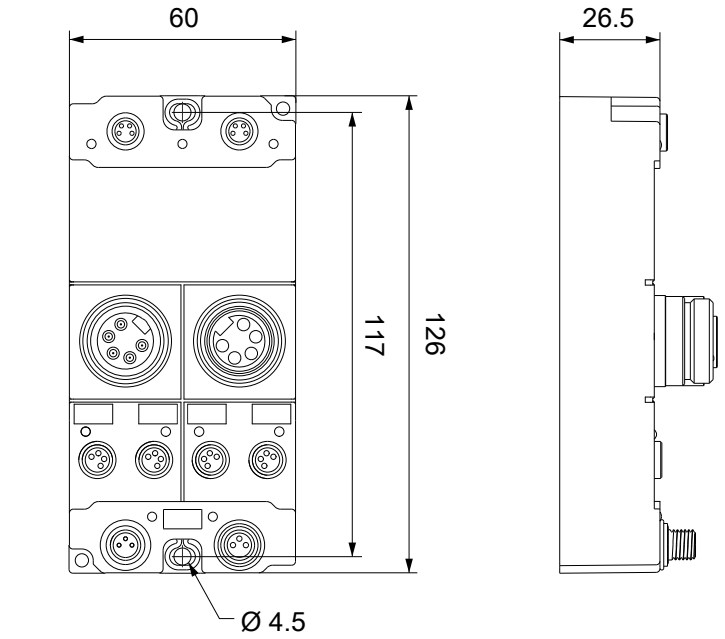
Protective caps are pre-assembled at the factory to protect connectors during transport. They may not be tight enough to ensure IP67 protection.

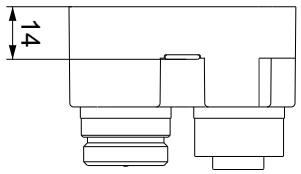
Ensure that the protective caps are correctly seated to ensure IP67 protection.

3 Mounting and cabling

3.1 Mounting

3.1.1 Dimensions





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

Housing features

Housing material	PA6 (polyamide)
Sealing compound	polyurethane
Mounting	two fastening holes Ø 4.5 mm for M4
Metal parts	brass, nickel-plated
Contacts	CuZn, gold-plated
Power feed through	max. 16 A at 40 °C (7/8” connectors)
Mounting position	variable
Protection class	IP65, IP66, IP67 (conforms to EN 60529) when screwed together
Dimensions (H x W x D)	approx. 126 x 60 x 26.5 mm (without connectors)

3.1.2 Fixing

NOTE

Dirt during assembly

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

- Protect the plug connectors against dirt during the assembly.

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

Cooling plate

The EP9214 module has a cooling plate on the underside. For the effective dissipation of the resultant power loss, the box must be bolted to a metal base, e.g. the machine bed, if possible making contact over the entire surface. A temperature-related automatic switch-off of the box can occur if care is not taken to ensure that the power loss from the module is dissipated via the cooling plate. A corresponding temperature error bit is then set!

3.1.3 Tightening torques for plug connectors

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

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

3.1.4 Functional earth (FE)

All existing connections for the functional earth must be connected to earth:

- Fastening holes
- "FE" cores in the supply cables

Functional earth via the fastening holes

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

Make sure that the box is earthed with low impedance via both fastening screws.

Functional earth via the supply lines

The pins of the supply connectors marked with "FE" are directly connected to the functional earth potential of the fastening holes.

Connect the functional earth of the "FE" cores in accordance with the following instructions:

- If the remote station is a device with 7/8"-connector: connect the devices with a pre-configured cable. Possible types of preconfigured cables:
  - Beckhoff ZK2030-1112-0xxx
  - Beckhoff ZK2030-1114-0xxx
  - Beckhoff ZK2030-1314-0xxx
- Otherwise: ground the "FE" core with low impedance as near as possible to the remote station.

3.2 EtherCAT

3.2.1 Connectors

NOTE

Risk of confusion: supply voltages and EtherCAT

Defect possible through incorrect insertion.

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

EtherCAT Box Modules have two green M8 sockets for the incoming and downstream EtherCAT connections.

Fig. 4: EtherCAT connectors

Connection

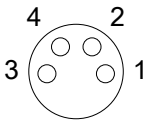


Fig. 5: M8 socket

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

[1)] Core colors according to EN 61918

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

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

3.2.2 Status LEDs

Fig. 6: EtherCAT Status LEDs

L/A (Link/Act)

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

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

Run

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

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

Description of the EtherCAT slave states

3.2.3 Cables

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

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

Detailed recommendations for the cabling of EtherCAT devices

3.3 Supply voltage input and downstream connection

3.3.1 Connection

NOTE

Use cables with suitable cross-sections!

Ensure that the cross-sections of the cables employed are suitable for the load circuit inputs and outputs and the respective nominal current being used!

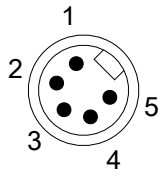
The supply voltages are fed and relayed onward via two 7/8" connectors in the center of the modules:

- "Power IN", left: 7/8" plug for feeding the supply voltages
- "Power OUT", right: 7/8" socket for downstream connection of supply voltages

The contacts of the 7/8" connectors can conduct a maximum current of 16 A (40 °C).

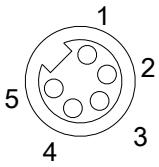
Two LEDs next to the device identifier label indicate the status of the supply voltages.

Pin assignment



Input

7/8“ connector



Downstream connection

7/8" socket

Pin	Voltage
1	GND Up
2	GND Us
3	FE (functional earth), (including upper and lower wire bracket of the central screw connection)
4	Control voltage Us, +24 V_{DC}
5	Peripheral voltage Up, +24 V_{DC}

For suitable connection cables, see chapter Accessories.

Control voltage Us: 24 V_{DC}

The fieldbus and the processor logic are supplied from the 24 V_{DC} control voltage Us. The control voltage is electrically isolated from the fieldbus circuitry.

Peripheral voltage Up: 24 V_{DC}

The peripheral voltage Up is monitored and fed to the power outputs, but is not used in the EP9214.

Redirection of the supply voltages

The power connections Power In and Power Out are bridged in the module. Hence, the supply voltages Us and Up can be passed from EtherCAT Box to EtherCAT Box in a simple manner.

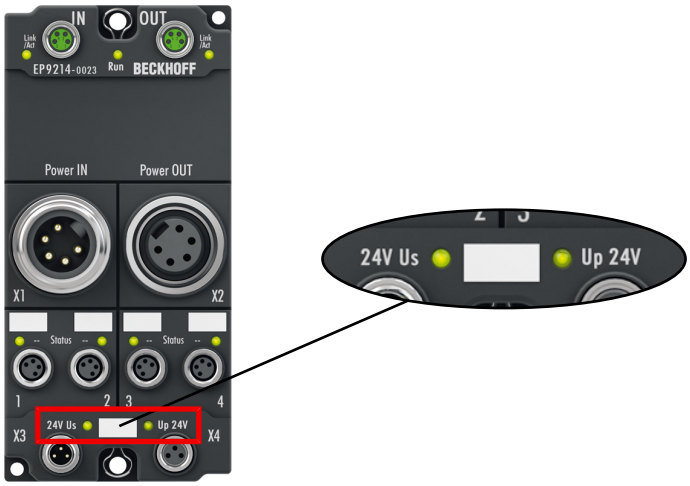
NOTE

Observe the maximum current of the 7/8" plug connectors!

Also ensure when relaying the supply voltages Us and Up onward that the maximum permissible current of 16 A / 40 °C for each 7/8" plug connector is not exceeded!

3.3.2 Status LEDs

Status LEDs for the power supply



LED	Display	Meaning
Us (control voltage)	off	The supply voltage Us is not available.
	green illuminated	The supply voltage Us is available.
Up (peripheral voltage)	off	The supply voltage Up is not available.
	green illuminated	The supply voltage Up is available.

3.3.3 Conductor losses 7/8"

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

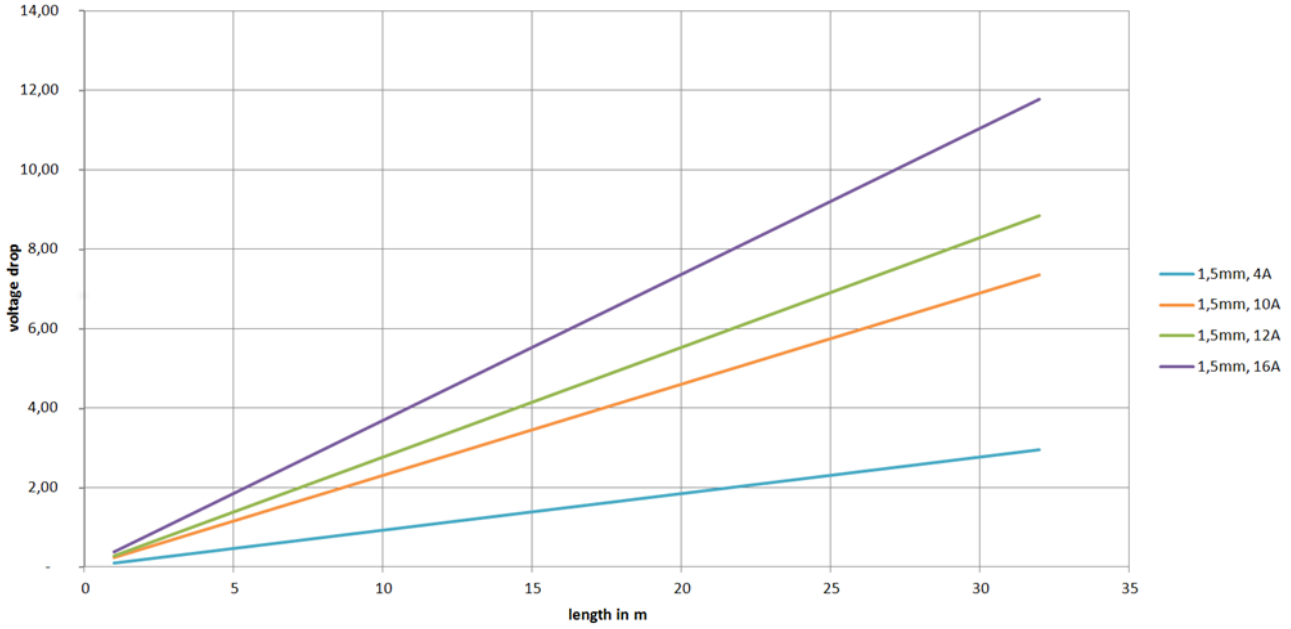


Fig. 7: ZK2030-xxxx-yyy - Conductor losses

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

3.4 Supply voltage outputs

3.4.1 Connection

NOTE

Risk of confusion: supply voltages and EtherCAT

Defect possible through incorrect insertion.

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

The supply voltages are output via four 4-pin M8 sockets labeled 1, 2, 3 and 4.

Connection

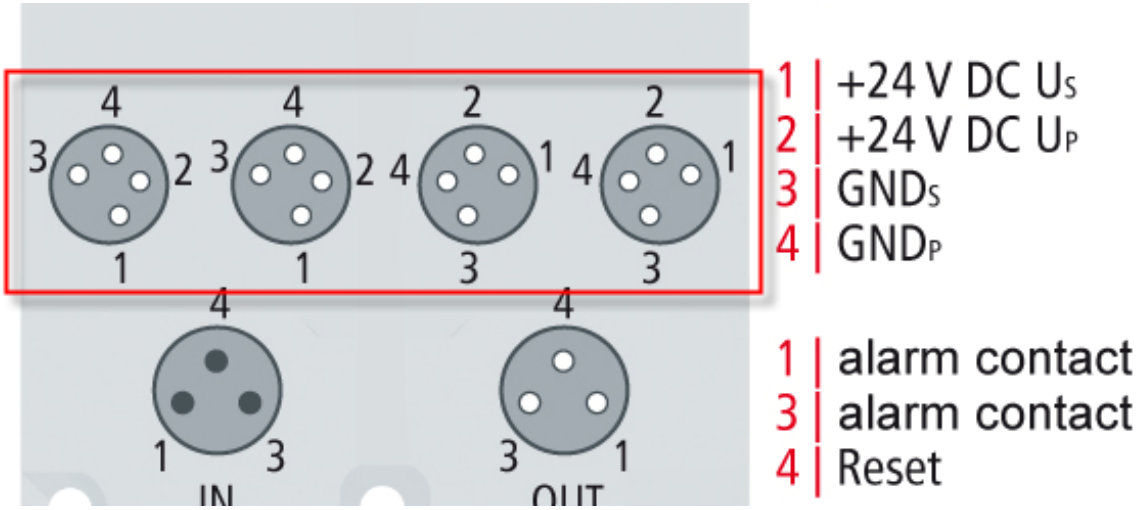


Fig. 8: Connection of the M8 sockets

Contact	Voltage	
1	Control voltage Us, +24 V_{DC}	
2	Peripheral voltage Up, +24 V_{DC}	
3	GNDs*	*) may be internally connected to one another depending on the connected module: see individual module descriptions
4	GNDp*	

The contacts of the M8 connectors can conduct a maximum current of 4 A.

A LED indicates the status of the power outputs.

NOTE

Do not confuse the power outputs with the EtherCAT connection

Never connect the power cables (M8, 24 V_{DC}) to the green-marked EtherCAT sockets of the EtherCAT Box Modules. This can cause the destruction of the modules!

Control voltage Us: 24 V_{DC}

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

Peripheral voltage Up: 24 V_{DC}

The peripheral voltage Up (24 V_{DC}) supplies the digital outputs; it can be supplied separately. Hence, if the load voltage is switched off, the fieldbus function as well as the supply and function of the inputs are retained.

Electrical isolation

The grounds of the control voltage (GNDs) and peripheral voltage (GNDp) are electrically isolated from each other in order to ensure the electrical isolation of the peripheral devices on Up from the control voltage.

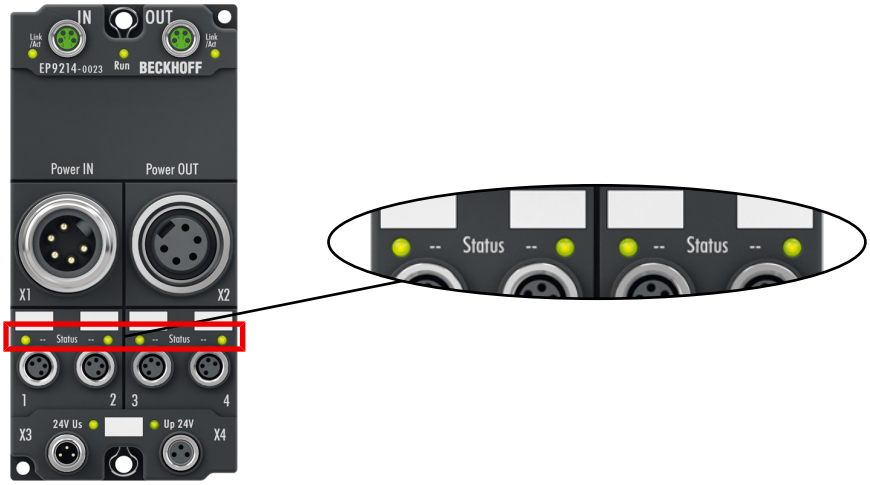
NOTE

The electrical isolation can be nullified

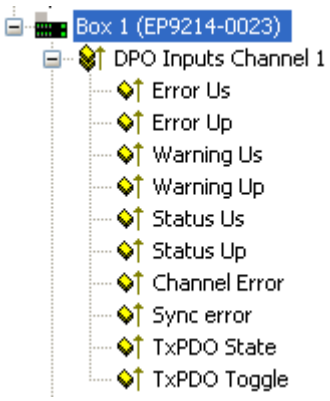
If you connect digital and analog Fieldbus Box modules directly to one another via four-pole power lines, then there may no longer be any electrical isolation due to the connected boxes!

3.4.2 Status LEDs and status bits

Each supply voltage output has a status LED that indicates the status of the output.
The LED applies to both voltages / currents (U_S and U_P; logical OR).



The status bits are located in the process data. They report statuses, warnings and errors for the entire device.



The following table shows the meaning of different combinations of messages by status LEDs and status bits.

LED	Status Us / Up	Warning	Error Us / Up	Description
off	0	0	0	The output is ready
Green	1	0	0	The output is just switching on
Green	1	0	0	The output is switched on. Normal operating state.
Flashing green	1	1	0	The output is still operating, but will switch off if conditions remain unchanged (Warning Ux).
Flashing red	0	1	1	The output has been switched off (Error Ux). Switching on again is not yet possible (waiting time of 20 seconds)
Red	0	0	1	The output has been disabled and can be returned to a normal state by a reset.

Initialization

When switching on the power supply to the EP9214 / EP9224, all green LEDs and then all red LEDs are switched on briefly to test the LEDs.

3.4.3 Power cable conductor losses M8

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

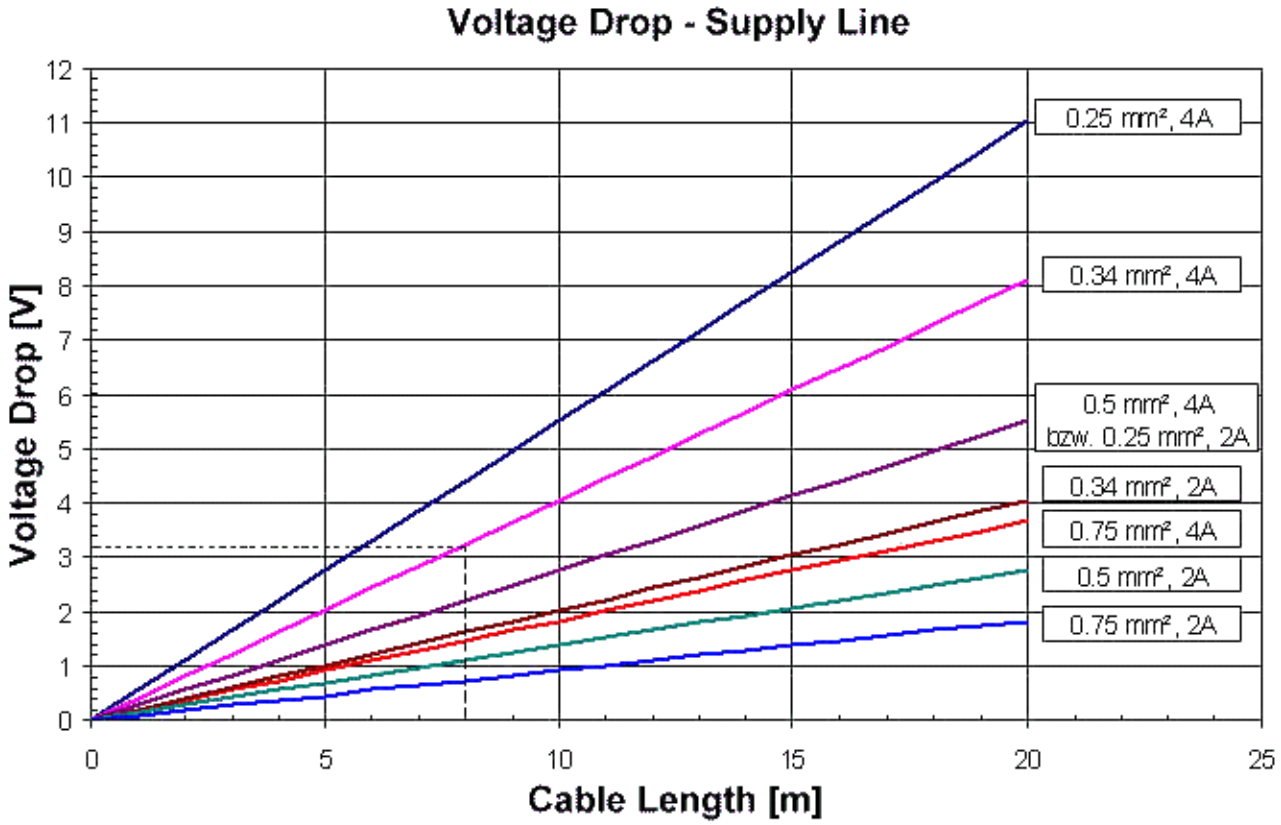


Fig. 9: Power cable conductor losses

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.

3.5 Monitoring and reset contacts

The EP9214 has a monitoring contact (signaling contact) and a reset contact. These contacts are fed out via an M8 plug and an M8 socket.

The contacts of this M8 plug and M8 socket are wired together 1:1.

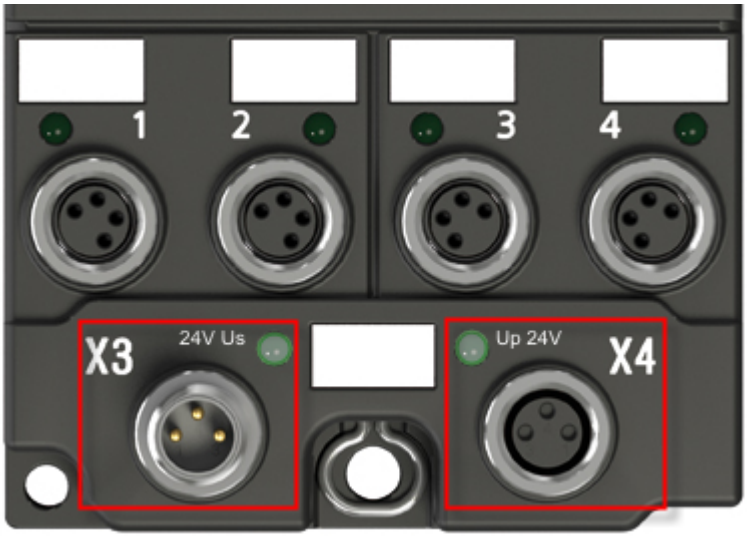


Fig. 10: EP9214 - Monitoring and reset connections

Connection

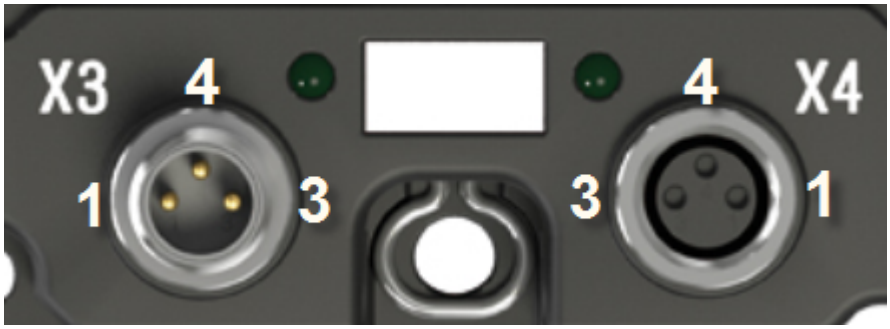


Fig. 11: EP9214 - Monitoring and reset contacts

Contact	Meaning
Pins 1 and 3: Monitoring	Potential-free signaling contact (NO contact). It is closed on application of the supply voltage. It is opened if an error occurs in one of the eight load circuits
Pin 4: Reset	All errors are reset by applying 24 V_{DC} to the Reset contact.

The contacts of the M8 connectors can conduct a maximum current of 4 A.

3.6 Disposal

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

4 Commissioning and configuration

4.1 Integrating into a TwinCAT project

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

4.2 Operation with or without EtherCAT master

The EP92x4 is preset in the factory and delivered with a set nominal current of 4.0 A and all eight channels switched on.

NOTE

The channels switch on automatically during commissioning

In the basic setting the nominal current of the EP92x4 is 4 A per channel. Shortly after the EP92x4 is supplied with voltage, all channels are switched on with a delay of 100 ms each.

This is preset by the CoE object 0xF707:01

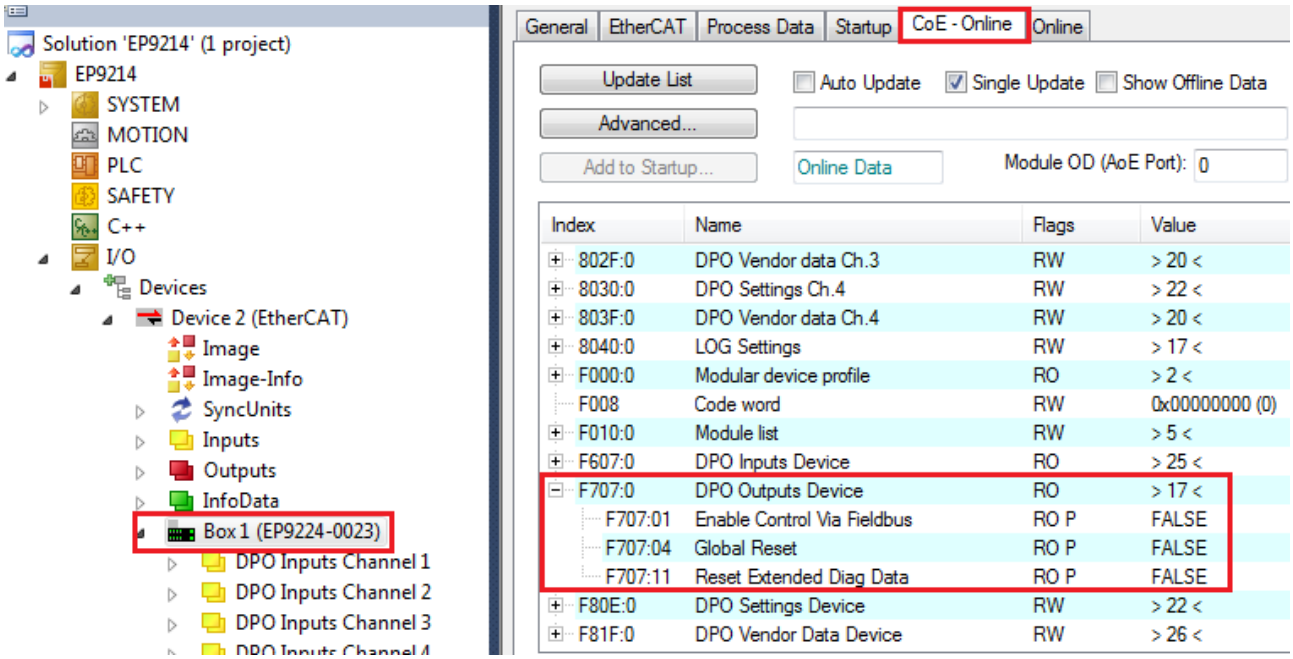


Fig. 12: CoE object 0xF707:01 - Enable Control Via Fieldbus

If the EP92x4 is operated on an EtherCAT master, the basic setting or the bootup can be adapted.

This is done via the variable DPO Outputs Device - > *Enable control via Fieldbus* in the process data.

At the next power-on of the box the load circuits will then be switched on depending on the settings in the CoE objects.

In the case of EtherCAT use, adjust all parameters first

If the EP92x4 is being operated for the first time with an EtherCAT connection, all parameter must be adjusted.

NOTE

Outputs switch to the default status without an EtherCAT connection

The EtherCAT connection may be disconnected once the EP92x4 has been parameterized with an EtherCAT Master. However, the voltage and current values of all outputs switch to the default status in this case. If the connection to the EtherCAT Master is restored, the previously set values are available again.

Example of the parameterization of the outputs when using EtherCAT

Different settings of the Box Module can be made on the "CoE – Online" tab. As an example, the "Nominal Current U_S" (Index: 8000:12) can be set by double-clicking on this parameter to open the "Set Value Dialog" (see illustration below).

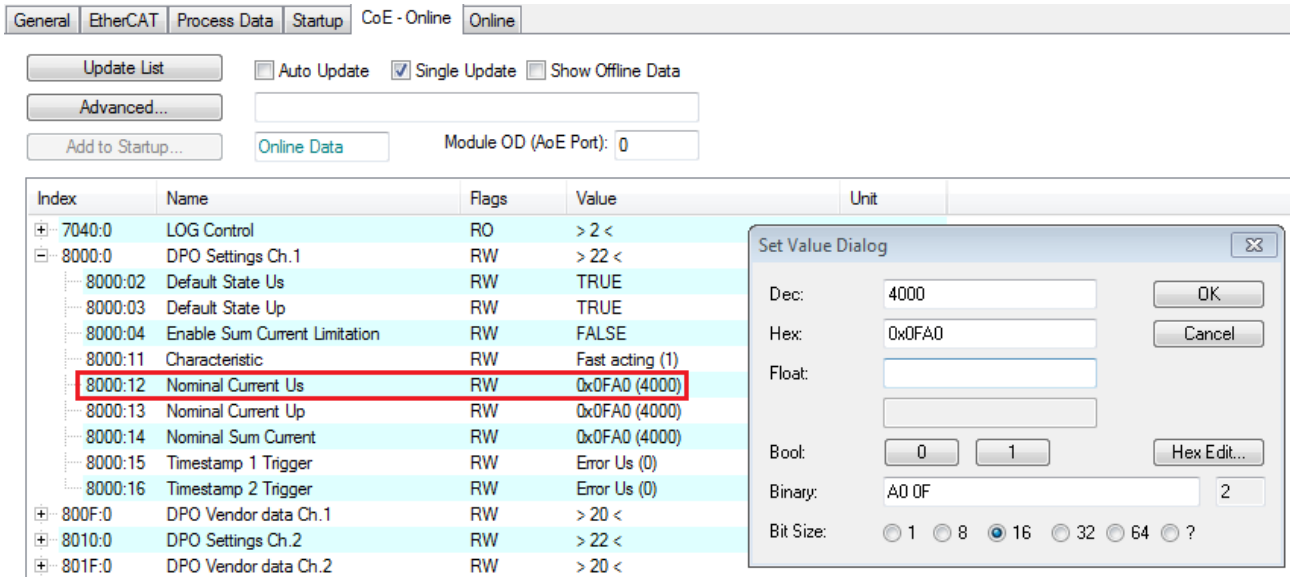


Fig. 13: Setting the DPO Settings Ch. 1 with EtherCAT connection

If the EtherCAT connection has been disconnected, the option "Show Offline Data" should be enabled. The default values of the respective parameters are thus displayed.

4.3 Switch-off behavior

4.3.1 Switch-off characteristics

The EP92x4 EtherCAT Box selectively protects all connected 24 V_{DC} load circuits. This is done via various electronic circuits, additionally protected by a 7 A micro-fuse.

Selective switch-off means that the load circuits are individually monitored and if a channel is exceeded, only that channel is switched off.

This ensures the function of the remaining consumers connected to the higher-level power supply unit.

General functional principle

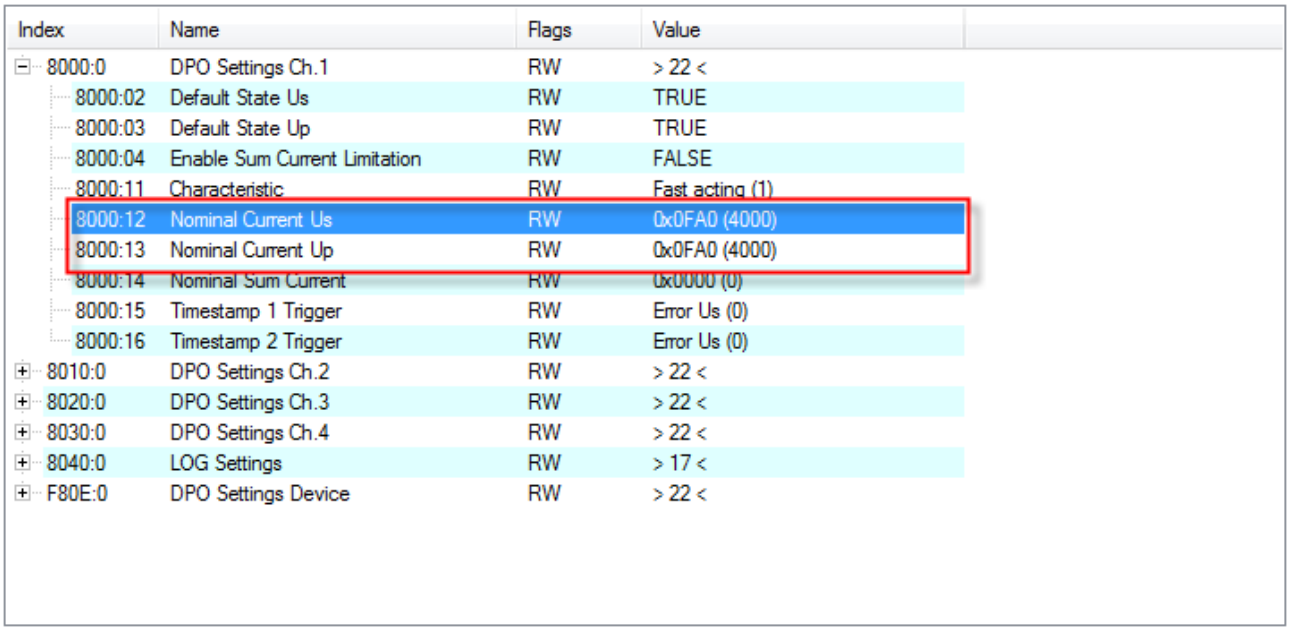
The EP92x4 EtherCAT Box monitors the current for each of the 8 output channels. 4 x Us, 4 x Up. Switching off takes place depending on the selected nominal current and tripping characteristic.

Superordinate to all is the hardware switch-off, which responds if

- 7 A is reached for 50 ms
- there is a short-circuit for 50 ms
- the capacitive load and thus the start-up current of the connected devices is too high

Due to the intelligent current limitation an output current exceeding 7 A is not possible under operating conditions. The additionally installed 7 A micro fuse thus blows only if the upstream electronic switch-off is already defective.

The nominal current can be set individually for each output channel Us and Up between 1 A and 4 A (in mA) or 3 A in the case of EtherCAT P devices.



Index	Name	Flags	Value
8000:0	DPO Settings Ch.1	RW	> 22 <
8000:02	Default State Us	RW	TRUE
8000:03	Default State Up	RW	TRUE
8000:04	Enable Sum Current Limitation	RW	FALSE
8000:11	Characteristic	RW	Fast acting (1)
8000:12	Nominal Current Us	RW	0x0FA0 (4000)
8000:13	Nominal Current Up	RW	0x0FA0 (4000)
8000:14	Nominal Sum Current	RW	0x0000 (0)
8000:15	Timestamp 1 Trigger	RW	Error Us (0)
8000:16	Timestamp 2 Trigger	RW	Error Us (0)
8010:0	DPO Settings Ch.2	RW	> 22 <
8020:0	DPO Settings Ch.3	RW	> 22 <
8030:0	DPO Settings Ch.4	RW	> 22 <
8040:0	LOG Settings	RW	> 17 <
F80E:0	DPO Settings Device	RW	> 22 <

Fig. 14: Setting the nominal current

All set characteristics are referenced to the set nominal current. The following table shows the response time of the monitoring in relation to the nominal current and characteristic.

Nominal current	Very fast acting	Fast acting	Slow acting	Time delay
100 %	1 h	-	-	-
110 %	1 h	4 h	-	-
120 %	7 min	4 h	-	-
150 %	30 s	30 min	1 h	4 h
210 %	500 ms	20 s	20 s	100 s
275 %	500 ms	1 s	20 s	10 s
300 %	20 ms	100 ms	1 s	3 s

If overcurrent (≥ nominal current) is detected and it is foreseeable that the current monitoring will trip if conditions remain unchanged, then a warning is given both in the process data and in form of a flashing LED. An output switch-off due to overcurrent is indicated by a red LED.

If one of the outputs was switched off due to a diagnosis, it must be reactivated by an active RESET.

Restart after Power OFF/ON

If an output was switched off due to an error, then an active reset by the RESET contact (if existent) or the fieldbus is necessary. Switching off and on again is not sufficient! To protect the circuitry, a RESET can take place maximally every 20 seconds.

Switch-on can take place either by EtherCAT or by 24 V on the RESET contact (if existent). To protect the circuitry, a RESET can take place maximally every 20 seconds. Faster successive edges are ignored.

Switch-on delay of load circuits 1 to 4

Here is a table of the startup times, adjustable in the CoE object 0xF80E:11

Description	Switch-on delay
Fast	10 ms
Moderate	100 ms
Slow	200 ms

4.3.2 Current limitation, switching the load circuits off

The switch-off behavior of the individual load circuits can be adapted to the application.

The following modes can be set individually for each channel:

- Very fast acting
- Fast acting
- Slow acting
- Time delay

Release time (switch-off time) of the modes

Nominal current	Very fast acting	Fast acting	Slow acting	Time delay
100 %	1 h	-	-	-
110 %	1 h	4 h	-	-
120 %	7 min	4 h	-	-
150 %	30 s	30 min	1 h	4 h
210 %	500 ms	20 s	20 s	100 s
275 %	500 ms	1 s	20 s	10 s
300 %	20 ms	100 ms	1 s	3 s

The release time depends on the set nominal current.

Following the switch-off of a channel it is necessary to reactivate it after rectification of the cause of the error.

Switch-off of the box due to overtemperature

The EP92x4 is internally protected against overheating. A warning is shown in the process data if a temperature of 75 °C is reached; the warning is reset at a value of <73 °C.

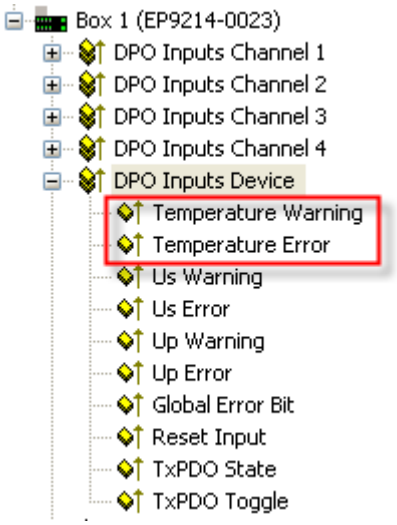


Fig. 15: Temperature Warning and Temperature Error Bit

On reaching 85 °C all load circuits are switched off in order to protect the hardware against destruction. In this case the **Temperature Error** bit is set.

So that the permitted temperature is not exceeded, the Box is to be mounted with its rear panel on the flattest possible thermally conductive surface.

Switching the Box on again following an overtemperature error

The error can only be reset via the Global Error Bit when the temperature has fallen below 73 °C and the warning is thus extinguished. The Error Bit is not saved and is reset by a Power Cycle.

Switch off of the box due to undervoltage

Since undervoltage impairs the function of the safety mechanisms, a warning is given in the process data from an input voltage of 21.5 V. If the voltage Up falls below 18 V, all Up outputs are switched off and the **Error** bit is set.

Us and Up outputs are switched off in case of undervoltage of Us.

In the factory default setting, this error persists until a PowerCycle OR global reset takes place. An *automatic error acknowledgment* can be enabled on Up with the entry F80E:05 in the CoE. This is useful if UP is only switched on after successfully starting up the system.

Undervoltage is detected independently for Us and Up.

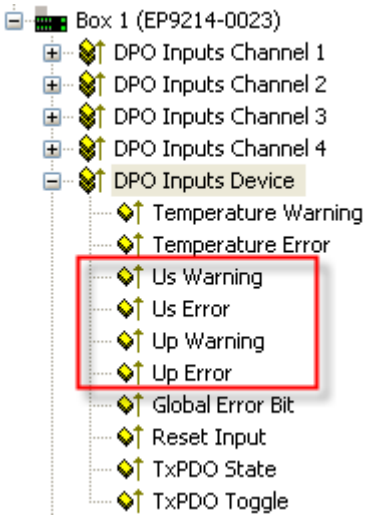


Fig. 16: Undervoltage bits

Switching on again

Switching off due to undervoltage and overtemperature is equivalent to the response of the current monitoring, but applies to the entire box and all outputs. In order to acknowledge the error, it is necessary to set the process data GLOBAL RESET or to switch the module off and on again, in addition to which the temperature must have fallen below 73 °C!

Switching load circuits on again after switch-off

This takes place either via the process data [▶ 54] by EtherCAT or via the Reset input [▶ 27](if existent) directly on the Box.

4.3.3 Setting the current limitation

The switch-off behavior of the individual load circuits can be adapted to the application.

The following modes can be set individually for each channel:

- Very fast acting
- Fast acting
- Slow acting
- Time delay

Release time (switch-off time) of the modes

Nominal current	Very fast acting	Fast acting	Slow acting	Time delay
100 %	1 h	-	-	-
110 %	1 h	4 h	-	-
120 %	7 min	4 h	-	-
150 %	30 s	30 min	1 h	4 h
210 %	500 ms	20 s	20 s	100 s
275 %	500 ms	1 s	20 s	10 s
300 %	20 ms	100 ms	1 s	3 s

The release time depends on the set nominal current.

CoE parameters for setting the current limiting characteristic

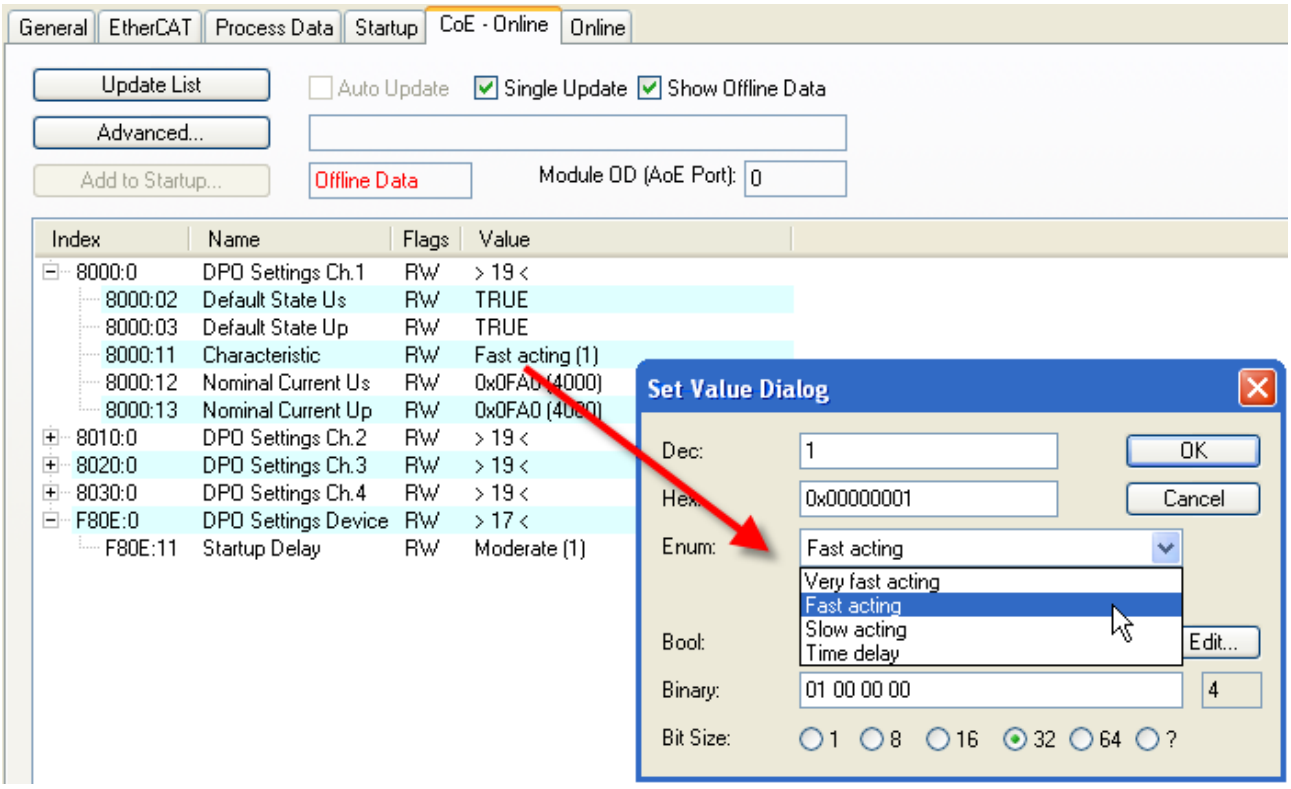


Fig. 17: CoE parameters for setting the current limiting characteristic

Meaning of the parameters

Index	Name	Meaning
0x80n0:02	Default State Us	TRUE: in case of operation without fieldbus the load circuit Us of channel n is automatically switched on FALSE: in case of operation without fieldbus the load circuit Us of channel n remains switched off
0x80n0:02	Default State Up	TRUE: in case of operation without fieldbus the load circuit Up of channel n is automatically switched on FALSE: in case of operation without fieldbus the load circuit Up of channel n remains switched off
0x80n0:11	Characteristic	Tripping time depending on nominal current
0x80n0:12	Nominal Current Us	Specification of the nominal current of Us in mA
0x80n0:13	Nominal Current Up	Specification of the nominal current of Up in mA

Switching load circuits on again after switch-off

This takes place either via the process data [▶ 54] by EtherCAT or via the Reset input [▶ 27](if existent) directly on the Box.

4.3.4 Status LEDs and status bits

Below is a table showing the meaning of the Status LEDs and Status bits for the power outputs (taking the EP9214 as an example):

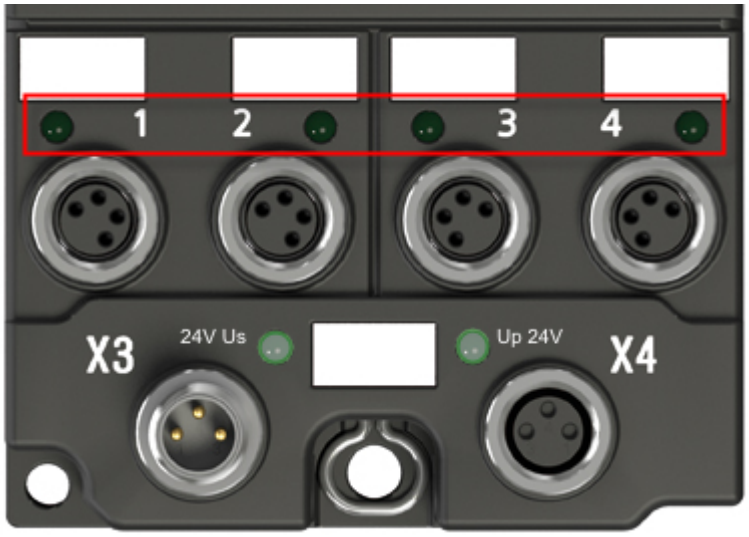


Fig. 18: EP9214 - Status LEDs

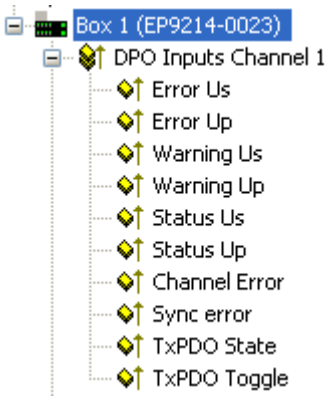


Fig. 19: EP9214 - Status bits

The LED applies to both voltages/currents (Us and Up; OR).

LED	Status Us / Up	Warning	Error Us / Up	Description
Off	0	0	0	The output is ready
Green	1	0	0	The output is just switching on
Green	1	0	0	The output is switched on. Normal operating state.
Flashing green	1	1	0	The output is still operating, but will switch off if conditions remain unchanged (Warning Ux).
Flashing red	0	1	1	The output has been switched off (Error Ux). Switching on again is not yet possible (waiting time of 20 seconds)
Red	0	0	1	The output has been disabled and can be returned to a normal state by a reset.
Red running light all channels	x	1	1	Undervoltage Us/Up or temperature error

Initialization

When switching on the voltage supply to the EP9214 / EP9224, all green LEDs and then all red LEDs are switched on briefly to test the LEDs.

4.4 EP9214-0023

4.4.1 EP9214-0023 – Object description

Parameterization

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

EtherCAT XML Device Description

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

The CoE overview contains objects for different intended applications:

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

4.4.1.1 Objects for parameterization

4.4.1.1.1 Index 1011 Restore default parameters

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

4.4.1.1.2 Index 8000 DPO Settings Ch.1

Index	Name	Meaning	Data type	Flags	Default
8000:0	DPO Settings Ch.1		UINT8	RO	0x13 (19_{dec})
8000:02	Default State Us	The output adopts this value if F707:01 is not set	boolean	RW	0x01 (1_{dec})
8000:03	Default State Up	The output adopts this value if F707:01 is not set	boolean	RW	0x01 (1_{dec})
8000:11	Characteristic	Specifies the characteristic with which the current monitoring reacts: 0_{dec}: very fast acting 1_{dec}: fast acting 2_{dec}: slow acting 3_{dec}: time delay	UINT16	RW	0x0001 (1_{dec})
8000:12	Nominal Current Us	Nominal maximum current at the output	UINT16	RW	0x0FA0 (4000_{dec})
8000:13	Nominal Current Up	Nominal maximum current at the output	UINT16	RW	0x0FA0 (4000_{dec})

4.4.1.1.3 Index 8010 DPO Settings Ch.2

Index	Name	Meaning	Data type	Flags	Default
8010:0	DPO Settings Ch.2		UINT8	RO	0x13 (19_{dec})
8010:02	Default State Us	The output adopts this value if F707:01 is not set	boolean	RW	0x01 (1_{dec})
8010:03	Default State Up	The output adopts this value if F707:01 is not set	boolean	RW	0x01 (1_{dec})
8010:11	Characteristic	Specifies the characteristic with which the current monitoring reacts: 0_{dec}: very fast acting 1_{dec}: fast acting 2_{dec}: slow acting 3_{dec}: time delay	UINT16	RW	0x0001 (1_{dec})
8010:12	Nominal Current Us	Nominal maximum current at the output	UINT16	RW	0x0FA0 (4000_{dec})
8010:13	Nominal Current Up	Nominal maximum current at the output	UINT16	RW	0x0FA0 (4000_{dec})

4.4.1.1.4 Index 8020 DPO Settings Ch.3

Index	Name	Meaning	Data type	Flags	Default
8020:0	DPO Settings Ch.3		UINT8	RO	0x13 (19_{dec})
8020:02	Default State Us	The output adopts this value if F707:01 is not set	boolean	RW	0x01 (1_{dec})
8020:03	Default State Up	The output adopts this value if F707:01 is not set	boolean	RW	0x01 (1_{dec})
8020:11	Characteristic	Specifies the characteristic with which the current monitoring reacts: 0_{dec}: very fast acting 1_{dec}: fast acting 2_{dec}: slow acting 3_{dec}: time delay	UINT16	RW	0x0001 (1_{dec})
8020:12	Nominal Current Us	Nominal maximum current at the output	UINT16	RW	0x0FA0 (4000_{dec})
8020:13	Nominal Current Up	Nominal maximum current at the output	UINT16	RW	0x0FA0 (4000_{dec})

4.4.1.1.5 Index 8030 DPO Settings Ch.4

Index	Name	Meaning	Data type	Flags	Default
8030:0	DPO Settings Ch.4		UINT8	RO	0x13 (19_{dec})
8030:02	Default State Us	The output adopts this value if F707:01 is not set	boolean	RW	0x01 (1_{dec})
8030:03	Default State Up	The output adopts this value if F707:01 is not set	boolean	RW	0x01 (1_{dec})
8030:11	Characteristic	Specifies the characteristic with which the current monitoring reacts: 0_{dec}: very fast acting 1_{dec}: fast acting 2_{dec}: slow acting 3_{dec}: time delay	UINT16	RW	0x0001 (1_{dec})
8030:12	Nominal Current Us	Nominal maximum current at the output	UINT16	RW	0x0FA0 (4000_{dec})
8030:13	Nominal Current Up	Nominal maximum current at the output	UINT16	RW	0x0FA0 (4000_{dec})

4.4.1.1.6 Index F707 DPO Outputs Device

Index	Name	Meaning	Data type	Flags	Default
F707:0	DPO Outputs Device		UINT8	RO	0x04 (4_{dec})
F707:01	Enable Control Via Fieldbus	0_{bin}: All outputs are set according to their default values (80X0:02, 80X0:03) 1_{bin}: All outputs are set according to their PDOs (70X0:01, 70X0:02)	boolean	RO	0x00 (0_{dec})
F707:04	Global Reset	All error bits are reset	boolean	RO	0x00 (0_{dec})

4.4.1.1.7 Index F80E DPO Settings Device

Index	Name	Meaning	Data type	Flags	Default
F80E:0	DPO Settings Device		UINT8	RW	0x11 (17_{dec})
F80E:11	Startup Delay	Sets the time that is kept between two switch-on procedures: 1_{dec}: fast (10 ms) 2_{dec}: moderate (100 ms) 3_{dec}: slow (200 ms)	UINT16	RW	0x0001 (1_{dec})

4.4.1.2 Standard objects

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

4.4.1.2.1 Index 1000 Device type

Index	Name	Meaning	Data type	Flags	Default
1000:0	Device type	Device type of the EtherCAT slave: The Lo-Word contains the CoE profile used (5001). The Hi-Word contains the module profile according to the modular device profile.	UINT32	RO	0x010E1389 (17699721_{dec})

4.4.1.2.2 Index 1008 Device name

Index	Name	Meaning	Data type	Flags	Default
1008:0	Device name	Device name of the EtherCAT slave	STRING	RO	EP9214-0023

4.4.1.2.3 Index 1009 Hardware version

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

4.4.1.2.4 Index 100A Software Version

Index	Name	Meaning	Data type	Flags	Default
100A:0	Software version	Firmware version of the EtherCAT slave	STRING	RO	06

4.4.1.2.5 Index 1018 Identity

Index	Name	Meaning	Data type	Flags	Default
1018:0	Identity	Information for identifying the slave	UINT8	RO	0x04 (4_{dec})
1018:01	Vendor ID	Vendor ID of the EtherCAT slave	UINT32	RO	0x00000002 (2_{dec})
1018:02	Product code	Product code of the EtherCAT slave	UINT32	RO	0x23FE4052 (603865170_{dec})
1018:03	Revision	Revision number of the EtherCAT slave; the Low Word (bit 0-15) indicates the special terminal number, the High Word (bit 16-31) refers to the device description	UINT32	RO	0x00000000 (0_{dec})
1018:04	Serial number	Serial number of the EtherCAT slave; the Low Byte (bit 0-7) of the Low Word contains the year of production, the High Byte (bit 8-15) of the Low Word contains the week of production, the High Word (bit 16-31) is 0	UINT32	RO	0x00000000 (0_{dec})

4.4.1.2.6 Index 10F0 Backup parameter handling

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

4.4.1.2.7 Index 1600 DPO RxPDO-Map Outputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
1600:0	DPO RxPDO-Map Outputs Ch.1	PDO Mapping RxPDO 1	UINT8	RO	0x06 (6_{dec})
1600:01	SubIndex 001	1. PDO Mapping entry (object 0x7000 (DPO Outputs Ch.1), entry 0x01 (Output Us))	UINT32	RO	0x7000:01, 1
1600:02	SubIndex 002	2. PDO Mapping entry (object 0x7000 (DPO Outputs Ch.1), entry 0x02 (Output Up))	UINT32	RO	0x7000:02, 1
1600:03	SubIndex 003	3. PDO Mapping entry (2 bits align)	UINT32	RO	0x0000:00, 2
1600:04	SubIndex 004	4. PDO Mapping entry (object 0x7000 (DPO Outputs Ch.1), entry 0x05 (Reset Us))	UINT32	RO	0x7000:05, 1
1600:05	SubIndex 005	5. PDO Mapping entry (object 0x7000 (DPO Outputs Ch.1), entry 0x06 (Reset Up))	UINT32	RO	0x7000:06, 1
1600:06	SubIndex 006	6. PDO Mapping entry (10 bits align)	UINT32	RO	0x0000:00, 10

4.4.1.2.8 Index 1601 DPO RxPDO-Map Outputs Ch.2

Index	Name	Meaning	Data type	Flags	Default
1601:0	DPO RxPDO-Map Outputs Ch.2	PDO Mapping RxPDO 2	UINT8	RO	0x06 (6_{dec})
1601:01	SubIndex 001	1. PDO Mapping entry (object 0x7010 (DPO Outputs Ch.2), entry 0x01 (Output Us))	UINT32	RO	0x7010:01, 1
1601:02	SubIndex 002	2. PDO Mapping entry (object 0x7010 (DPO Outputs Ch.2), entry 0x02 (Output Up))	UINT32	RO	0x7010:02, 1
1601:03	SubIndex 003	3. PDO Mapping entry (2 bits align)	UINT32	RO	0x0000:00, 2
1601:04	SubIndex 004	4. PDO Mapping entry (object 0x7010 (DPO Outputs Ch.2), entry 0x05 (Reset Us))	UINT32	RO	0x7010:05, 1
1601:05	SubIndex 005	5. PDO Mapping entry (object 0x7010 (DPO Outputs Ch.2), entry 0x06 (Reset Up))	UINT32	RO	0x7010:06, 1
1601:06	SubIndex 006	6. PDO Mapping entry (10 bits align)	UINT32	RO	0x0000:00, 10

4.4.1.2.9 Index 1602 DPO RxPDO-Map Outputs Ch.3

Index	Name	Meaning	Data type	Flags	Default
1602:0	DPO RxPDO-Map Outputs Ch.3	PDO Mapping RxPDO 3	UINT8	RO	0x06 (6_{dec})
1602:01	SubIndex 001	1. PDO Mapping entry (object 0x7020 (DPO Outputs Ch.3), entry 0x01 (Output Us))	UINT32	RO	0x7020:01, 1
1602:02	SubIndex 002	2. PDO Mapping entry (object 0x7020 (DPO Outputs Ch.3), entry 0x02 (Output Up))	UINT32	RO	0x7020:02, 1
1602:03	SubIndex 003	3. PDO Mapping entry (2 bits align)	UINT32	RO	0x0000:00, 2
1602:04	SubIndex 004	4. PDO Mapping entry (object 0x7020 (DPO Outputs Ch.3), entry 0x05 (Reset Us))	UINT32	RO	0x7020:05, 1
1602:05	SubIndex 005	5. PDO Mapping entry (object 0x7020 (DPO Outputs Ch.3), entry 0x06 (Reset Up))	UINT32	RO	0x7020:06, 1
1602:06	SubIndex 006	6. PDO Mapping entry (10 bits align)	UINT32	RO	0x0000:00, 10

4.4.1.2.10 Index 1603 DPO RxPDO-Map Outputs Ch.4

Index	Name	Meaning	Data type	Flags	Default
1603:0	DPO RxPDO-Map Outputs Ch.4	PDO Mapping RxPDO 4	UINT8	RO	0x06 (6_{dec})
1603:01	SubIndex 001	1. PDO Mapping entry (object 0x7030 (DPO Outputs Ch.4), entry 0x01 (Output Us))	UINT32	RO	0x7030:01, 1
1603:02	SubIndex 002	2. PDO Mapping entry (object 0x7030 (DPO Outputs Ch.4), entry 0x02 (Output Up))	UINT32	RO	0x7030:02, 1
1603:03	SubIndex 003	3. PDO Mapping entry (2 bits align)	UINT32	RO	0x0000:00, 2
1603:04	SubIndex 004	4. PDO Mapping entry (object 0x7030 (DPO Outputs Ch.4), entry 0x05 (Reset Us))	UINT32	RO	0x7030:05, 1
1603:05	SubIndex 005	5. PDO Mapping entry (object 0x7030 (DPO Outputs Ch.4), entry 0x06 (Reset Up))	UINT32	RO	0x7030:06, 1
1603:06	SubIndex 006	6. PDO Mapping entry (10 bits align)	UINT32	RO	0x0000:00, 10

4.4.1.2.11 Index 1604 DPO RxPDO-Map Outputs Device

Index	Name	Meaning	Data type	Flags	Default
1604:0	DPO RxPDO-Map Outputs Device	PDO Mapping RxPDO 5	UINT8	RO	0x04 (4_{dec})
1604:01	SubIndex 001	1. PDO Mapping entry (object 0xF707 (DPO Outputs Device), entry 0x01 (Enable Control Via Fieldbus))	UINT32	RO	0xF707:01, 1
1604:02	SubIndex 002	2. PDO Mapping entry (2 bits align)	UINT32	RO	0x0000:00, 2
1604:03	SubIndex 003	3. PDO Mapping entry (object 0xF707 (DPO Outputs Device), entry 0x04 (Global Reset))	UINT32	RO	0xF707:04, 1
1604:04	SubIndex 004	4. PDO Mapping entry (12 bits align)	UINT32	RO	0x0000:00, 12

4.4.1.2.12 Index 1A00 DPO TxPDO-Map Inputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
1A00:0	DPO TxPDO-Map Inputs Ch.1	PDO Mapping TxPDO 1	UINT8	RO	0x0B (11_{dec})
1A00:01	SubIndex 001	1. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x01 (Error Us))	UINT32	RO	0x6000:01, 1
1A00:02	SubIndex 002	2. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x02 (Error Up))	UINT32	RO	0x6000:02, 1
1A00:03	SubIndex 003	3. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x03 (Warning Us))	UINT32	RO	0x6000:03, 1
1A00:04	SubIndex 004	4. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x04 (Warning Up))	UINT32	RO	0x6000:04, 1
1A00:05	SubIndex 005	5. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x05 (Status Us))	UINT32	RO	0x6000:05, 1
1A00:06	SubIndex 006	6. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x06 (Status Up))	UINT32	RO	0x6000:06, 1
1A00:07	SubIndex 007	7. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x07 (Channel Error))	UINT32	RO	0x6000:07, 1
1A00:08	SubIndex 008	8. PDO Mapping entry (6 bits align)	UINT32	RO	0x0000:00, 6
1A00:09	SubIndex 009	9. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x0E (Sync error))	UINT32	RO	0x6000:0E, 1
1A00:0A	SubIndex 010	10. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x0F (TxPDO State))	UINT32	RO	0x6000:0F, 1
1A00:0B	SubIndex 011	11. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x6000:10, 1

4.4.1.2.13 Index 1A01 DPO TxPDO-Map Inputs Ch.2

Index	Name	Meaning	Data type	Flags	Default
1A01:0	DPO TxPDO-Map Inputs Ch.2	PDO Mapping TxPDO 2	UINT8	RO	0x0B (11_{dec})
1A01:01	SubIndex 001	1. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x01 (Error Us))	UINT32	RO	0x6010:01, 1
1A01:02	SubIndex 002	2. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x02 (Error Up))	UINT32	RO	0x6010:02, 1
1A01:03	SubIndex 003	3. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x03 (Warning Us))	UINT32	RO	0x6010:03, 1
1A01:04	SubIndex 004	4. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x04 (Warning Up))	UINT32	RO	0x6010:04, 1
1A01:05	SubIndex 005	5. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x05 (Status Us))	UINT32	RO	0x6010:05, 1
1A01:06	SubIndex 006	6. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x06 (Status Up))	UINT32	RO	0x6010:06, 1
1A01:07	SubIndex 007	7. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x07 (Channel Error))	UINT32	RO	0x6010:07, 1
1A01:08	SubIndex 008	8. PDO Mapping entry (6 bits align)	UINT32	RO	0x0000:00, 6
1A01:09	SubIndex 009	9. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x0E (Sync error))	UINT32	RO	0x6010:0E, 1
1A01:0A	SubIndex 010	10. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x0F (TxPDO State))	UINT32	RO	0x6010:0F, 1
1A01:0B	SubIndex 011	11. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x6010:10, 1

4.4.1.2.14 Index 1A02 DPO TxPDO-Map Inputs Ch.3

Index	Name	Meaning	Data type	Flags	Default
1A02:0	DPO TxPDO-Map Inputs Ch.3	PDO Mapping TxPDO 3	UINT8	RO	0x0B (11_{dec})
1A02:01	SubIndex 001	1. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x01 (Error Us))	UINT32	RO	0x6020:01, 1
1A02:02	SubIndex 002	2. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x02 (Error Up))	UINT32	RO	0x6020:02, 1
1A02:03	SubIndex 003	3. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x03 (Warning Us))	UINT32	RO	0x6020:03, 1
1A02:04	SubIndex 004	4. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x04 (Warning Up))	UINT32	RO	0x6020:04, 1
1A02:05	SubIndex 005	5. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x05 (Status Us))	UINT32	RO	0x6020:05, 1
1A02:06	SubIndex 006	6. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x06 (Status Up))	UINT32	RO	0x6020:06, 1
1A02:07	SubIndex 007	7. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x07 (Channel Error))	UINT32	RO	0x6020:07, 1
1A02:08	SubIndex 008	8. PDO Mapping entry (6 bits align)	UINT32	RO	0x0000:00, 6
1A02:09	SubIndex 009	9. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x0E (Sync error))	UINT32	RO	0x6020:0E, 1
1A02:0A	SubIndex 010	10. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x0F (TxPDO State))	UINT32	RO	0x6020:0F, 1
1A02:0B	SubIndex 011	11. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x6020:10, 1

4.4.1.2.15 Index 1A03 DPO TxPDO-Map Inputs Ch.4

Index	Name	Meaning	Data type	Flags	Default
1A03:0	DPO TxPDO-Map Inputs Ch.4	PDO Mapping TxPDO 4	UINT8	RO	0x0B (11_{dec})
1A03:01	SubIndex 001	1. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x01 (Error Us))	UINT32	RO	0x6030:01, 1
1A03:02	SubIndex 002	2. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x02 (Error Up))	UINT32	RO	0x6030:02, 1
1A03:03	SubIndex 003	3. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x03 (Warning Us))	UINT32	RO	0x6030:03, 1
1A03:04	SubIndex 004	4. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x04 (Warning Up))	UINT32	RO	0x6030:04, 1
1A03:05	SubIndex 005	5. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x05 (Status Us))	UINT32	RO	0x6030:05, 1
1A03:06	SubIndex 006	6. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x06 (Status Up))	UINT32	RO	0x6030:06, 1
1A03:07	SubIndex 007	7. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x07 (Channel Error))	UINT32	RO	0x6030:07, 1
1A03:08	SubIndex 008	8. PDO Mapping entry (6 bits align)	UINT32	RO	0x0000:00, 6
1A03:09	SubIndex 009	9. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x0E (Sync error))	UINT32	RO	0x6030:0E, 1
1A03:0A	SubIndex 010	10. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x0F (TxPDO State))	UINT32	RO	0x6030:0F, 1
1A03:0B	SubIndex 011	11. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x6030:10, 1

4.4.1.2.16 Index 1A04 DPO TxPDO-Map Inputs Device

Index	Name	Meaning	Data type	Flags	Default
1A04:0	DPO TxPDO-Map Inputs Device	PDO Mapping TxPDO 5	UINT8	RW	0x0C (12_{dec})
1A04:01	SubIndex 001	1. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x01 (Temperature Warning))	UINT32	RW	0xF607:01, 1
1A04:02	SubIndex 002	2. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x02 (Temperature Error))	UINT32	RW	0xF607:02, 1
1A04:03	SubIndex 003	3. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x03 (Us Warning))	UINT32	RW	0xF607:03, 1
1A04:04	SubIndex 004	4. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x04 (Us Error))	UINT32	RW	0xF607:04, 1
1A04:05	SubIndex 005	5. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x05 (Up Warning))	UINT32	RW	0xF607:05, 1
1A04:06	SubIndex 006	6. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x06 (Up Error))	UINT32	RW	0xF607:06, 1
1A04:07	SubIndex 007	7. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x07 (Global Error Bit))	UINT32	RW	0xF607:07, 1
1A04:08	SubIndex 008	8. PDO Mapping entry (4 bits align)	UINT32	RW	0x0000:00, 4
1A04:09	SubIndex 009	9. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x0C (Reset Input))	UINT32	RW	0xF607:0C, 1
1A04:0A	SubIndex 010	10. PDO Mapping entry (2 bits align)	UINT32	RW	0x0000:00, 2
1A04:0B	SubIndex 011	11. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x0F (TxPDO State))	UINT32	RW	0xF607:0F, 1
1A04:0C	SubIndex 012	12. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x10 (TxPDO Toggle))	UINT32	RW	0xF607:10, 1

4.4.1.2.17 Index 1C00 Sync manager type

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

4.4.1.2.18 Index 1C12 RxPDO assign

Index	Name	Meaning	Data type	Flags	Default
1C12:0	RxPDO assign	PDO Assign Outputs	UINT8	RW	0x05 (5_{dec})
1C12:01	Subindex 001	1. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x1600 (5632_{dec})
1C12:02	Subindex 002	2. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x1601 (5633_{dec})
1C12:03	Subindex 003	3. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x1602 (5634_{dec})
1C12:04	Subindex 004	4. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x1603 (5635_{dec})
1C12:05	Subindex 005	5. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x1604 (5636_{dec})

4.4.1.2.19 Index 1C13 TxPDO assign

Index	Name	Meaning	Data type	Flags	Default
1C13:0	TxPDO assign	PDO Assign Inputs	UINT8	RW	0x05 (5_{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})
1C13:05	Subindex 005	5. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x1A04 (6660_{dec})

4.4.1.2.20 Index 1C32 SM output parameter

Index	Name	Meaning	Data type	Flags	Default
1C32:0	SM output parameter	Synchronization parameters for the outputs	UINT8	RO	0x20 (32_{dec})
1C32:01	Sync mode	Current synchronization mode: • 0: Free Run • 1: Synchron with SM 2 Event • 2: DC-Mode - Synchron with SYNC0 Event • 3: DC-Mode - Synchron with SYNC1 Event	UINT16	RW	0x0000 (0_{dec})
1C32:02	Cycle time	Cycle time (in ns): • Free Run: Cycle time of the local timer • Synchron with SM 2 Event: 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	0x00000384 (900_{dec})
1C32:04	Sync modes supported	Supported synchronization modes: • Bit 0 = 1: free run is supported • Bit 1 = 1: Synchron with SM 2 Event is supported • Bit 2-3 = 01: DC mode is supported • Bit 4-5 = 10: Output Shift with SYNC1 event (only DC mode) • Bit 14 = 1: dynamic times (measurement through writing of 1C32:08)	UINT16	RO	0xC007 (49159_{dec})
1C32:05	Minimum cycle time	Minimum cycle time (in ns)	UINT32	RO	0x000F4240 (1000000_{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	0x00000384 (900_{dec})
1C32:08	Command	• 0: Measurement of the local cycle time is stopped • 1: Measurement of the local cycle time is started The entries 1C32:03, 1C32:05, 1C32:06, 1C32:09, 1C33:03, 1C33:06, 1C33:09 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	0x00000384 (900_{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})

4.4.1.2.21 Index 1C33 SM input parameter

Index	Name	Meaning	Data type	Flags	Default
1C33:0	SM input parameter	Synchronization parameters for the inputs	UINT8	RO	0x20 (32_{dec})
1C33:01	Sync mode	Current synchronization mode: • 0: Free Run • 1: Synchron with SM 3 Event (no outputs available) • 2: DC - Synchron with SYNC0 Event • 3: DC - Synchron with SYNC1 Event • 34: Synchron with SM 2 Event (outputs available)	UINT16	RW	0x0000 (0_{dec})
1C33:02	Cycle time	as 1C32:02	UINT32	RW	0x000F4240 (1000000_{dec})
1C33:03	Shift time	Time between SYNC0 event and reading of the inputs (in ns, only DC mode)	UINT32	RO	0x00000384 (900_{dec})
1C33:04	Sync modes supported	Supported synchronization modes: • Bit 0: free run is supported • Bit 1: Synchron with SM 2 Event is supported (outputs available) • Bit 1: Synchron with SM 3 Event is supported (no outputs available) • Bit 2-3 = 01: DC mode is supported • Bit 4-5 = 01: Input Shift through local event (outputs available) • Bit 4-5 = 10: Input Shift with SYNC1 event (no outputs available) • Bit 14 = 1: dynamic times (measurement through writing of 1C32:08 or 1C33:08)	UINT16	RO	0xC007 (49159_{dec})
1C33:05	Minimum cycle time	as 1C32:05	UINT32	RO	0x000F4240 (1000000_{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	0x00000384 (900_{dec})
1C33:08	Command	as 1C32:08	UINT16	RW	0x0000 (0_{dec})
1C33:09	Maximum delay time	Time between SYNC1 event and reading of the inputs (in ns, only DC mode)	UINT32	RO	0x00000384 (900_{dec})
1C33:0B	SM event missed counter	as 1C32:11	UINT16	RO	0x0000 (0_{dec})
1C33:0C	Cycle exceeded counter	as 1C32:12	UINT16	RO	0x0000 (0_{dec})
1C33:0D	Shift too short counter	as 1C32:13	UINT16	RO	0x0000 (0_{dec})
1C33:20	Sync error	as 1C32:32	boolean	RO	0x00 (0_{dec})

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

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

4.4.1.3.1 Index 6000 DPO Inputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
6000:0	DPO Inputs Ch.1	Input of the first channel	UINT8	RO	0x10 (16_{dec})
6000:01	Error Us	The current monitoring of Us has tripped. The bit must be reset by a 'Global Reset' (F707:04) or by the corresponding Reset Us (7000:05). The output cannot be activated as long as the warning bit is 1.	boolean	RO	0x00 (0_{dec})
6000:02	Error Up	The current monitoring of Up has tripped.	boolean	RO	0x00 (0_{dec})
6000:03	Warning Us	The monitoring has detected overcurrent; the switching off of output Us on this channel is imminent if the current consumption of the branch does not decrease.	boolean	RO	0x00 (0_{dec})
6000:04	Warning Up	The monitoring has detected overcurrent; the switching off of output Us on this channel is imminent if the current consumption of the branch does not decrease.	boolean	RO	0x00 (0_{dec})
6000:05	Status Us	0: The output is switched off 1: The output supplies 24 V	boolean	RO	0x00 (0_{dec})
6000:06	Status Up	0: The output is switched off 1: The output supplies 24 V	boolean	RO	0x00 (0_{dec})
6000:07	Channel Error	6000:01 or 6000:02 are set	boolean	RO	0x00 (0_{dec})
6000:0E	Sync error		boolean	RO	0x00 (0_{dec})
6000:0F	TxPDO State		boolean	RO	0x00 (0_{dec})
6000:10	TxPDO Toggle		boolean	RO	0x00 (0_{dec})

4.4.1.3.2 Index 6010 DPO Inputs Ch.2

Index	Name	Meaning	Data type	Flags	Default
6010:0	DPO Inputs Ch.2	Inputs of the second channel	UINT8	RO	0x10 (16_{dec})
6010:01	Error Us	The current monitoring of Us has tripped. The bit must be reset by a 'Global Reset' (F707:04) or by the corresponding Reset Us (7000:05). The output cannot be activated as long as the warning bit is 1.	boolean	RO	0x00 (0_{dec})
6010:02	Error Up	The current monitoring of Up has tripped.	boolean	RO	0x00 (0_{dec})
6010:03	Warning Us	The monitoring has detected overcurrent; the switching off of output Us on this channel is imminent if the current consumption of the branch does not decrease.	boolean	RO	0x00 (0_{dec})
6010:04	Warning Up	The monitoring has detected overcurrent; the switching off of output Us on this channel is imminent if the current consumption of the branch does not decrease.	boolean	RO	0x00 (0_{dec})
6010:05	Status Us	0: The output is switched off 1: The output supplies 24 V	boolean	RO	0x00 (0_{dec})
6010:06	Status Up	0: The output is switched off 1: The output supplies 24 V	boolean	RO	0x00 (0_{dec})
6010:07	Channel Error	6010:01 or 6010:02 are set	boolean	RO	0x00 (0_{dec})
6010:0E	Sync error		boolean	RO	0x00 (0_{dec})
6010:0F	TxPDO State		boolean	RO	0x00 (0_{dec})
6010:10	TxPDO Toggle		boolean	RO	0x00 (0_{dec})

4.4.1.3.3 Index 6020 DPO Inputs Ch.3

Index	Name	Meaning	Data type	Flags	Default
6020:0	DPO Inputs Ch.3	Inputs of the third channel	UINT8	RO	0x10 (16_{dec})
6020:01	Error Us	The current monitoring of Us has tripped. The bit must be reset by a 'Global Reset' (F707:04) or by the corresponding Reset Us (7000:05). The output cannot be activated as long as the warning bit is 1.	boolean	RO	0x00 (0_{dec})
6020:02	Error Up	The current monitoring of Up has tripped.	boolean	RO	0x00 (0_{dec})
6020:03	Warning Us	The monitoring has detected overcurrent; the switching off of output Us on this channel is imminent if the current consumption of the branch does not decrease.	boolean	RO	0x00 (0_{dec})
6020:04	Warning Up	The monitoring has detected overcurrent; the switching off of output Us on this channel is imminent if the current consumption of the branch does not decrease.	boolean	RO	0x00 (0_{dec})
6020:05	Status Us	0: The output is switched off 1: The output supplies 24 V	boolean	RO	0x00 (0_{dec})
6020:06	Status Up	0: The output is switched off 1: The output supplies 24 V	boolean	RO	0x00 (0_{dec})
6020:07	Channel Error	6020:01 or 6020:02 are set	boolean	RO	0x00 (0_{dec})
6020:0E	Sync error		boolean	RO	0x00 (0_{dec})
6020:0F	TxPDO State		boolean	RO	0x00 (0_{dec})
6020:10	TxPDO Toggle		boolean	RO	0x00 (0_{dec})

4.4.1.3.4 Index 6030 DPO Inputs Ch.4

Index	Name	Meaning	Data type	Flags	Default
6030:0	DPO Inputs Ch.4	Inputs of the fourth channel	UINT8	RO	0x10 (16_{dec})
6030:01	Error Us	The current monitoring of Us has tripped. The bit must be reset by a 'Global Reset' (F707:04) or by the corresponding Reset Us (7000:05). The output cannot be activated as long as the warning bit is 1.	boolean	RO	0x00 (0_{dec})
6030:02	Error Up	The current monitoring of Up has tripped.	boolean	RO	0x00 (0_{dec})
6030:03	Warning Us	The monitoring has detected overcurrent; the switching off of output Us on this channel is imminent if the current consumption of the branch does not decrease.	boolean	RO	0x00 (0_{dec})
6030:04	Warning Up	The monitoring has detected overcurrent; the switching off of output Us on this channel is imminent if the current consumption of the branch does not decrease.	boolean	RO	0x00 (0_{dec})
6030:05	Status Us	0: The output is switched off 1: The output supplies 24 V	boolean	RO	0x00 (0_{dec})
6030:06	Status Up	0: The output is switched off 1: The output supplies 24 V	boolean	RO	0x00 (0_{dec})
6030:07	Channel Error	6020:01 or 6020:02 are set	boolean	RO	0x00 (0_{dec})
6030:0E	Sync error		boolean	RO	0x00 (0_{dec})
6030:0F	TxPDO State		boolean	RO	0x00 (0_{dec})
6030:10	TxPDO Toggle		boolean	RO	0x00 (0_{dec})

4.4.1.3.5 Index 7000 DPO Outputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
7000:0	DPO Outputs Ch.1		UINT8	RO	0x06 (6_{dec})
7000:01	Output Us	0: Us will be switched off 1: Us will be switched on	boolean	RO	0x00 (0_{dec})
7000:02	Output Up	0: Us will be switched off 1: Us will be switched on	boolean	RO	0x00 (0_{dec})
7000:05	Reset Us	An error on Us will be reset	boolean	RO	0x00 (0_{dec})
7000:06	Reset Up	An error on Up will be reset	boolean	RO	0x00 (0_{dec})

4.4.1.3.6 Index 7010 DPO Outputs Ch.2

Index	Name	Meaning	Data type	Flags	Default
7010:0	DPO Outputs Ch.2		UINT8	RO	0x06 (6_{dec})
7010:01	Output Us	0: Us will be switched off 1: Us will be switched on	boolean	RO	0x00 (0_{dec})
7010:02	Output Up	0: Us will be switched off 1: Us will be switched on	boolean	RO	0x00 (0_{dec})
7010:05	Reset Us	An error on Us will be reset	boolean	RO	0x00 (0_{dec})
7010:06	Reset Up	An error on Up will be reset	boolean	RO	0x00 (0_{dec})

4.4.1.3.7 Index 7020 DPO Outputs Ch.3

Index	Name	Meaning	Data type	Flags	Default
7020:0	DPO Outputs Ch.3		UINT8	RO	0x06 (6_{dec})
7020:01	Output Us	0: Us will be switched off 1: Us will be switched on	boolean	RO	0x00 (0_{dec})
7020:02	Output Up	0: Us will be switched off 1: Us will be switched on	boolean	RO	0x00 (0_{dec})
7020:05	Reset Us	An error on Us will be reset	boolean	RO	0x00 (0_{dec})
7020:06	Reset Up	An error on Up will be reset	boolean	RO	0x00 (0_{dec})

4.4.1.3.8 Index 7030 DPO Outputs Ch.4

Index	Name	Meaning	Data type	Flags	Default
7030:0	DPO Outputs Ch.4		UINT8	RO	0x06 (6_{dec})
7030:01	Output Us	0: Us will be switched off 1: Us will be switched on	boolean	RO	0x00 (0_{dec})
7030:02	Output Up	0: Us will be switched off 1: Us will be switched on	boolean	RO	0x00 (0_{dec})
7030:05	Reset Us	An error on Us will be reset	boolean	RO	0x00 (0_{dec})
7030:06	Reset Up	An error on Up will be reset	boolean	RO	0x00 (0_{dec})

4.4.1.3.9 Index 800F DPO Vendor data Ch.1

Index	Name	Meaning	Data type	Flags	Default
800F:0	DPO Vendor data Ch.1		UINT8	RO	0x14 (20_{dec})
800F:11	GainS		UINT16	RW	0x4000 (16384_{dec})
800F:12	OffsetS		INT16	RW	0x0000 (0_{dec})
800F:13	GainP		UINT16	RW	0x4000 (16384_{dec})
800F:14	OffsetP		INT16	RW	0x0000 (0_{dec})

4.4.1.3.10 Index 801F DPO Vendor data Ch.2

Index	Name	Meaning	Data type	Flags	Default
801F:0	DPO Vendor data Ch.2		UINT8	RO	0x14 (20_{dec})
801F:11	GainS		UINT16	RW	0x4000 (16384_{dec})
801F:12	OffsetS		INT16	RW	0x0000 (0_{dec})
801F:13	GainP		UINT16	RW	0x4000 (16384_{dec})
801F:14	OffsetP		INT16	RW	0x0000 (0_{dec})

4.4.1.3.11 Index 802F DPO Vendor data Ch.3

Index	Name	Meaning	Data type	Flags	Default
802F:0	DPO Vendor data Ch.3		UINT8	RO	0x14 (20_{dec})
802F:11	GainS		UINT16	RW	0x4000 (16384_{dec})
802F:12	OffsetS		INT16	RW	0x0000 (0_{dec})
802F:13	GainP		UINT16	RW	0x4000 (16384_{dec})
802F:14	OffsetP		INT16	RW	0x0000 (0_{dec})

4.4.1.3.12 Index 803F DPO Vendor data Ch.4

Index	Name	Meaning	Data type	Flags	Default
803F:0	DPO Vendor data Ch.4		UINT8	RO	0x14 (20_{dec})
803F:11	GainS		UINT16	RW	0x4000 (16384_{dec})
803F:12	OffsetS		INT16	RW	0x0000 (0_{dec})
803F:13	GainP		UINT16	RW	0x4000 (16384_{dec})
803F:14	OffsetP		INT16	RW	0x0000 (0_{dec})

4.4.1.3.13 Index F000 Modular device profile

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

4.4.1.3.14 Index F008 Code word

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

4.4.1.3.15 Index F010 Module list

Index	Name	Meaning	Data type	Flags	Default
F010:0	Module list		UINT8	RW	0x04 (4_{dec})
F010:01	SubIndex 001		UINT32	RW	0x0000010E (270_{dec})
F010:02	SubIndex 002		UINT32	RW	0x0000010E (270_{dec})
F010:03	SubIndex 003		UINT32	RW	0x0000010E (270_{dec})
F010:04	SubIndex 004		UINT32	RW	0x0000010E (270_{dec})

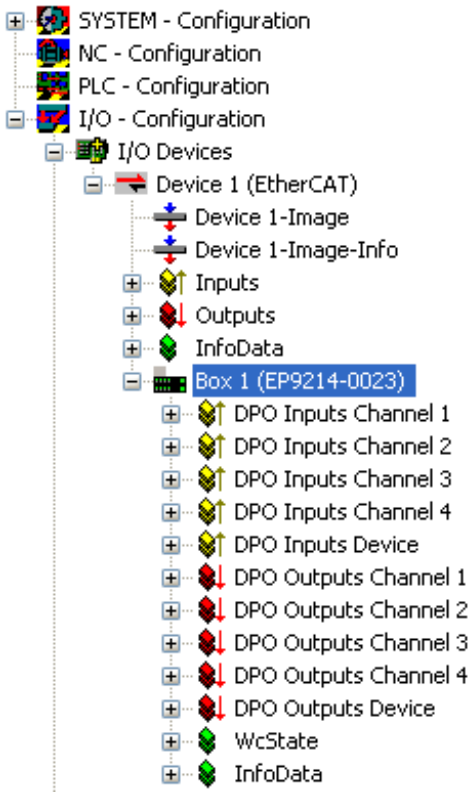
4.4.1.3.16 Index F607 DPO Inputs Device

Index	Name	Meaning	Data type	Flags	Default
F607:0	DPO Inputs Device		UINT8	RO	0x10 (16_{dec})
F607:01	Temperature Warning	A temperature of about 80 °C has been reached	boolean	RO	0x00 (0_{dec})
F607:02	Temperature Error	A critical temperature of about 85 °C has been reached, the outputs will be switched off. The bit must be reset by a Global Reset (F707:04) or by a voltage reset. No output can be switched on if the error bit is set.	boolean	RO	0x00 (0_{dec})
F607:03	Us Warning	Us is less than 21.5 V, no further outputs can be switched on.	boolean	RO	0x00 (0_{dec})
F607:04	Us Error	Us is less than 19 V, all Us outputs will be switched off. This bit must be reset by a Global Reset (F707:04) or by a voltage reset. No Us output can be switched on if the error bit is set.	boolean	RO	0x00 (0_{dec})
F607:05	Up Warning	See F607:03	boolean	RO	0x00 (0_{dec})
F607:06	Up Error	See F607:04	boolean	RO	0x00 (0_{dec})
F607:07	Global Error Bit	One of the error bits of the four channels or F607:02 or F607:04 or F60706 is set	boolean	RO	0x00 (0_{dec})
F607:0C	Reset Input	0: There is no voltage on the external reset input 1: 24 V is present on the external reset input (only if there is a reset input)	boolean	RO	0x00 (0_{dec})
F607:0F	TxPDO State		boolean	RO	0x00 (0_{dec})
F607:10	TxPDO Toggle		boolean	RO	0x00 (0_{dec})

4.4.1.3.17 Index F81F DPO Vendor Data Device

Index	Name	Meaning	Data type	Flags	Default
F81F:0	DPO Vendor Data Device		UINT8	RO	0x1A (26_{dec})
F81F:01	Enable Auto Offset Calibration	reserved	boolean	RW	0x00 (0_{dec})
F81F:02	Enable Crosstalk Compensation	reserved	boolean	RW	0x01 (1_{dec})
F81F:10	Enable Calibration Mode	reserved	boolean	RW	0x00 (0_{dec})
F81F:11	GainS	reserved	UINT16	RW	0x4000 (16384_{dec})
F81F:12	OffsetS	reserved	INT16	RW	0x0000 (0_{dec})
F81F:13	GainP	reserved	UINT16	RW	0x4000 (16384_{dec})
F81F:14	OffsetP	reserved	INT16	RW	0x0000 (0_{dec})
F81F:15	Gain US	reserved	UINT16	RW	0x4000 (16384_{dec})
F81F:16	Offset US	reserved	INT16	RW	0x0000 (0_{dec})
F81F:17	Gain UP	reserved	UINT16	RW	0x4000 (16384_{dec})
F81F:18	Offset UP	reserved	INT16	RW	0x0000 (0_{dec})
F81F:19	Gain Temperature	reserved	UINT16	RW	0x4000 (16384_{dec})
F81F:1A	Offset Temperature	reserved	INT16	RW	0x0000 (0_{dec})

4.4.2 EP9214-0023 - Process image



The EP9214 has 4 x 16-bit status data of the four output channels **DPO Inputs Channel n.**

Subsequently, a status word follows for the complete device **DPO Inputs Device.**

In the output section there are 4 x 16-bit output data of the four output channels **DPO Outputs Channel n.**

An output word follows for the complete device **DPO Outputs Device**.

WcState and **InfoData** are standard EtherCAT system variables.

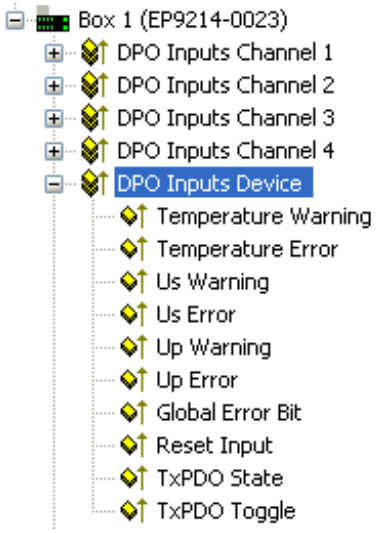
DPO Inputs Channel 1 to 4

The four channels each have status bits for displaying the current channel state:

see Status LEDs [▶ 24]

Channel Error:
Error Us or Error Up is TRUE

DPO Inputs Device



The EP9214 has 4 x 16-bit status data of the four output channels **DPO Inputs Channel n.**

Subsequently, a status word follows for the complete device **DPO Inputs Device.**

Channel Error:
Error Us or Error Up
One of the eight channels is TRUE

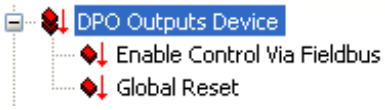
DPO Outputs Channel 1 to 4

The EP9214 has 4 x 16-bit output data of the four output channels **DPO Outputs Channel n**.

Output Us:
TRUE - switches on the output
FALSE - switches off the output

Reset Us:
TRUE - reset in the event of an error…

DPO Outputs Device



Subsequently, a status word follows for the complete device **DPO outputs Device.**

Enable Control Via Fieldbus:
TRUE - control of all outputs via the fieldbus / the PLC
FALSE - automatic switch-on depending on the CoE entries

Global Reset:
Resets all errors in the Box

4.5 EP9224-0023

4.5.1 EP9224-0023 – Diagnostic functions

4.5.1.1 Special features of the EP9224

The EP9224 EtherCAT Box offers all the basic properties of the EP9214-0023. Beyond that it permits more detailed settings and a further-reaching diagnosis of the output channels.

The diagnostic information is either directly visible in the process data or can be read out via the *logdata.csv* log file in the event of an error.

The limitation of the sum current can be implemented as a supplement to the channel current limitation in the EP9214 basic version.

Additional properties

- Switch-off due to sum current monitoring [▶ 56]
- Extended diagnostic data by process data [▶ 60]
- Data Logging [▶ 65]

Additional settings in the CoE

Settings for each output channel

The object 80n0:04 must be enabled in order to activate the sum current limitation.

The sum current can then be defined in the object 80n0:14.

Index	Name	Flags	Value
8000:0	DPO Settings Ch.1	RW	> 22 <
8000:02	Default State Us	RW	TRUE
8000:03	Default State Up	RW	TRUE
8000:04	Enable Sum Current Limitation	RW	FALSE
8000:11	Characteristic	RW	Fast acting (1)
8000:12	Nominal Current Us	RW	0x0FA0 (4000)
8000:13	Nominal Current Up	RW	0x0FA0 (4000)
8000:14	Nominal Sum Current	RW	0x0FA0 (4000)
8000:15	Timestamp 1 Trigger	RW	Error Us (0)
8000:16	Timestamp 2 Trigger	RW	Error Us (0)
8010:0	DPO Settings Ch.2	RW	> 22 <
8020:0	DPO Settings Ch.3	RW	> 22 <
8030:0	DPO Settings Ch.4	RW	> 22 <
8040:0	LOG Settings	RW	> 17 <
F80E:0	DPO Settings Device	RW	> 22 <

Fig. 20: Object 8000:14 Nominal Sum Current

CoE	Title	Description
80n0:04	Enable Sum Current Limitation	The CoE object 80n0:04 must be set to TRUE in order to activate 80n0:14
80n0:14	Nominal Sum Current	Apart from the nominal current for each Us and Up (basic function of the EP92x4), the sum current of both outputs can also be limited per channel. This property is recommended if the end device may not exceed a total power. The default setting is 4.0 A (4000) and the maximum sum current 8 A. For the EP9224-0037 the default setting is 3.0 A (3000) and the maximum sum current 6 A. The sum current switch-off corresponds to the behavior of the load circuit concerned (CoE 80n0:11).
80n0:15 / 16	Timestamp n Trigger	On occurrence of the selected event, the corresponding value (Peak Value n [▶ 60]) and the appropriate timestamp are set in the process data.

If overcurrent (≥ nominal current) is detected and it is foreseeable that the current monitoring will trip if conditions remain unchanged, then a warning is given both in the process data and in form of a flashing LED. An output switch-off due to overcurrent is indicated by a red LED.

If one of the outputs was switched off due to a diagnosis, it must be reactivated by an active RESET.

Restart after Power OFF/ON

If an output was switched off due to an error, then an active reset by the RESET contact (if existent) or the fieldbus is necessary. Switching off and on again is not sufficient!

Switch-on can take place either by EtherCAT or by 24 V on the RESET contact (if existent). To protect the circuitry, a RESET can take place maximally every 20 seconds. Faster successive edges are ignored.

Additional diagnosis

Extended diagnosis [▶ 60] and data logging [▶ 65]

4.5.1.2 Additional PDOs of the EP922x

The selection of additional PDOs in the PDO Mapping is required for the use of the diagnostic functions.

This allows the display of further diagnostic data [▶ 60] in the process data section.

PDOs, taking the EP9224-0023 as an example.

Additional input PDOs

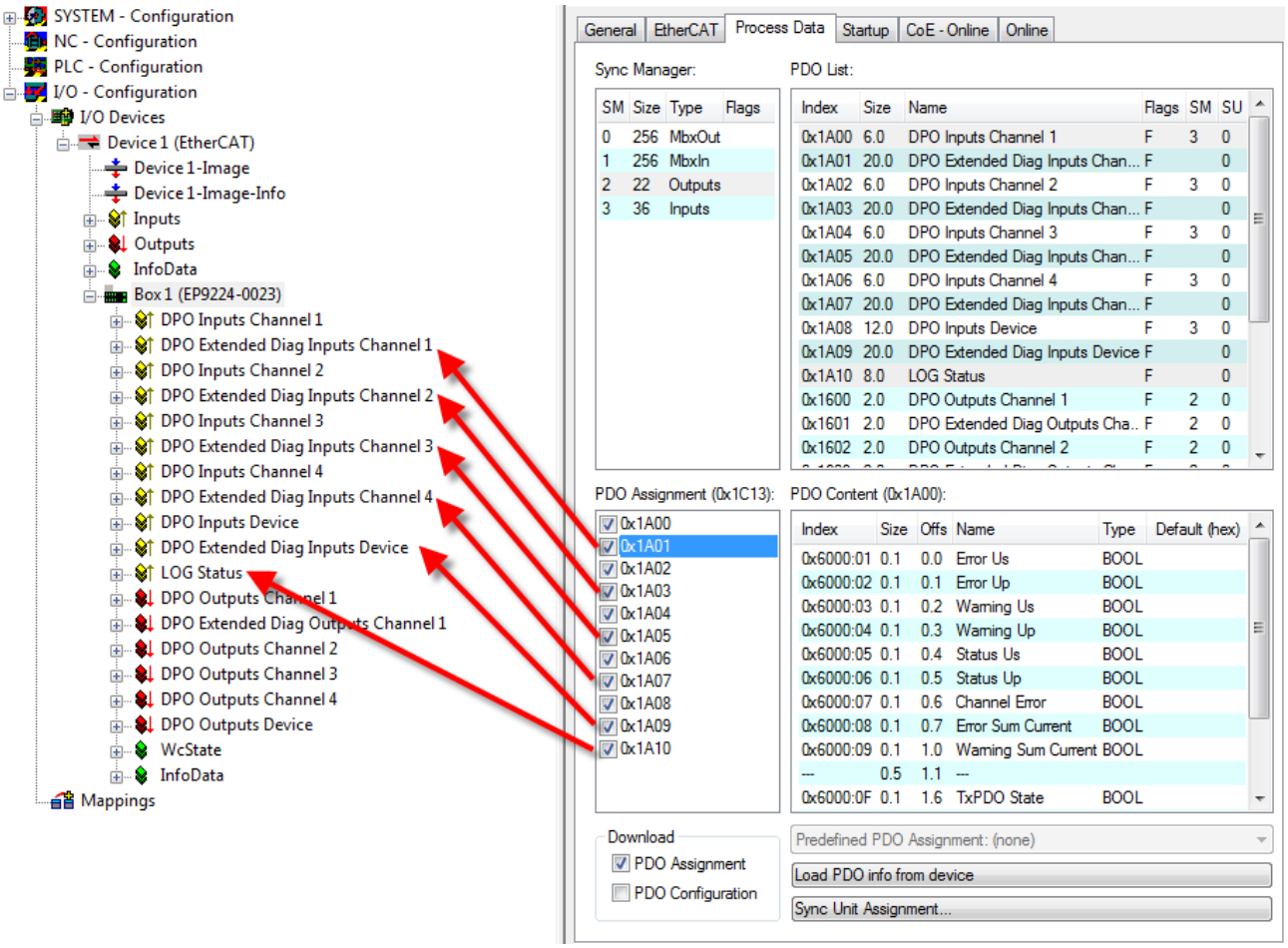


Fig. 21: EP9224 – Additional input PDOs

Additional output PDOs

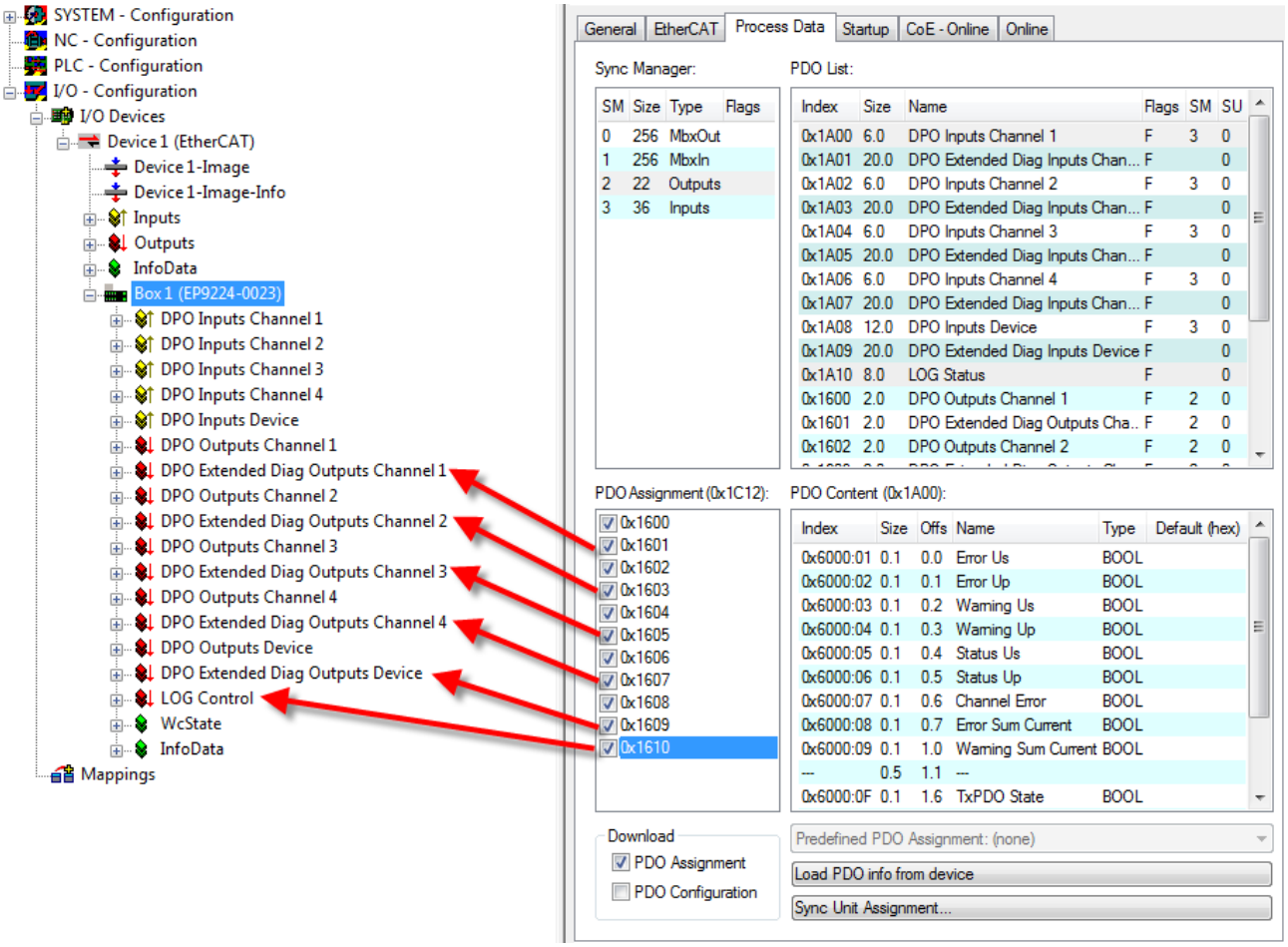


Fig. 22: EP9224 – Additional output PDOs

4.5.1.3 Extended channel and device diagnostics of the EP9224-00xx

The selection of additional PDOs in the PDO Mapping is required for the use of the diagnostic functions.

Certain values can be recorded with time stamp (timestamp / trigger [▶ 62]) for each channel of **DPO Extended Diag Inputs Channel n** and for the **DPO Extended Diag Inputs Device** module.

DPO Extended Diag Output Device resets the recording.

DPO Extended Diag Inputs Channel n

The DPO *Extended Diag Inputs Channel* n can be enabled with each channel.

It continuously indicates the respective current value *Peak Value n* and the precise time of the arrival *Timestamp n*.

The selection of the triggering event takes place in the CoE object 80x0:15 or 16.

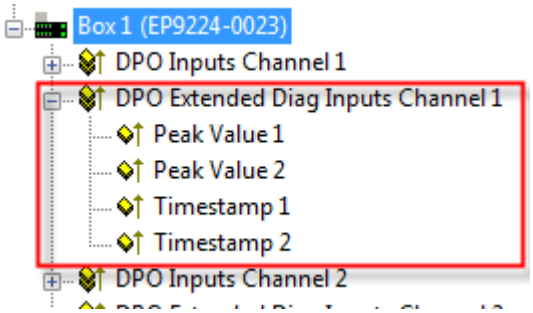


Fig. 23: EP9224 - DPO Extended Diag Inputs Channel 1

DPO Extended Diag Inputs Device

As for each channel there is also a *DPO Extended Diag Inputs Device* for the entire EP9224.

It continuously indicates the respective current value *Peak Value n* and the precise time of the arrival *Timestamp n*.

The selection of the triggering event takes place in the CoE object F80E:15 or 16.

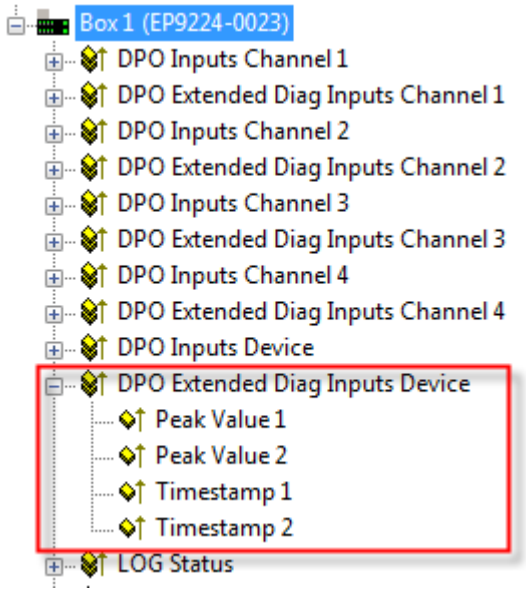


Fig. 24: EP9224 - DPO Extended Diag Inputs Device

DPO Extended Diag Outputs Channel n

The *Peak Value* and *Timestamp* data of the respective channel are reset by setting the *Reset Extended Diag Data* bit.

The bit is state-triggered.

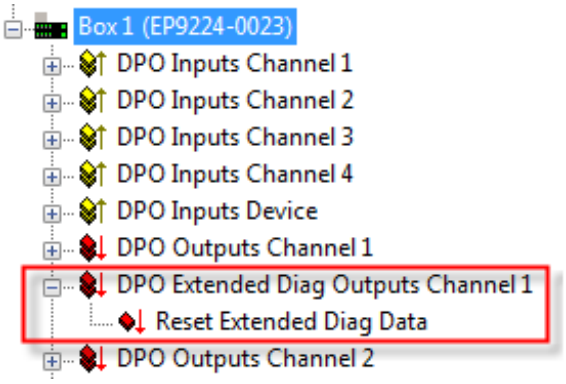


Fig. 25: EP9224 - DPO Extended Diag Outputs Channel 1

DPO Extended Diag Outputs Device

The *Peak Value* and *Timestamp* data of the module are reset by setting the *Reset Extended Diag Data* bit.

The bit is state-triggered.

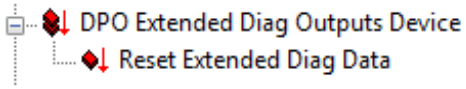


Fig. 26: EP9224 - DPO Extended Diag Outputs Device

4.5.1.4 Timestamp / trigger of the EP9224

The last min/max values **Peak Value n** and the respective timestamp **Timestamp n** can be displayed or recorded via the *Timestamp / Trigger* setting, depending on the trigger criterion in the CoE 80n0:15 and 16.

Process data

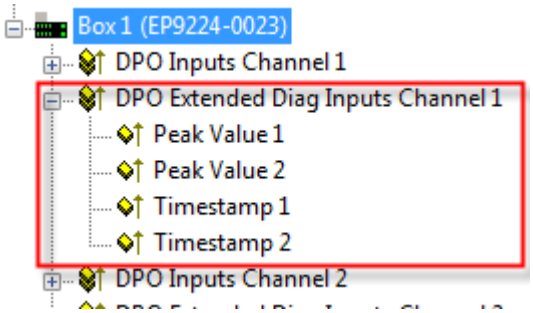


Fig. 27: EP9224 - Process data

Peak value / Timestamp

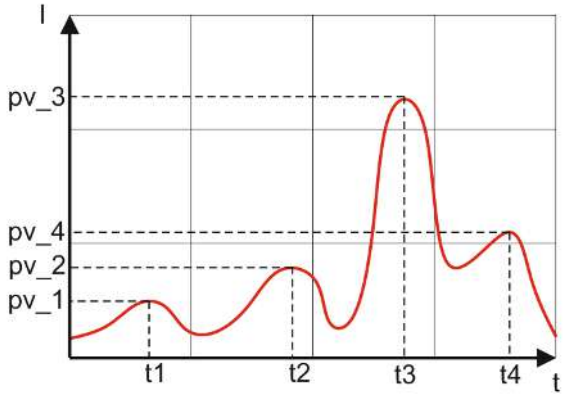


Fig. 28: EP9224 - Peak value / Timestamp

The present value and the associated timestamp are set each time the value momentarily saved in **Peak Value n** is exceeded or fallen below.

Thus, for example, in the above case with the setting *Maximum Current Us*, the value pv_3 is displayed in the process data with the timestamp t3.

Selection of the trigger criterion

Settings for each output channel

The object 80n0:15 or 16 must be adapted for the selection.

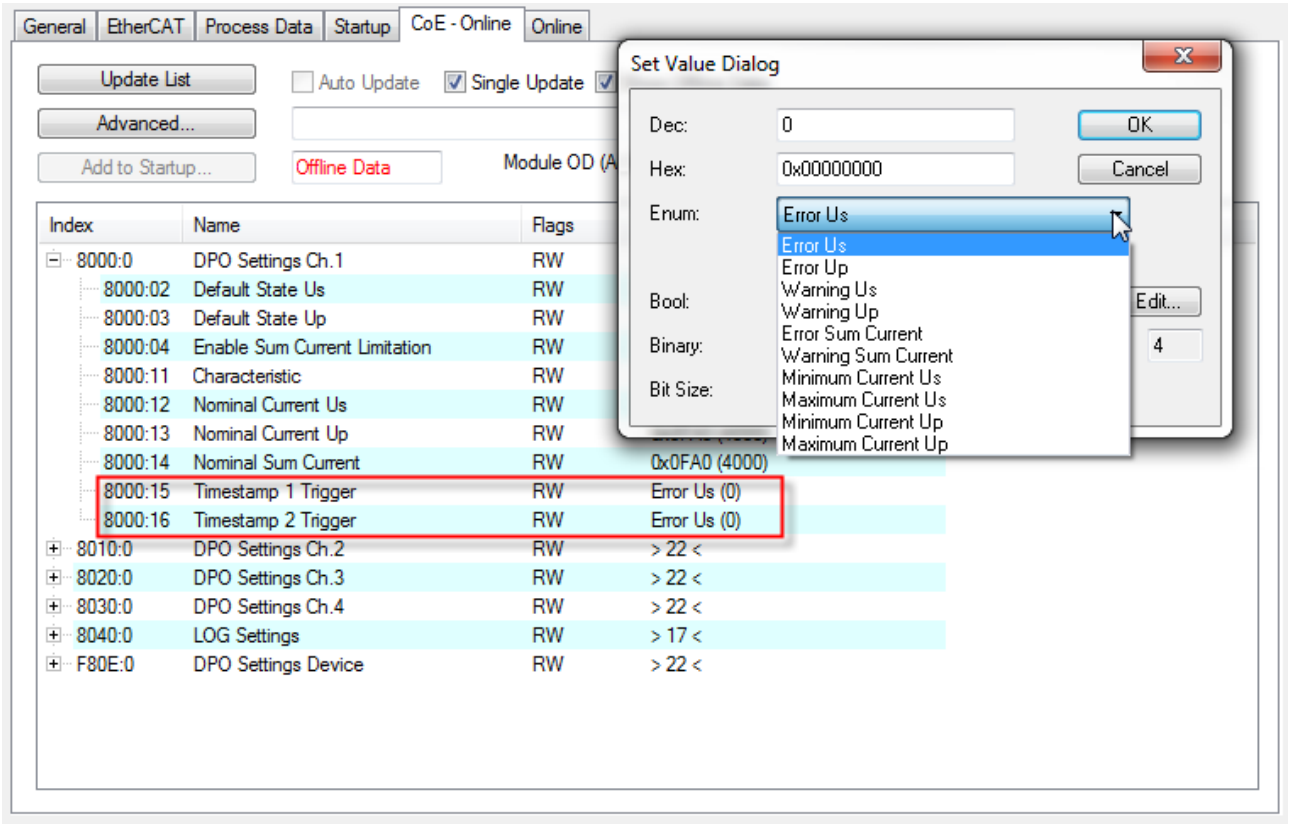


Fig. 29: EP9224 – Selection of the trigger criterion – settings per output channel

Description of the setting

CoE	Title	Description
80n0:15 / 16	Error Us	Switch-off of Us due to an error (edge triggered 0->1)
	Error Up	Switch-off of Up due to an error (edge triggered 0->1)
	Warning Us	imminent switch-off of Us due to a continuous overload > 100% (edge triggered 0->1)
	Warning Up	imminent switch-off of Up due to a continuous overload > 100% (edge triggered 0->1)
	Error Sum Current	Switch-off of Us and Up due to a sum current error (edge triggered 0->1)
	Warning Sum Current	Imminent switch-off of Us and Up due to a sum current error (edge triggered 0->1)
	Minimum Current Us	minimum current on Us
	Maximum Current Us	maximum current on Us
	Minimum Current Up	minimum current on Up
	Maximum Current Up	maximum current on Up

Reset of the values

Reset of *Peak Value n* and *Timestamp* for each channel

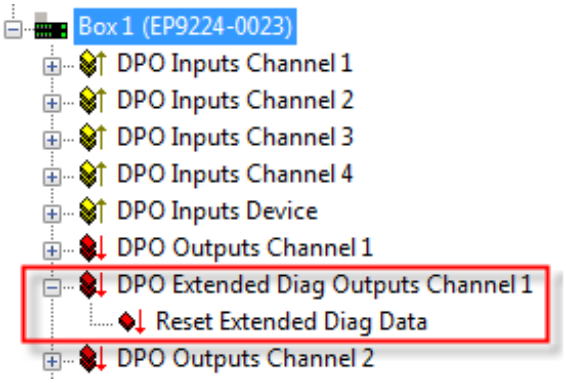


Fig. 30: EP9224 - Reset Extended Diag Data for the channel

Reset of *Peak Value n* and *Timestamp* of the module

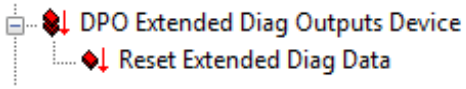


Fig. 31: EP9224 - Reset Extended Diag Data for the module

4.5.1.5 Data Logging

Overview

With the data logging the continuous logging of all relevant EP9224 data can be started.

These data are written to a 40-line ring buffer. In the case of the EP9224-0037 the memory is 25 lines..

On the first error the recording is stopped so that the data can be evaluated after an error or during normal operation.

In the event of an error, data are still written for a few cycles. The switching-off of a channel is indicated by OFF.

The writing rate or scanning rate is 10 ms in the factory setting. The value can be adjusted from 1 ms to 1000 ms in the CoE.

Setting the sampling rate via CoE object 8040:11

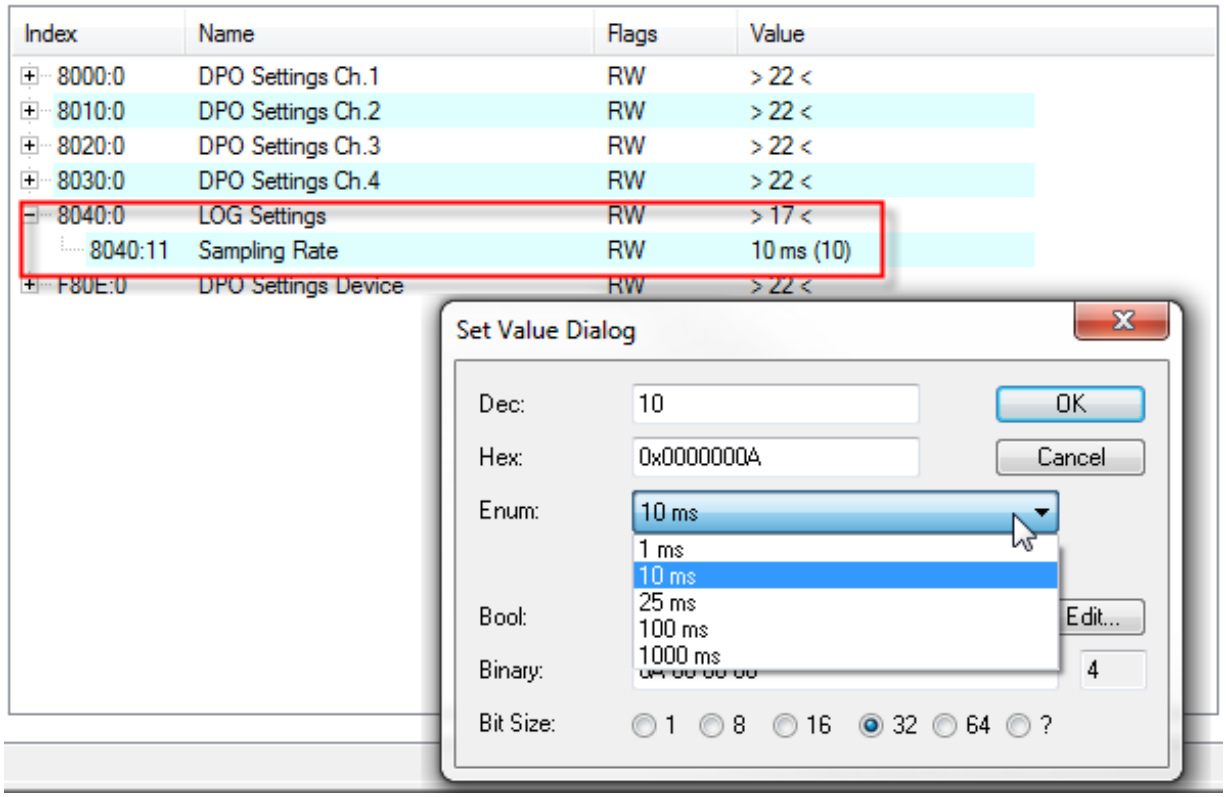


Fig. 32: EP9224 – Setting the sampling rate

Starting the logger

The logger is started/stopped via the process data

- Start logger and
- Stop logger

These must be enabled via the PDO mapping 0x1610 (see PDO settings [▶ 58]).

DPO LOG Control

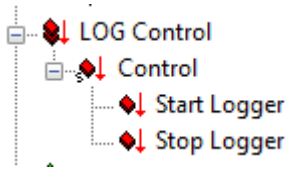


Fig. 33: EP9224 - DPO LOG Control

The log file is written when stopping the logger or in the case of an error.

The state of the logger can be tracked in the PDO input area.

To do this it is necessary to activate the PDO 0x1A10 (see PDO settings [▶ 58]).

DPO LOG Status

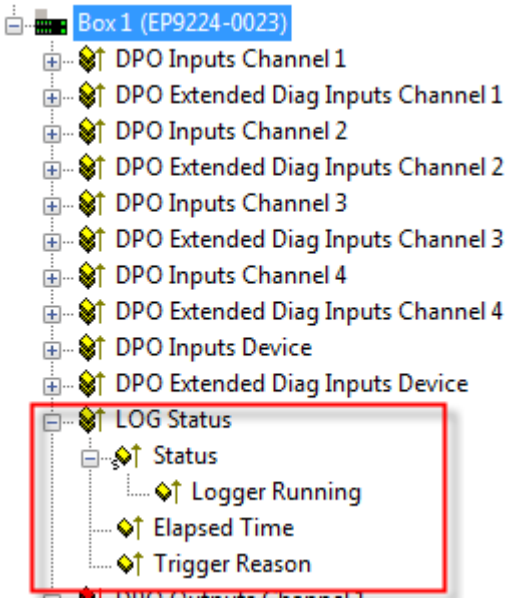


Fig. 34: EP9224 - DPO LOG Status

Upload the file from the EP9224

The EP9224 creates the file, giving it the name *logdata.csv*. This cannot be changed.

When uploading, for example, it must be specified accordingly in TwinCAT.

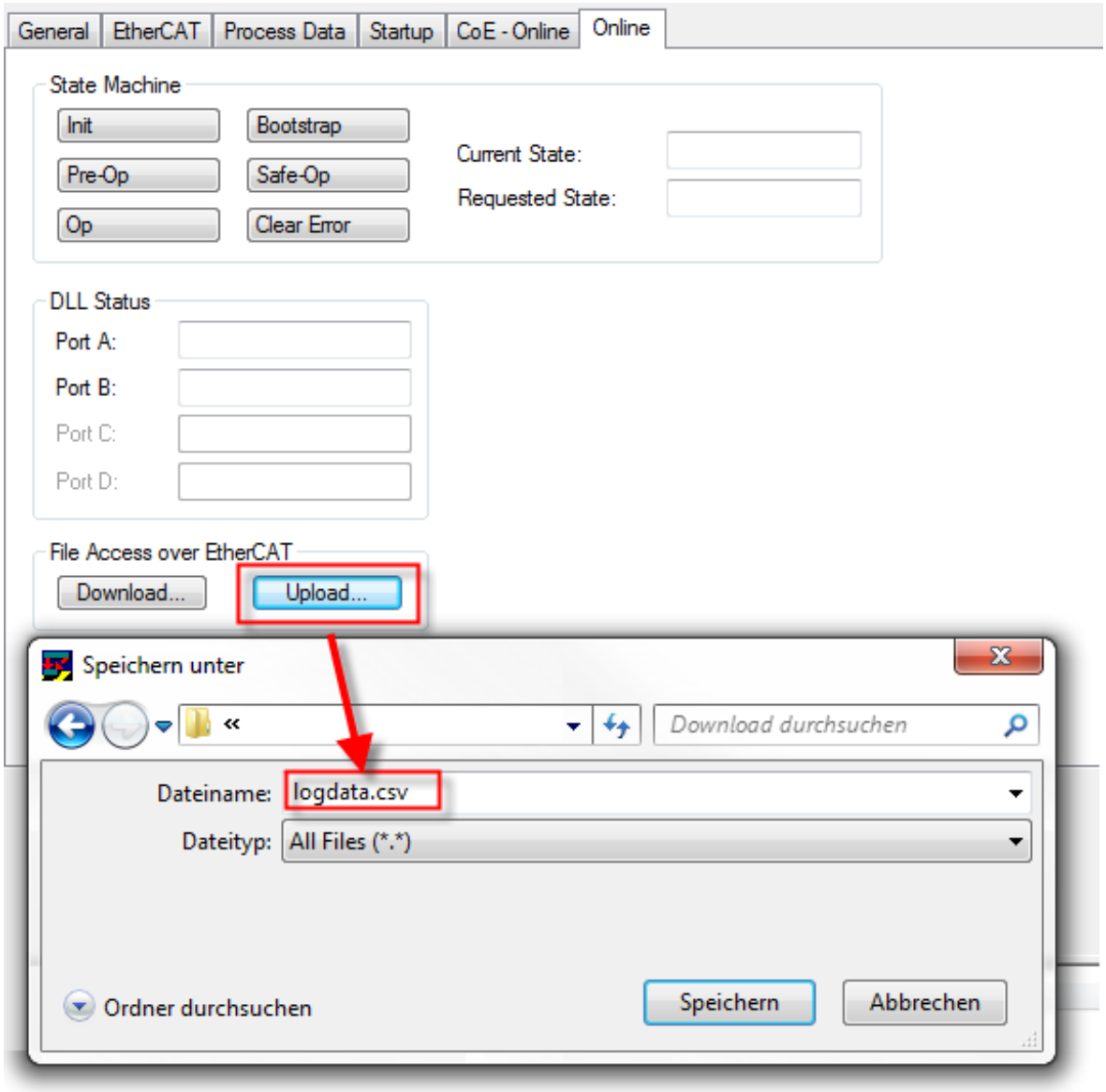


Fig. 35: EP9224 - Uploading the file

Structure of the logging file: logdata.csv

The data are saved in the CSV format, so that simple viewing with EXCEL or a corresponding interpretation is possible.

**** Logfile from Ethercat Slave ****			
Device Name	EP9224-0023		
File Version	01. Mai		
Reason for which the snapshot was taken	Overcurrent		
Age of snapshot	55 s		
System timestamp (0 if DC not supported)	2,47326E+13		
Column description	Time offset additiona	I(Us1)	I(Us2)
Unit	ms	100 mA	100 m
	390	25	
	380	25	
	370	25	
	360	25	
	350	25	

Fig. 36: EP9224 – Structure of the logdata.csv file

Header

Field	Description
Device Name	Name of the module
File Version	Version number (Note: when importing from EXCEL the version, e.g. 1.5, is interpreted/displayed as a date (1st May))
Reason for which the snapshot was taken	Reason for stopping the data logger
Age of snapshot	time elapsed from stopping the data logger until the upload
System timestamp (0 if DC not supported)	current timestamp when uploading

Columns

Type	Description
Time offset additional to snapshot age	The age of the measured values in the row in relation to the stopping of the data logger (0 = stop, > 0 older values) in ms
I(U...)	present current values of the channels Us / Up 1 - 4 in 100 mA
Internal Temperature	internal module temperature in °C
Us / Up	Input voltage Us and Up at the 7/8" input in V
Sum Current Us / Up	Sum current of Us and Up in A
I^2t(U...)	virtual overload, incremented or decremented depending on the nominal current • from 10% warning • at 100% shut-off

Example: slow exceeding of the current (simulation with potentiometer)

logdata.csv (zip)

Time offset	I(Us1)	I(Us2)	I(Us	I(Us4	I(Up	I(U	I(U	I(U	Internal	Us	Up	Sum c	Sum	I²t(Us1)
ms	100 mA	100 mA	100	100 n	100	100	100	10	°C	V	V	A	A	%
390	30	0	0	0	1	0	0	0	38	22	23	3	0	0
380	30	0	0	0	1	0	0	0	38	22	23	3	0	0
370	33	0	0	0	1	0	0	0	38	22	22	3	0	0
360	33	0	0	0	1	0	0	0	38	22	23	3	0	0
350	33	0	0	0	1	0	0	0	38	22	23	3	0	0
340	33	0	0	0	1	0	0	0	38	22	23	3	0	0
330	33	0	0	0	1	0	0	0	38	22	23	3	0	0
320	33	0	0	0	1	0	0	0	38	22	22	3	0	0
310	33	0	0	0	1	0	0	0	38	22	22	3	0	0
300	33	0	0	0	1	0	0	0	38	22	22	3	0	0
290	33	0	0	0	1	0	0	0	38	22	22	3	0	0
280	33	0	0	0	1	0	0	0	38	22	23	3	0	0
270	36	0	0	0	1	0	0	0	38	22	23	3	0	0
260	36	0	0	0	1	0	0	0	38	22	22	3	0	0
250	36	0	0	0	1	0	0	0	38	22	23	3	0	0
240	36	0	0	0	1	0	0	0	38	22	23	3	0	0
230	36	0	0	0	1	0	0	0	38	22	23	3	0	0
220	36	0	0	0	1	0	0	0	38	22	23	3	0	0
210	36	0	0	0	1	0	0	0	38	22	22	3	0	0
200	36	0	0	0	1	0	0	0	38	22	22	3	0	0
190	36	0	0	0	1	0	0	0	38	22	22	3	0	0
180	36	0	0	0	1	0	0	0	38	22	23	3	0	1
170	36	0	0	0	1	0	0	0	38	22	22	3	0	1
160	40	0	0	0	1	0	0	0	38	22	23	4	0	1
150	40	0	0	0	1	0	0	0	38	22	22	4	0	1
140	41	0	0	0	1	0	0	0	38	22	23	4	0	1
130	40	0	0	0	1	0	0	0	38	22	23	4	0	1
120	40	0	0	0	1	0	0	0	38	22	23	4	0	1
110	40	0	0	0	1	0	0	0	38	22	22	4	0	1
100	46	0	0	0	1	0	0	0	38	22	23	4	0	11
90	46	0	0	0	1	0	0	0	38	22	23	4	0	21
80	46	0	0	0	1	0	0	0	38	22	23	4	0	31
70	46	0	0	0	1	0	0	0	38	22	23	4	0	41
60	46	0	0	0	1	0	0	0	38	22	23	4	0	51
50	46	0	0	0	1	0	0	0	38	22	23	4	0	61
40	46	0	0	0	1	0	0	0	38	22	22	4	0	71
30	51	0	0	0	1	0	0	0	38	21	22	5	0	81
20	49	0	0	0	1	0	0	0	38	21	21	4	0	91
10	Off	0	0	0	1	0	0	0	38	22	22	0	0	99
0	Off	0	0	0	1	0	0	0	38	23	23	0	0	99

Fig. 37: EP9224 - logdata.csv

Description:

- EP9224: Setting the Us channel to a nominal current of 1500 mA
- Continuous increase of the current on channel1 Us within the recorded range of 3.0 A to 4.9 A, then switch-off takes place.
- Overcurrent begins from 180 ms
- 100% overload reached (99), channel is switched off
- the module now waits for an error correction or an active reset of the error

4.5.2 EP9224-0023 – Object description

4.5.2.1 Objects for parameterization

4.5.2.1.1 Index 1011 Restore default parameters

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

4.5.2.1.2 Index 8000 DPO Settings Ch.1

Index	Name	Meaning	Data type	Flags	Default
8000:0	DPO Settings Ch.1		UINT8	RO	0x16 (22_{dec})
8000:02	Default State Us	The output assumes this value if *Enable Control VIA Fieldbus* (F707:01) is not set or if there is no connection to the fieldbus	boolean	RW	0x01 (1_{dec})
8000:03	Default State Up	The output assumes this value if *Enable Control VIA Fieldbus* (F707:01) is not set or if there is no connection to the fieldbus	boolean	RW	0x01 (1_{dec})
8000:04	Enable Sum Current Limitation	Sum current limitation for the channel: 0_{bin}: disabled 1_{bin}: enabled	boolean	RW	0x00 (0_{dec})
8000:11	Characteristic	Specifies the characteristic with which the current monitoring reacts: 0_{dec}: very fast acting 1_{dec}: fast acting 2_{dec}: slow acting 3_{dec}: time delay	UINT16	RW	0x0001 (1_{dec})
8000:12	Nominal Current Us	Nominal current on the output	UINT16	RW	0x0FA0 (4000_{dec})
8000:13	Nominal Current Up	Nominal current on the output	UINT16	RW	0x0FA0 (4000_{dec})
8000:14	Nominal Sum Current	Nominal sum current	UINT16	RW	0x0FA0 (4000_{dec})
8000:15	Timestamp 1 Trigger	Trigger condition for the extended diagnosis	UINT16	RW	0x0000 (0_{dec})
8000:16	Timestamp 2 Trigger	Trigger condition for the extended diagnosis	UINT16	RW	0x0000 (0_{dec})

4.5.2.1.3 Index 8010 DPO Settings Ch.2

Index	Name	Meaning	Data type	Flags	Default
8010:0	DPO Settings Ch.2		UINT8	RO	0x16 (22_{dec})
8010:02	Default State Us	The output assumes this value if *Enable Control VIA Fieldbus* (F707:01) is not set or if there is no connection to the fieldbus	boolean	RW	0x01 (1_{dec})
8010:03	Default State Up	The output assumes this value if *Enable Control VIA Fieldbus* (F707:01) is not set or if there is no connection to the fieldbus	boolean	RW	0x01 (1_{dec})
8010:04	Enable Sum Current Limitation	Sum current limitation for the channel: 0_{bin}: disabled 1_{bin}: enabled	boolean	RW	0x00 (0_{dec})
8010:11	Characteristic	Specifies the characteristic with which the current monitoring reacts: 0_{dec}: very fast acting 1_{dec}: fast acting 2_{dec}: slow acting 3_{dec}: time delay	UINT16	RW	0x0001 (1_{dec})
8010:12	Nominal Current Us	Nominal current on the output	UINT16	RW	0x0FA0 (4000_{dec})
8010:13	Nominal Current Up	Nominal current on the output	UINT16	RW	0x0FA0 (4000_{dec})
8010:14	Nominal Sum Current	Nominal sum current	UINT16	RW	0x0FA0 (4000_{dec})
8010:15	Timestamp 1 Trigger	Trigger condition for the extended diagnosis	UINT16	RW	0x0000 (0_{dec})
8010:16	Timestamp 2 Trigger	Trigger condition for the extended diagnosis	UINT16	RW	0x0000 (0_{dec})

4.5.2.1.4 Index 8020 DPO Settings Ch.3

Index	Name	Meaning	Data type	Flags	Default
8020:0	DPO Settings Ch.3		UINT8	RO	0x16 (22_{dec})
8020:02	Default State Us	The output assumes this value if *Enable Control VIA Fieldbus* (F707:01) is not set or if there is no connection to the fieldbus	boolean	RW	0x01 (1_{dec})
8020:03	Default State Up	The output assumes this value if *Enable Control VIA Fieldbus* (F707:01) is not set or if there is no connection to the fieldbus	boolean	RW	0x01 (1_{dec})
8020:04	Enable Sum Current Limitation	Sum current limitation for the channel: 0_{bin}: disabled 1_{bin}: enabled	boolean	RW	0x00 (0_{dec})
8020:11	Characteristic	Specifies the characteristic with which the current monitoring reacts: 0_{dec}: very fast acting 1_{dec}: fast acting 2_{dec}: slow acting 3_{dec}: time delay	UINT16	RW	0x0001 (1_{dec})
8020:12	Nominal Current Us	Nominal current on the output	UINT16	RW	0x0FA0 (4000_{dec})
8020:13	Nominal Current Up	Nominal current on the output	UINT16	RW	0x0FA0 (4000_{dec})
8020:14	Nominal Sum Current	Nominal sum current	UINT16	RW	0x0FA0 (4000_{dec})
8020:15	Timestamp 1 Trigger	Trigger condition for the extended diagnosis	UINT16	RW	0x0000 (0_{dec})
8020:16	Timestamp 2 Trigger	Trigger condition for the extended diagnosis	UINT16	RW	0x0000 (0_{dec})

4.5.2.1.5 Index 8030 DPO Settings Ch.4

Index	Name	Meaning	Data type	Flags	Default
8030:0	DPO Settings Ch.4		UINT8	RO	0x16 (22_{dec})
8030:02	Default State Us	The output assumes this value if *Enable Control VIA Fieldbus* (F707:01) is not set or if there is no connection to the fieldbus	boolean	RW	0x01 (1_{dec})
8030:03	Default State Up	The output assumes this value if *Enable Control VIA Fieldbus* (F707:01) is not set or if there is no connection to the fieldbus	boolean	RW	0x01 (1_{dec})
8030:04	Enable Sum Current Limitation	Sum current limitation for the channel: 0_{bin}: disabled 1_{bin}: enabled	boolean	RW	0x00 (0_{dec})
8030:11	Characteristic	Specifies the characteristic with which the current monitoring reacts: 0_{dec}: very fast acting 1_{dec}: fast acting 2_{dec}: slow acting 3_{dec}: time delay	UINT16	RW	0x0001 (1_{dec})
8030:12	Nominal Current Us	Nominal current on the output	UINT16	RW	0x0FA0 (4000_{dec})
8030:13	Nominal Current Up	Nominal current on the output	UINT16	RW	0x0FA0 (4000_{dec})
8030:14	Nominal Sum Current	Nominal sum current	UINT16	RW	0x0FA0 (4000_{dec})
8030:15	Timestamp 1 Trigger	Trigger condition for the extended diagnosis	UINT16	RW	0x0000 (0_{dec})
8030:16	Timestamp 2 Trigger	Trigger condition for the extended diagnosis	UINT16	RW	0x0000 (0_{dec})

4.5.2.1.6 Index 8040 LOG Settings

Index	Name	Meaning	Data type	Flags	Default
8040:0	LOG Settings		UINT8	RO	0x11 (17_{dec})
8040:11	Sampling Rate	permitted values: 1: 1 ms 10: 10 ms 25: 25 ms 100: 100 ms	UINT16	RW	0x000A (10_{dec})

4.5.2.1.7 Index F607 DPO Inputs Device

Index	Name	Meaning	Data type	Flags	Default
F607:0	DPO Inputs Device		UINT8	RO	0x19 (25_{dec})
F607:01	Temperature Warning	A temperature of about 80 °C has been reached	boolean	RO	0x00 (0_{dec})
F607:02	Temperature Error	A critical temperature of about 85 °C has been reached, the outputs will be switched off. The bit must be reset by a Global Reset (F707:04) or by a voltage reset. No output can be switched on if the error bit is set.	boolean	RO	0x00 (0_{dec})
F607:03	Us Warning	Us is less than 21.5 V, no further outputs can be switched on.	boolean	RO	0x00 (0_{dec})
F607:04	Us Error	Us is less than 19 V, all Us outputs will be switched off. This bit must be reset by a Global Reset (F707:04) or by a voltage reset. No Us output can be switched on if the error bit is set.	boolean	RO	0x00 (0_{dec})
F607:05	Up Warning	Up is less than 21.5 V, no further outputs can be switched on.	boolean	RO	0x00 (0_{dec})
F607:06	Up Error	Up is less than 19 V, all Up outputs will be switched off. This bit must be reset by a Global Reset (F707:04) or by a voltage reset. No Up output can be switched on if the Error bit is set.	boolean	RO	0x00 (0_{dec})
F607:07	Global Error Bit	One of the error bits of the four channels or F607:02 or F607:04 or F60706 is set	boolean	RO	0x00 (0_{dec})
F607:08	Sum Current Warning	The sum current monitoring has detected a current peak.	boolean	RO	0x00 (0_{dec})
F607:09	Sum Current Error	The sum current monitoring has detected an overcurrent. All outputs will be switched off.	boolean	RO	0x00 (0_{dec})
F607:0C	Reset Input	0: There is no voltage on the external reset input 1: 24 V is present on the external reset input	boolean	RO	0x00 (0_{dec})
F607:0F	TxPDO State		boolean	RO	0x00 (0_{dec})
F607:10	TxPDO Toggle		boolean	RO	0x00 (0_{dec})
F607:11	Current Us	Sum current of the module on Us	INT16	RO	0x0000 (0_{dec})
F607:12	Current Up	Sum current of the module on Up	INT16	RO	0x0000 (0_{dec})
F607:13	Voltage Us	Voltage at the Us input	INT16	RO	0x0000 (0_{dec})
F607:14	Voltage Up	Voltage at the Up input	INT16	RO	0x0000 (0_{dec})
F607:15	Temperature	Internal temperature of the power output stage	INT16	RO	0x0000 (0_{dec})
F607:16	Peak Value 1	Extended diagnosis	INT16	RO	0x0000 (0_{dec})
F607:17	Peak Value 2	Extended diagnosis	INT16	RO	0x0000 (0_{dec})
F607:18	Timestamp 1		UINT64	RO	
F607:19	Timestamp 2		UINT64	RO	

4.5.2.1.8 Index F707 DPO Outputs Device

Index	Name	Meaning	Data type	Flags	Default
F707:0	DPO Outputs Device		UINT8	RO	0x11 (17_{dec})
F707:01	Enable Control Via Fieldbus	0_{bin}: All outputs are set according to their default values (80X0:02, 80X0:03) 1_{bin}: All outputs are set according to their PDOs (70X0:01, 70X0:02)	boolean	RO	0x00 (0_{dec})
F707:04	Global Reset	All error bits are reset	boolean	RO	0x00 (0_{dec})
F707:11	Reset Extended Diag Data	Reset peak values and timestamps from F607	boolean	RO	0x00 (0_{dec})

4.5.2.1.9 Index F80E DPO Settings Device

Index	Name	Meaning	Data type	Flags	Default
F80E:0	DPO Settings Device		UINT8	RO	0x16 (22_{dec})
F80E:02	Enable Sum Current Limitation	Sum current monitoring: 0_{bin}: enabled 1_{bin}: disabled	boolean	RW	0x00 (0_{dec})
F80E:03	Automatic Restart After Uncritic Events on Us	Automatic restart after undervoltage and overtemperature: 0_{bin}: enabled 1_{bin}: disabled	boolean	RW	0x00 (0_{dec})
F80E:04	Automatic Restart After Uncritic Events on Up	Automatic restart after undervoltage and overtemperature: 0_{bin}: enabled 1_{bin}: disabled	boolean	RW	0x00 (0_{dec})
F80E:11	Startup Delay	Sets the time that is kept between two switch-on procedures: 1_{dec}: fast (10 ms) 2_{dec}: moderate (100 ms) 3_{dec}: slow (200 ms)	UINT16	RW	0x0001 (1_{dec})
F80E:12	Nominal Sum Current	Nominal sum current	INT16	RW	0x2710 (10000_{dec})
F80E:13	Sum Current Characteristic	Characteristic of the sum current monitoring	UINT16	RW	0x0001 (1_{dec})
F80E:15	Timestamp 1 Trigger	Variable of the extended diagnosis to be monitored: 0: Temperature Warning 1: Temperature Error 2: Us Warning 3: Us Error 4: Up Warning 5: Up Error 6: Global Error Bit 7: Sum Current Warning 8: Sum Current Error 16: Minimum Current Us 17: Maximum Current Us 18: Minimum Current Up 19: Maximum Current Up 20: Minimum Voltage Us 21: Maximum Voltage Us 22: Minimum Voltage Up 23: Maximum Voltage Up 25: Maximum Temperature 24: Minimum Temperature	UINT16	RW	0x0000 (0_{dec})
F80E:16	Timestamp 2 Trigger	Variable of the extended diagnosis to be monitored: 0: Temperature Warning 1: Temperature Error 2: Us Warning 3: Us Error 4: Up Warning 5: Up Error 6: Global Error Bit 7: Sum Current Warning 8: Sum Current Error 16: Minimum Current Us 17: Maximum Current Us 18: Minimum Current Up 19: Maximum Current Up 20: Minimum Voltage Us 21: Maximum Voltage Us 22: Minimum Voltage Up 23: Maximum Voltage Up 25: Maximum Temperature 24: Minimum Temperature	UINT16	RW	0x0000 (0_{dec})

4.5.2.2 Standard objects

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

4.5.2.2.1 Index 1000 Device type

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

4.5.2.2.2 Index 1008 Device name

Index	Name	Meaning	Data type	Flags	Default
1008:0	Device name	Device name of the EtherCAT slave	STRING	RO	EP9224-0023

4.5.2.2.3 Index 1009 Hardware version

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

4.5.2.2.4 Index 100A Software version

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

4.5.2.2.5 Index 1018 Identity

Index	Name	Meaning	Data type	Flags	Default
1018:0	Identity	Information for identifying the slave	UINT8	RO	0x04 (4_{dec})
1018:01	Vendor ID	Vendor ID of the EtherCAT slave	UINT32	RO	0x00000002 (2_{dec})
1018:02	Product code	Product code of the EtherCAT slave	UINT32	RO	0x24084052 (604520530_{dec})
1018:03	Revision	Revision number of the EtherCAT slave; the Low Word (bit 0-15) indicates the special terminal number, the High Word (bit 16-31) refers to the device description	UINT32	RO	0x00000000 (0_{dec})
1018:04	Serial number	Serial number of the EtherCAT slave; the Low Byte (bit 0-7) of the Low Word contains the year of production, the High Byte (bit 8-15) of the Low Word contains the week of production, the High Word (bit 16-31) is 0	UINT32	RO	0x00000000 (0_{dec})

4.5.2.2.6 Index 10F0 Backup parameter handling

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

4.5.2.2.7 Index 1600 DPO RxPDO-Map Outputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
1600:0	DPO RxPDO-Map Outputs Ch.1	PDO Mapping RxPDO 1	UINT8	RO	0x06 (6_{dec})
1600:01	SubIndex 001	1. PDO Mapping entry (object 0x7000 (DPO Outputs Ch.1), entry 0x01 (Output Us))	UINT32	RO	0x7000:01, 1
1600:02	SubIndex 002	2. PDO Mapping entry (object 0x7000 (DPO Outputs Ch.1), entry 0x02 (Output Up))	UINT32	RO	0x7000:02, 1
1600:03	SubIndex 003	3. PDO Mapping entry (2 bits align)	UINT32	RO	0x0000:00, 2
1600:04	SubIndex 004	4. PDO Mapping entry (object 0x7000 (DPO Outputs Ch.1), entry 0x05 (Reset Us))	UINT32	RO	0x7000:05, 1
1600:05	SubIndex 005	5. PDO Mapping entry (object 0x7000 (DPO Outputs Ch.1), entry 0x06 (Reset Up))	UINT32	RO	0x7000:06, 1
1600:06	SubIndex 006	6. PDO Mapping entry (10 bits align)	UINT32	RO	0x0000:00, 10

4.5.2.2.8 Index 1601 DPO RxPDO-Map Extended Diag Outputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
1601:0	DPO RxPDO-Map Extended Diag Outputs Ch.1	PDO Mapping RxPDO 2	UINT8	RO	0x02 (2_{dec})
1601:01	SubIndex 001	1. PDO Mapping entry (object 0x7010 (DPO Outputs Ch.2), entry 0x01 (Output Us))	UINT32	RO	0x7000:11, 1
1601:02	SubIndex 002	2. PDO Mapping entry (object 0x7010 (DPO Outputs Ch.2), entry 0x02 (Output Up))	UINT32	RO	0x0000:00, 15

4.5.2.2.9 Index 1602 DPO RxPDO-Map Outputs Ch.2

Index	Name	Meaning	Data type	Flags	Default
1602:0	DPO RxPDO-Map Outputs Ch.2	PDO Mapping RxPDO 3	UINT8	RO	0x06 (6_{dec})
1602:01	SubIndex 001	1. PDO Mapping entry (object 0x7020 (DPO Outputs Ch.3), entry 0x01 (Output Us))	UINT32	RO	0x7010:01, 1
1602:02	SubIndex 002	2. PDO Mapping entry (object 0x7020 (DPO Outputs Ch.3), entry 0x02 (Output Up))	UINT32	RO	0x7010:02, 1
1602:03	SubIndex 003	3. PDO Mapping entry (2 bits align)	UINT32	RO	0x0000:00, 2
1602:04	SubIndex 004	4. PDO Mapping entry (object 0x7020 (DPO Outputs Ch.3), entry 0x05 (Reset Us))	UINT32	RO	0x7010:05, 1
1602:05	SubIndex 005	5. PDO Mapping entry (object 0x7020 (DPO Outputs Ch.3), entry 0x06 (Reset Up))	UINT32	RO	0x7010:06, 1
1602:06	SubIndex 006	6. PDO Mapping entry (10 bits align)	UINT32	RO	0x0000:00, 10

4.5.2.2.10 Index 1603 DPO RxPDO-Map Extended Diag Outputs Ch.2

Index	Name	Meaning	Data type	Flags	Default
1603:0	DPO RxPDO-Map Extended Diag Outputs Ch.2	PDO Mapping RxPDO 4	UINT8	RO	0x02 (2_{dec})
1603:01	SubIndex 001	1. PDO Mapping entry (object 0x7030 (DPO Outputs Ch.4), entry 0x01 (Output Us))	UINT32	RO	0x7010:11, 1
1603:02	SubIndex 002	2. PDO Mapping entry (object 0x7030 (DPO Outputs Ch.4), entry 0x02 (Output Up))	UINT32	RO	0x0000:00, 15

4.5.2.2.11 Index 1604 DPO RxPDO-Map Outputs Ch.3

Index	Name	Meaning	Data type	Flags	Default
1604:0	DPO RxPDO-Map Outputs Ch.3	PDO Mapping RxPDO 5	UINT8	RO	0x06 (6_{dec})
1604:01	SubIndex 001	1. PDO Mapping entry (object 0x7020 (DPO Outputs Ch.3), entry 0x01 (Output Us))	UINT32	RO	0x7020:01, 1
1604:02	SubIndex 002	2. PDO Mapping entry (object 0x7020 (DPO Outputs Ch.3), entry 0x02 (Output Up))	UINT32	RO	0x7020:02, 1
1604:03	SubIndex 003	3. PDO Mapping entry (2 bits align)	UINT32	RO	0x0000:00, 2
1604:04	SubIndex 004	4. PDO Mapping entry (object 0x7020 (DPO Outputs Ch.3), entry 0x05 (Reset Us))	UINT32	RO	0x7020:05, 1
1604:05	SubIndex 005	5. PDO Mapping entry (object 0x7020 (DPO Outputs Ch.3), entry 0x06 (Reset Up))	UINT32	RO	0x7020:06, 1
1604:06	SubIndex 006	6. PDO Mapping entry (10 bits align)	UINT32	RO	0x0000:00, 10

4.5.2.2.12 Index 1605 DPO RxPDO-Map Extended Diag Outputs Ch.3

Index	Name	Meaning	Data type	Flags	Default
1605:0	DPO RxPDO-Map Extended Diag Outputs Ch.3	PDO Mapping RxPDO 6	UINT8	RO	0x02 (2_{dec})
1605:01	SubIndex 001	1. PDO Mapping entry (object 0x7020 (DPO Outputs Ch.3), entry 0x11 (Reset Extended Diag Data))	UINT32	RO	0x7020:11, 1
1605:02	SubIndex 002	2. PDO Mapping entry (15 bits align)	UINT32	RO	0x0000:00, 15

4.5.2.2.13 Index 1606 DPO RxPDO-Map Outputs Ch.4

Index	Name	Meaning	Data type	Flags	Default
1606:0	DPO RxPDO-Map Outputs Ch.4	PDO Mapping RxPDO 7	UINT8	RO	0x06 (6_{dec})
1606:01	SubIndex 001	1. PDO Mapping entry (object 0x7030 (DPO Outputs Ch.4), entry 0x01 (Output Us))	UINT32	RO	0x7030:01, 1
1606:02	SubIndex 002	2. PDO Mapping entry (object 0x7030 (DPO Outputs Ch.4), entry 0x02 (Output Up))	UINT32	RO	0x7030:02, 1
1606:03	SubIndex 003	3. PDO Mapping entry (2 bits align)	UINT32	RO	0x0000:00, 2
1606:04	SubIndex 004	4. PDO Mapping entry (object 0x7030 (DPO Outputs Ch.4), entry 0x05 (Reset Us))	UINT32	RO	0x7030:05, 1
1606:05	SubIndex 005	5. PDO Mapping entry (object 0x7030 (DPO Outputs Ch.4), entry 0x06 (Reset Up))	UINT32	RO	0x7030:06, 1
1606:06	SubIndex 006	6. PDO Mapping entry (10 bits align)	UINT32	RO	0x0000:00, 10

4.5.2.2.14 Index 1607 DPO RxPDO-Map Extended Diag Outputs Ch.4

Index	Name	Meaning	Data type	Flags	Default
1607:0	DPO RxPDO-Map Extended Diag Outputs Ch.4	PDO Mapping RxPDO 8	UINT8	RO	0x02 (2_{dec})
1607:01	SubIndex 001	1. PDO Mapping entry (object 0x7030 (DPO Outputs Ch.4), entry 0x11 (Reset Extended Diag Data))	UINT32	RO	0x7030:11, 1
1607:02	SubIndex 002	2. PDO Mapping entry (15 bits align)	UINT32	RO	0x0000:00, 15

4.5.2.2.15 Index 1608 DPO RxPDO-Map Outputs Device

Index	Name	Meaning	Data type	Flags	Default
1608:0	DPO RxPDO-Map Outputs Device	PDO Mapping RxPDO 9	UINT8	RO	0x04 (4_{dec})
1608:01	SubIndex 001	1. PDO Mapping entry (object 0xF707 (DPO Outputs Device), entry 0x01 (Enable Control Via Fieldbus))	UINT32	RO	0xF707:01, 1
1608:02	SubIndex 002	2. PDO Mapping entry (2 bits align)	UINT32	RO	0x0000:00, 2
1608:03	SubIndex 003	3. PDO Mapping entry (object 0xF707 (DPO Outputs Device), entry 0x04 (Global Reset))	UINT32	RO	0xF707:04, 1
1608:04	SubIndex 004	4. PDO Mapping entry (12 bits align)	UINT32	RO	0x0000:00, 12

4.5.2.2.16 Index 1609 DPO RxPDO-Map Extended Diag Outputs Device

Index	Name	Meaning	Data type	Flags	Default
1609:0	DPO RxPDO-Map Extended Diag Outputs Device	PDO Mapping RxPDO 10	UINT8	RO	0x02 (2_{dec})
1609:01	SubIndex 001	1. PDO Mapping entry (object 0xF707 (DPO Outputs Device), entry 0x11 (Reset Extended Diag Data))	UINT32	RO	0xF707:11, 1
1609:02	SubIndex 002	2. PDO Mapping entry (15 bits align)	UINT32	RO	0x0000:00, 15

4.5.2.2.17 Index 1610 LOG RxPDO-Map Contr

Index	Name	Meaning	Data type	Flags	Default
1610:0	LOG RxPDO-Map Control	PDO Mapping RxPDO 17	UINT8	RO	0x03 (3_{dec})
1610:01	SubIndex 001	1. PDO Mapping entry (object 0x7040 (LOG Control), entry 0x01 (Start Logger))	UINT32	RO	0x7040:01, 1
1610:02	SubIndex 002	2. PDO Mapping entry (object 0x7040 (LOG Control), entry 0x02 (Stop Logger))	UINT32	RO	0x7040:02, 1
1610:03	SubIndex 003	3. PDO Mapping entry (14 bits align)	UINT32	RO	0x0000:00, 14

4.5.2.2.18 Index 1A00 DPO TxPDO-Map Inputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
1A00:0	DPO TxPDO-Map Inputs Ch.1	PDO Mapping TxPDO 1	UINT8	RO	0x0E (14_{dec})
1A00:01	SubIndex 001	1. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x01 (Error Us))	UINT32	RO	0x6000:01, 1
1A00:02	SubIndex 002	2. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x02 (Error Up))	UINT32	RO	0x6000:02, 1
1A00:03	SubIndex 003	3. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x03 (Warning Us))	UINT32	RO	0x6000:03, 1
1A00:04	SubIndex 004	4. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x04 (Warning Up))	UINT32	RO	0x6000:04, 1
1A00:05	SubIndex 005	5. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x05 (Status Us))	UINT32	RO	0x6000:05, 1
1A00:06	SubIndex 006	6. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x06 (Status Up))	UINT32	RO	0x6000:06, 1
1A00:07	SubIndex 007	7. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x07 (Channel Error))	UINT32	RO	0x6000:07, 1
1A00:08	SubIndex 008	8. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x08 (Error Sum Current))	UINT32	RO	0x6000:08, 1
1A00:09	SubIndex 009	9. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x09 (Warning Sum Current))	UINT32	RO	0x6000:09, 1
1A00:0A	SubIndex 010	10. PDO Mapping entry (4 bits align)	UINT32	RO	0x0000:00, 5
1A00:0B	SubIndex 011	11. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x0E (Sync error))	UINT32	RO	0x6000:0F, 1
1A00:0C	SubIndex 012	12. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x0F (TxPDO State))	UINT32	RO	0x6000:10, 1
1A00:0D	SubIndex 013	13. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x6000:11, 16
1A00:0E	SubIndex 014	14. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x11 (Current Us))	UINT32	RO	0x6000:12, 16

4.5.2.2.19 Index 1A01 DPO TxPDO-Map Extended Diag Inputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
1A01:0	DPO TxPDO-Map Extended Diag Inputs Ch.1	PDO Mapping TxPDO 2	UINT8	RO	0x04 (4_{dec})
1A01:01	SubIndex 001	1. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x13 (Maximum Current Us))	UINT32	RO	0x6000:13, 16
1A01:02	SubIndex 002	2. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x14 (Maximum Current Up))	UINT32	RO	0x6000:14, 16
1A01:03	SubIndex 003	3. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x15 (Minimum Current Us))	UINT32	RO	0x6000:17, 64
1A01:04	SubIndex 004	4. PDO Mapping entry (object 0x6000 (DPO Inputs Ch.1), entry 0x16 (Minimum Current Up))	UINT32	RO	0x6000:18, 64

4.5.2.2.20 Index 1A02 DPO TxPDO-Map Inputs Ch.2

Index	Name	Meaning	Data type	Flags	Default
1A02:0	DPO TxPDO-Map Inputs Ch.2	PDO Mapping TxPDO 3	UINT8	RO	0x0E (14_{dec})
1A02:01	SubIndex 001	1. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x01 (Error Us))	UINT32	RO	0x6010:01, 1
1A02:02	SubIndex 002	2. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x02 (Error Up))	UINT32	RO	0x6010:02, 1
1A02:03	SubIndex 003	3. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x03 (Warning Us))	UINT32	RO	0x6010:03, 1
1A02:04	SubIndex 004	4. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x04 (Warning Up))	UINT32	RO	0x6010:04, 1
1A02:05	SubIndex 005	5. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x05 (Status Us))	UINT32	RO	0x6010:05, 1
1A02:06	SubIndex 006	6. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x06 (Status Up))	UINT32	RO	0x6010:06, 1
1A02:07	SubIndex 007	7. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x07 (Channel Error))	UINT32	RO	0x6010:07, 1
1A02:08	SubIndex 008	8. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x08 (Error Sum Current))	UINT32	RO	0x6010:08, 1
1A02:09	SubIndex 009	9. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x09 (Warning Sum Current))	UINT32	RO	0x6010:09, 1
1A02:0A	SubIndex 010	10. PDO Mapping entry (4 bits align)	UINT32	RO	0x0000:00, 5
1A02:0B	SubIndex 011	11. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x0E (Sync error))	UINT32	RO	0x6010:0F, 1
1A02:0C	SubIndex 012	12. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x0F (TxPDO State))	UINT32	RO	0x6010:10, 1
1A02:0D	SubIndex 013	13. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x6010:11, 16
1A02:0E	SubIndex 014	14. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x11 (Current Us))	UINT32	RO	0x6010:12, 16

4.5.2.2.21 Index 1A03 DPO TxPDO-Map Extended Diag Inputs Ch.2

Index	Name	Meaning	Data type	Flags	Default
1A03:0	DPO TxPDO-Map Extended Diag Inputs Ch.2	PDO Mapping TxPDO 4	UINT8	RO	0x04 (4_{dec})
1A03:01	SubIndex 001	1. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x13 (Maximum Current Us))	UINT32	RO	0x6010:13, 16
1A03:02	SubIndex 002	2. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x14 (Maximum Current Up))	UINT32	RO	0x6010:14, 16
1A03:03	SubIndex 003	3. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x15 (Minimum Current Us))	UINT32	RO	0x6010:17, 64
1A03:04	SubIndex 004	4. PDO Mapping entry (object 0x6010 (DPO Inputs Ch.2), entry 0x16 (Minimum Current Up))	UINT32	RO	0x6010:18, 64

4.5.2.2.22 Index 1A04 DPO TxPDO-Map Inputs Ch.3

Index	Name	Meaning	Data type	Flags	Default
1A04:0	DPO TxPDO-Map Inputs Ch.3	PDO Mapping TxPDO 5	UINT8	RO	0x0E (14_{dec})
1A04:01	SubIndex 001	1. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x01 (Error Us))	UINT32	RO	0x6020:01, 1
1A04:02	SubIndex 002	2. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x02 (Error Up))	UINT32	RO	0x6020:02, 1
1A04:03	SubIndex 003	3. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x03 (Warning Us))	UINT32	RO	0x6020:03, 1
1A04:04	SubIndex 004	4. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x04 (Warning Up))	UINT32	RO	0x6020:04, 1
1A04:05	SubIndex 005	5. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x05 (Status Us))	UINT32	RO	0x6020:05, 1
1A04:06	SubIndex 006	6. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x06 (Status Up))	UINT32	RO	0x6020:06, 1
1A04:07	SubIndex 007	7. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x07 (Channel Error))	UINT32	RO	0x6020:07, 1
1A04:08	SubIndex 008	8. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x08 (Error Sum Current))	UINT32	RO	0x6020:08, 1
1A04:09	SubIndex 009	9. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x09 (Warning Sum Current))	UINT32	RO	0x6020:09, 1
1A04:0A	SubIndex 010	10. PDO Mapping entry (4 bits align)	UINT32	RO	0x0000:00, 5
1A04:0B	SubIndex 011	11. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x0E (Sync error))	UINT32	RO	0x6020:0F, 1
1A04:0C	SubIndex 012	12. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x0F (TxPDO State))	UINT32	RO	0x6020:10, 1
1A04:0D	SubIndex 013	13. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x6020:11, 16
1A04:0E	SubIndex 014	14. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x11 (Current Us))	UINT32	RO	0x6020:12, 16

4.5.2.2.23 Index 1A05 DPO TxPDO-Map Extended Diag Inputs Ch.3

Index	Name	Meaning	Data type	Flags	Default
1A05:0	DPO TxPDO-Map Extended Diag Inputs Ch.3	PDO Mapping TxPDO 6	UINT8	RO	0x04 (4_{dec})
1A05:01	SubIndex 001	1. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x13 (Maximum Current Us))	UINT32	RO	0x6020:13, 16
1A05:02	SubIndex 002	2. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x14 (Maximum Current Up))	UINT32	RO	0x6020:14, 16
1A05:03	SubIndex 003	3. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x15 (Minimum Current Us))	UINT32	RO	0x6020:17, 64
1A05:04	SubIndex 004	4. PDO Mapping entry (object 0x6020 (DPO Inputs Ch.3), entry 0x16 (Minimum Current Up))	UINT32	RO	0x6020:18, 64

4.5.2.2.24 Index 1A06 DPO TxPDO-Map Inputs Ch.4

Index	Name	Meaning	Data type	Flags	Default
1A06:0	DPO TxPDO-Map Inputs Ch.4	PDO Mapping TxPDO 7	UINT8	RO	0x0E (14_{dec})
1A06:01	SubIndex 001	1. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x01 (Error Us))	UINT32	RO	0x6030:01, 1
1A06:02	SubIndex 002	2. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x02 (Error Up))	UINT32	RO	0x6030:02, 1
1A06:03	SubIndex 003	3. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x03 (Warning Us))	UINT32	RO	0x6030:03, 1
1A06:04	SubIndex 004	4. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x04 (Warning Up))	UINT32	RO	0x6030:04, 1
1A06:05	SubIndex 005	5. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x05 (Status Us))	UINT32	RO	0x6030:05, 1
1A06:06	SubIndex 006	6. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x06 (Status Up))	UINT32	RO	0x6030:06, 1
1A06:07	SubIndex 007	7. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x07 (Channel Error))	UINT32	RO	0x6030:07, 1
1A06:08	SubIndex 008	8. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x08 (Error Sum Current))	UINT32	RO	0x6030:08, 1
1A06:09	SubIndex 009	9. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x09 (Warning Sum Current))	UINT32	RO	0x6030:09, 1
1A06:0A	SubIndex 010	10. PDO Mapping entry (4 bits align)	UINT32	RO	0x0000:00, 5
1A06:0B	SubIndex 011	11. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x0E (Sync error))	UINT32	RO	0x6030:0F, 1
1A06:0C	SubIndex 012	12. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x0F (TxPDO State))	UINT32	RO	0x6030:10, 1
1A06:0D	SubIndex 013	13. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x10 (TxPDO Toggle))	UINT32	RO	0x6030:11, 16
1A06:0E	SubIndex 014	14. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x11 (Current Us))	UINT32	RO	0x6030:12, 16

4.5.2.2.25 Index 1A07 DPO TxPDO-Map Extended Diag Inputs Ch.4

Index	Name	Meaning	Data type	Flags	Default
1A07:0	DPO TxPDO-Map Extended Diag Inputs Ch.4	PDO Mapping TxPDO 8	UINT8	RO	0x04 (4_{dec})
1A07:01	SubIndex 001	1. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x13 (Maximum Current Us))	UINT32	RO	0x6030:13, 16
1A07:02	SubIndex 002	2. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x14 (Maximum Current Up))	UINT32	RO	0x6030:14, 16
1A07:03	SubIndex 003	3. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x15 (Minimum Current Us))	UINT32	RO	0x6030:17, 64
1A07:04	SubIndex 004	4. PDO Mapping entry (object 0x6030 (DPO Inputs Ch.4), entry 0x16 (Minimum Current Up))	UINT32	RO	0x6030:18, 64

4.5.2.2.26 Index 1A08 DPO TxPDO-Map Inputs Device

Index	Name	Meaning	Data type	Flags	Default
1A08:0	DPO TxPDO-Map Inputs Device	PDO Mapping TxPDO 9	UINT8	RO	0x13 (19_{dec})
1A08:01	SubIndex 001	1. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x01 (Temperature Warning))	UINT32	RO	0xF607:01, 1
1A08:02	SubIndex 002	2. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x02 (Temperature Error))	UINT32	RO	0xF607:02, 1
1A08:03	SubIndex 003	3. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x03 (Us Warning))	UINT32	RO	0xF607:03, 1
1A08:04	SubIndex 004	4. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x04 (Us Error))	UINT32	RO	0xF607:04, 1
1A08:05	SubIndex 005	5. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x05 (Up Warning))	UINT32	RO	0xF607:05, 1
1A08:06	SubIndex 006	6. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x06 (Up Error))	UINT32	RO	0xF607:06, 1
1A08:07	SubIndex 007	7. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x07 (Global Error Bit))	UINT32	RO	0xF607:07, 1
1A08:08	SubIndex 008	8. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x08 (Sum Current Warning))	UINT32	RO	0xF607:08, 1
1A08:09	SubIndex 009	9. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x09 (Sum Current Error))	UINT32	RO	0xF607:09, 1
1A08:0A	SubIndex 010	10. PDO Mapping entry (2 bits align)	UINT32	RO	0x0000:00, 2
1A08:0B	SubIndex 011	11. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x0C (Reset Input))	UINT32	RO	0xF607:0C, 1
1A08:0C	SubIndex 012	12. PDO Mapping entry (2 bits align)	UINT32	RO	0x0000:00, 2
1A08:0D	SubIndex 013	13. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x0F (TxPDO State))	UINT32	RO	0xF607:0F, 1
1A08:0E	SubIndex 014	14. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x10 (TxPDO Toggle))	UINT32	RO	0xF607:10, 1
1A08:0F	SubIndex 015	15. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x11 (Current Us))	UINT32	RO	0xF607:11, 16
1A08:10	SubIndex 016	16. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x12 (Current Up))	UINT32	RO	0xF607:12, 16
1A08:11	SubIndex 017	17. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x13 (Voltage Us))	UINT32	RO	0xF607:13, 16
1A08:12	SubIndex 018	18. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x14 (Voltage Up))	UINT32	RO	0xF607:14, 16
1A08:13	SubIndex 019	19. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x15 (Temperature))	UINT32	RO	0xF607:15, 16

4.5.2.2.27 Index 1A09 DPO TxPDO-Map Extended Diag Inputs Device

Index	Name	Meaning	Data type	Flags	Default
1A09:0	DPO TxPDO-Map Extended Diag Inputs Device	PDO Mapping TxPDO 10	UINT8	RO	0x04 (4_{dec})
1A09:01	SubIndex 001	1. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x16 (Peak Value 1))	UINT32	RO	0xF607:16, 16
1A09:02	SubIndex 002	2. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x17 (Peak Value 2))	UINT32	RO	0xF607:17, 16
1A09:03	SubIndex 003	3. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x18 (Timestamp 1))	UINT32	RO	0xF607:18, 64
1A09:04	SubIndex 004	4. PDO Mapping entry (object 0xF607 (DPO Inputs Device), entry 0x19 (Timestamp 2))	UINT32	RO	0xF607:19, 64

4.5.2.2.28 Index 1A10 LOG TxPDO-Map Status

Index	Name	Meaning	Data type	Flags	Default
1A10:0	LOG TxPDO-Map Status	PDO Mapping TxPDO 17	UINT8	RO	0x04 (4_{dec})
1A10:01	SubIndex 001	1. PDO Mapping entry (object 0x6040 (LOG Status), entry 0x01 (Logger Running))	UINT32	RO	0x6040:01, 1
1A10:02	SubIndex 002	2. PDO Mapping entry (15 bits align)	UINT32	RO	0x0000:00, 15
1A10:03	SubIndex 003	3. PDO Mapping entry (object 0x6040 (LOG Status), entry 0x11 (Elapsed Time))	UINT32	RO	0x6040:11, 32
1A10:04	SubIndex 004	4. PDO Mapping entry (object 0x6040 (LOG Status), entry 0x12 (Trigger Reason))	UINT32	RO	0x6040:12, 16

4.5.2.2.29 Index 1C00 Sync manager type

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

4.5.2.2.30 Index 1C12 RxPDO assign

Index	Name	Meaning	Data type	Flags	Default
1C12:0	RxPDO assign	PDO Assign Outputs	UINT8	RW	0x05 (5_{dec})
1C12:01	Subindex 001	1. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x1600 (5632_{dec})
1C12:02	Subindex 002	2. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x1602 (5634_{dec})
1C12:03	Subindex 003	3. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x1604 (5636_{dec})
1C12:04	Subindex 004	4. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x1606 (5638_{dec})
1C12:05	Subindex 005	5. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x1608 (5640_{dec})
1C12:06	Subindex 006	6. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x0000 (0_{dec})
1C12:07	Subindex 007	7. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x0000 (0_{dec})
1C12:08	Subindex 008	8. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x0000 (0_{dec})
1C12:09	Subindex 009	9. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x0000 (0_{dec})
1C12:0A	Subindex 010	10. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x0000 (0_{dec})
1C12:0B	Subindex 011	11. allocated RxPDO (contains the index of the associated RxPDO mapping object)	UINT16	RW	0x0000 (0_{dec})

4.5.2.2.31 Index 1C13 TxPDO assign

Index	Name	Meaning	Data type	Flags	Default
1C13:0	TxPDO assign	PDO Assign Inputs	UINT8	RW	0x05 (5_{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	0x1A02 (6658_{dec})
1C13:03	Subindex 003	3. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x1A04 (6660_{dec})
1C13:04	Subindex 004	4. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x1A06 (6662_{dec})
1C13:05	Subindex 005	5. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x1A08 (6664_{dec})
1C13:06	Subindex 006	6. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x0000 (0_{dec})
1C13:07	Subindex 007	7. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x0000 (0_{dec})
1C13:08	Subindex 008	8. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x0000 (0_{dec})
1C13:09	Subindex 009	9. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x0000 (0_{dec})
1C13:0A	Subindex 010	10. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x0000 (0_{dec})
1C13:0B	Subindex 011	11. allocated TxPDO (contains the index of the associated TxPDO mapping object)	UINT16	RW	0x0000 (0_{dec})

4.5.2.2.32 Index 1C32 SM output parameter

Index	Name	Meaning	Data type	Flags	Default
1C32:0	SM output parameter	Synchronization parameters for the outputs	UINT8	RO	0x20 (32_{dec})
1C32:01	Sync mode	Current synchronization mode: • 0: Free Run • 1: Synchron with SM 2 Event • 2: DC-Mode - Synchron with SYNC0 Event • 3: DC-Mode - Synchron with SYNC1 Event	UINT16	RW	0x0000 (0_{dec})
1C32:02	Cycle time	Cycle time (in ns): • Free Run: Cycle time of the local timer • Synchron with SM 2 Event: 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	0x00000384 (900_{dec})
1C32:04	Sync modes supported	Supported synchronization modes: • Bit 0 = 1: free run is supported • Bit 1 = 1: Synchron with SM 2 Event is supported • Bit 2-3 = 01: DC mode is supported • Bit 4-5 = 10: Output Shift with SYNC1 event (only DC mode) • Bit 14 = 1: dynamic times (measurement through writing of 1C32:08)	UINT16	RO	0x0001 (1_{dec})
1C32:05	Minimum cycle time	Minimum cycle time (in ns)	UINT32	RO	0x000F4240 (1000000_{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	0x00000384 (900_{dec})
1C32:08	Command	• 0: Measurement of the local cycle time is stopped • 1: Measurement of the local cycle time is started The entries 1C32:03, 1C32:05, 1C32:06, 1C32:09, 1C33:03, 1C33:06, 1C33:09 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	0x00000384 (900_{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})

4.5.2.2.33 Index 1C33 SM input parameter

Index	Name	Meaning	Data type	Flags	Default
1C33:0	SM input parameter	Synchronization parameters for the inputs	UINT8	RO	0x20 (32_{dec})
1C33:01	Sync mode	Current synchronization mode: • 0: Free Run • 1: Synchron with SM 3 Event (no outputs available) • 2: DC - Synchron with SYNC0 Event • 3: DC - Synchron with SYNC1 Event • 34: Synchron with SM 2 Event (outputs available)	UINT16	RW	0x0000 (0_{dec})
1C33:02	Cycle time	as 1C32:02	UINT32	RW	0x000F4240 (1000000_{dec})
1C33:03	Shift time	Time between SYNC0 event and reading of the inputs (in ns, only DC mode)	UINT32	RO	0x00000384 (900_{dec})
1C33:04	Sync modes supported	Supported synchronization modes: • Bit 0: free run is supported • Bit 1: Synchron with SM 2 Event is supported (outputs available) • Bit 1: Synchron with SM 3 Event is supported (no outputs available) • Bit 2-3 = 01: DC mode is supported • Bit 4-5 = 01: Input Shift through local event (outputs available) • Bit 4-5 = 10: Input Shift with SYNC1 Event (no outputs available) • Bit 14 = 1: dynamic times (measurement through writing of 1C32:08 or 1C33:08)	UINT16	RO	0x0001 (1_{dec})
1C33:05	Minimum cycle time	Minimum cycle time (in ns)	UINT32	RO	0x000F4240 (1000000_{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	0x00000384 (900_{dec})
1C33:08	Command	• 0: Measurement of the local cycle time is stopped • 1: Measurement of the local cycle time is started The entries 1C32:03, 1C32:05, 1C32:06, 1C32:09, 1C33:03, 1C33:06, 1C33:09 are updated with the maximum measured values. For a subsequent measurement the measured values are reset	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	0x00000384 (900_{dec})
1C33:0B	SM event missed counter	as 1C32:11	UINT16	RO	0x0000 (0_{dec})
1C33:0C	Cycle exceeded counter	as 1C32:12	UINT16	RO	0x0000 (0_{dec})
1C33:0D	Shift too short counter	as 1C32:13	UINT16	RO	0x0000 (0_{dec})
1C33:20	Sync error	as 1C32:32	boolean	RO	0x00 (0_{dec})

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

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

4.5.2.3.1 Index 6000 DPO Inputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
6000:0	DPO Inputs Ch.1	Input of the first channel	UINT8	RO	0x18 (24_{dec})
6000:01	Error Us	The current monitoring of Us has tripped. The bit must be reset by a Global Reset (F707:04) or by the corresponding Reset Us (7000:05). The output cannot be enabled as long as the bit is set.	boolean	RO	0x00 (0_{dec})
6000:02	Error Up	The current monitoring of Up has tripped. The bit must be reset by a Global Reset (F707:04) or by the corresponding Reset Up (7000:06). The output cannot be enabled as long as the bit is set.	boolean	RO	0x00 (0_{dec})
6000:03	Warning Us	The monitoring has detected overcurrent; the switching off of output Us on this channel is imminent if the current consumption of the junction does not decrease.	boolean	RO	0x00 (0_{dec})
6000:04	Warning Up	The monitoring has detected overcurrent; the switching off of output Us on this channel is imminent if the current consumption of the junction does not decrease.	boolean	RO	0x00 (0_{dec})
6000:05	Status Us	0: The output is switched off 1: The output supplies 24 V	boolean	RO	0x00 (0_{dec})
6000:06	Status Up	0: The output is switched off 1: The output supplies 24 V	boolean	RO	0x00 (0_{dec})
6000:07	Channel Error	6000:01 or 6000:02 are set	boolean	RO	0x00 (0_{dec})
6000:08	Error Sum Current	Sum current of the channel was exceeded. Therefore, the output has been switched off. An active reset is required in order to restart.	boolean	RO	0x00 (0_{dec})
6000:09	Warning Sum Current	Overcurrent peak was detected in the sum current. If the load on the output remains unchanged it will switch off.	boolean	RO	0x00 (0_{dec})
6000:0F	TxPDO State		boolean	RO	0x00 (0_{dec})
6000:10	TxPDO Toggle		boolean	RO	0x00 (0_{dec})
6000:11	Current Us	Current off Us	INT16	RO	0x0000 (0_{dec})
6000:12	Current Up	Current off Up	INT16	RO	0x0000 (0_{dec})
6000:13	Peak Value 1	Peak value of the 1st variable measured on the extended diagnosis for channel 1.	INT16	RO	0x0000 (0_{dec})
6000:14	Peak Value 2	Peak value of the 2nd variable measured on the extended diagnosis for channel 1.	INT16	RO	0x0000 (0_{dec})
6000:17	Timestamp 1	Timestamp at which the peak value 6000:13 was measured	UINT64	RO	
6000:18	Timestamp 2	Timestamp at which the peak value 6000:14 was measured	UINT64	RO	

4.5.2.3.2 Index 6010 DPO Inputs Ch.2

Index	Name	Meaning	Data type	Flags	Default
6010:0	DPO Inputs Ch.2	Inputs of the second channel	UINT8	RO	0x18 (24_{dec})
6010:01	Error Us	The current monitoring of Us has tripped. The bit must be reset by a Global Reset (F707:04) or by the corresponding Reset Us (7010:05). The output cannot be enabled as long as the bit is set.	boolean	RO	0x00 (0_{dec})
6010:02	Error Up	The current monitoring of Up has tripped. The bit must be reset by a Global Reset (F707:04) or by the corresponding Reset Up (7010:06). The output cannot be enabled as long as the bit is set.	boolean	RO	0x00 (0_{dec})
6010:03	Warning Us	The monitoring has detected overcurrent; the switching off of output Us on this channel is imminent if the current consumption of the junction does not decrease.	boolean	RO	0x00 (0_{dec})
6010:04	Warning Up	The monitoring has detected overcurrent; the switching off of output Us on this channel is imminent if the current consumption of the junction does not decrease.	boolean	RO	0x00 (0_{dec})
6010:05	Status Us	0: The output is switched off 1: The output supplies 24 V	boolean	RO	0x00 (0_{dec})
6010:06	Status Up	0: The output is switched off 1: The output supplies 24 V	boolean	RO	0x00 (0_{dec})
6010:07	Channel Error	6010:01 or 6010:02 are set	boolean	RO	0x00 (0_{dec})
6010:08	Error Sum Current		boolean	RO	0x00 (0_{dec})
6010:09	Warning Sum Current		boolean	RO	0x00 (0_{dec})
6010:0F	TxPDO State		boolean	RO	0x00 (0_{dec})
6010:10	TxPDO Toggle		boolean	RO	0x00 (0_{dec})
6010:11	Current Us	Current off Us	INT16	RO	0x0000 (0_{dec})
6010:12	Current Up	Current off Up	INT16	RO	0x0000 (0_{dec})
6010:13	Peak Value 1	Peak value of the 1st variable measured on the extended diagnosis for channel 2.	INT16	RO	0x0000 (0_{dec})
6010:14	Peak Value 2	Peak value of the 2nd variable measured on the extended diagnosis for channel 2.	INT16	RO	0x0000 (0_{dec})
6010:17	Timestamp 1	Timestamp at which the peak value 6010:13 was measured	UINT64	RO	
6010:18	Timestamp 2	Timestamp at which the peak value 6010:14 was measured	UINT64	RO	

4.5.2.3.3 Index 6020 DPO Inputs Ch.3

Index	Name	Meaning	Data type	Flags	Default
6020:0	DPO Inputs Ch.3	Inputs of the third channel	UINT8	RO	0x18 (24_{dec})
6020:01	Error Us	The current monitoring of Us has tripped. The bit must be reset by a Global Reset (F707:04) or by the corresponding Reset Us (7020:05). The output cannot be enabled as long as the bit is set.	boolean	RO	0x00 (0_{dec})
6020:02	Error Up	The current monitoring of Up has tripped. The bit must be reset by a Global Reset (F707:04) or by the corresponding Reset Up (7020:06). The output cannot be enabled as long as the bit is set.	boolean	RO	0x00 (0_{dec})
6020:03	Warning Us	The monitoring has detected overcurrent; the switching off of output Us on this channel is imminent if the current consumption of the junction does not decrease.	boolean	RO	0x00 (0_{dec})
6020:04	Warning Up	The monitoring has detected overcurrent; the switching off of output Us on this channel is imminent if the current consumption of the junction does not decrease.	boolean	RO	0x00 (0_{dec})
6020:05	Status Us	0: The output is switched off 1: The output supplies 24 V	boolean	RO	0x00 (0_{dec})
6020:06	Status Up	0: The output is switched off 1: The output supplies 24 V	boolean	RO	0x00 (0_{dec})
6020:07	Channel Error	6020:01 or 6020:02 are set	boolean	RO	0x00 (0_{dec})
6020:08	Error Sum Current		boolean	RO	0x00 (0_{dec})
6020:09	Warning Sum Current		boolean	RO	0x00 (0_{dec})
6020:0F	TxPDO State		boolean	RO	0x00 (0_{dec})
6020:10	TxPDO Toggle		boolean	RO	0x00 (0_{dec})
6020:11	Current Us	Current off Us	INT16	RO	0x0000 (0_{dec})
6020:12	Current Up	Current off Up	INT16	RO	0x0000 (0_{dec})
6020:13	Peak Value 1	Peak value of the 1st variable measured on the extended diagnosis for channel 3.	INT16	RO	0x0000 (0_{dec})
6020:14	Peak Value 2	Peak value of the 2nd variable measured on the extended diagnosis for channel 3.	INT16	RO	0x0000 (0_{dec})
6020:17	Timestamp 1	Timestamp at which the peak value 6020:13 was measured	UINT64	RO	
6020:18	Timestamp 2	Timestamp at which the peak value 6020:14 was measured	UINT64	RO	

4.5.2.3.4 Index 6030 DPO Inputs Ch.4

Index	Name	Meaning	Data type	Flags	Default
6030:0	DPO Inputs Ch.4	Inputs of the fourth channel	UINT8	RO	0x18 (24_{dec})
6030:01	Error Us	The current monitoring of Us has tripped. The bit must be reset by a Global Reset (F707:04) or by the corresponding Reset Us (7030:05). The output cannot be enabled as long as the bit is set.	boolean	RO	0x00 (0_{dec})
6030:02	Error Up	The current monitoring of Up has tripped. The bit must be reset by a Global Reset (F707:04) or by the corresponding Reset Up (7030:06). The output cannot be enabled as long as the bit is set.	boolean	RO	0x00 (0_{dec})
6030:03	Warning Us	The monitoring has detected overcurrent; the switching off of output Us on this channel is imminent if the current consumption of the junction does not decrease.	boolean	RO	0x00 (0_{dec})
6030:04	Warning Up	The monitoring has detected overcurrent; the switching off of output Us on this channel is imminent if the current consumption of the junction does not decrease.	boolean	RO	0x00 (0_{dec})
6030:05	Status Us	0: The output is switched off 1: The output supplies 24 V	boolean	RO	0x00 (0_{dec})
6030:06	Status Up	0: The output is switched off 1: The output supplies 24 V	boolean	RO	0x00 (0_{dec})
6030:07	Channel Error	6020:01 or 6020:02 are set	boolean	RO	0x00 (0_{dec})
6030:08	Error Sum Current		boolean	RO	0x00 (0_{dec})
6030:09	Warning Sum Current		boolean	RO	0x00 (0_{dec})
6030:0F	TxPDO State		boolean	RO	0x00 (0_{dec})
6030:10	TxPDO Toggle		boolean	RO	0x00 (0_{dec})
6030:11	Current Us	Current off Us	INT16	RO	0x0000 (0_{dec})
6030:12	Current Up	Current off Up	INT16	RO	0x0000 (0_{dec})
6030:13	Peak Value 1	Peak value of the 1st variable measured on the extended diagnosis for channel 4.	INT16	RO	0x0000 (0_{dec})
6030:14	Peak Value 2	Peak value of the 2nd variable measured on the extended diagnosis for channel 4.	INT16	RO	0x0000 (0_{dec})
6030:17	Timestamp 1	Timestamp at which the peak value 6030:13 was measured	UINT64	RO	
6030:18	Timestamp 2	Timestamp at which the peak value 6030:14 was measured	UINT64	RO	

4.5.2.3.5 Index 6040 LOG Status

Index	Name	Meaning	Data type	Flags	Default
6040:0	LOG Status		UINT8	RO	0x12 (18_{dec})
6040:01	Logger Running	0: Logger still running	boolean	RO	0x00 (0_{dec})
6040:11	Elapsed Time	Time since the logger was stopped	UINT32	RO	0x00000000 (0_{dec})
6040:12	Trigger Reason	Reason why the logger was stopped	UINT16	RO	0x0000 (0_{dec})

4.5.2.3.6 Index 7000 DPO Outputs Ch.1

Index	Name	Meaning	Data type	Flags	Default
7000:0	DPO Outputs Ch.1		UINT8	RO	0x11 (17_{dec})
7000:01	Output Us	0: Us will be switched off 1: Us will be switched on	boolean	RO	0x00 (0_{dec})
7000:02	Output Up	0: Us will be switched off 1: Us will be switched on	boolean	RO	0x00 (0_{dec})
7000:05	Reset Us	An error on Us will be reset	boolean	RO	0x00 (0_{dec})
7000:06	Reset Up	An error on Up will be reset	boolean	RO	0x00 (0_{dec})
7000:11	Reset Extended Diag Data	The peak value and timestamp of the extended diagnosis for this channel will be deleted.	boolean	RO	0x00 (0_{dec})

4.5.2.3.7 Index 7010 DPO Outputs Ch.2

Index	Name	Meaning	Data type	Flags	Default
7010:0	DPO Outputs Ch.2		UINT8	RO	0x11 (17_{dec})
7010:01	Output Us	0: Us will be switched off 1: Us will be switched on	boolean	RO	0x00 (0_{dec})
7010:02	Output Up	0: Us will be switched off 1: Us will be switched on	boolean	RO	0x00 (0_{dec})
7010:05	Reset Us	An error on Us will be reset	boolean	RO	0x00 (0_{dec})
7010:06	Reset Up	An error on Up will be reset	boolean	RO	0x00 (0_{dec})
7010:11	Reset Extended Diag Data	The peak value and timestamp of the extended diagnosis for this channel will be deleted.	boolean	RO	0x00 (0_{dec})

4.5.2.3.8 Index 7020 DPO Outputs Ch.3

Index	Name	Meaning	Data type	Flags	Default
7020:0	DPO Outputs Ch.3		UINT8	RO	0x11 (17_{dec})
7020:01	Output Us	0: Us will be switched off 1: Us will be switched on	boolean	RO	0x00 (0_{dec})
7020:02	Output Up	0: Us will be switched off 1: Us will be switched on	boolean	RO	0x00 (0_{dec})
7020:05	Reset Us	An error on Us will be reset	boolean	RO	0x00 (0_{dec})
7020:06	Reset Up	An error on Up will be reset	boolean	RO	0x00 (0_{dec})
7020:11	Reset Extended Diag Data	The peak value and timestamp of the extended diagnosis for this channel will be deleted.	boolean	RO	0x00 (0_{dec})

4.5.2.3.9 Index 7030 DPO Outputs Ch.4

Index	Name	Meaning	Data type	Flags	Default
7030:0	DPO Outputs Ch.4		UINT8	RO	0x11 (17_{dec})
7030:01	Output Us	0: Us will be switched off 1: Us will be switched on	boolean	RO	0x00 (0_{dec})
7030:02	Output Up	0: Us will be switched off 1: Us will be switched on	boolean	RO	0x00 (0_{dec})
7030:05	Reset Us	An error on Us will be reset	boolean	RO	0x00 (0_{dec})
7030:06	Reset Up	An error on Up will be reset	boolean	RO	0x00 (0_{dec})
7030:11	Reset Extended Diag Data	The peak value and timestamp of the extended diagnosis for this channel will be deleted.	boolean	RO	0x00 (0_{dec})

4.5.2.3.10 Index 7040 LOG Control

Index	Name	Meaning	Data type	Flags	Default
7040:0	LOG Control		UINT8	RO	0x02 (2_{dec})
7040:01	Start Logger		boolean	RO	0x00 (0_{dec})
7040:02	Stop logger		boolean	RO	0x00 (0_{dec})

4.5.2.3.11 Index 800F DPO Vendor data Ch.1

Index	Name	Meaning	Data type	Flags	Default
800F:0	DPO Vendor data Ch.1		UINT8	RO	0x14 (20_{dec})
800F:11	GainS		UINT16	RW	0x4000 (16384_{dec})
800F:12	OffsetS		INT16	RW	0x0000 (0_{dec})
800F:13	GainP		UINT16	RW	0x4000 (16384_{dec})
800F:14	OffsetP		INT16	RW	0x0000 (0_{dec})

4.5.2.3.12 Index 801F DPO Vendor data Ch.2

Index	Name	Meaning	Data type	Flags	Default
801F:0	DPO Vendor data Ch.2		UINT8	RO	0x14 (20_{dec})
801F:11	GainS		UINT16	RW	0x4000 (16384_{dec})
801F:12	OffsetS		INT16	RW	0x0000 (0_{dec})
801F:13	GainP		UINT16	RW	0x4000 (16384_{dec})
801F:14	OffsetP		INT16	RW	0x0000 (0_{dec})

4.5.2.3.13 Index 802F DPO Vendor data Ch.3

Index	Name	Meaning	Data type	Flags	Default
802F:0	DPO Vendor data Ch.3		UINT8	RO	0x14 (20_{dec})
802F:11	GainS		UINT16	RW	0x4000 (16384_{dec})
802F:12	OffsetS		INT16	RW	0x0000 (0_{dec})
802F:13	GainP		UINT16	RW	0x4000 (16384_{dec})
802F:14	OffsetP		INT16	RW	0x0000 (0_{dec})

4.5.2.3.14 Index 803F DPO Vendor data Ch.4

Index	Name	Meaning	Data type	Flags	Default
803F:0	DPO Vendor data Ch.4		UINT8	RO	0x14 (20_{dec})
803F:11	GainS		UINT16	RW	0x4000 (16384_{dec})
803F:12	OffsetS		INT16	RW	0x0000 (0_{dec})
803F:13	GainP		UINT16	RW	0x4000 (16384_{dec})
803F:14	OffsetP		INT16	RW	0x0000 (0_{dec})

4.5.2.3.15 Index F000 Modular device profile

Index	Name	Meaning	Data type	Flags	Default
F000:0	Modular device profile	General information for the modular device profile	UINT8	RO	0x02 (2_{dec})
F000:01	Module index distance	Index distance of the objects of the individual channels	UINT16	RO	0x0010 (16_{dec})
F000:02	Maximum number of modules	Number of channels	UINT16	RO	0x0005 (5_{dec})

4.5.2.3.16 Index F008 Code word

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

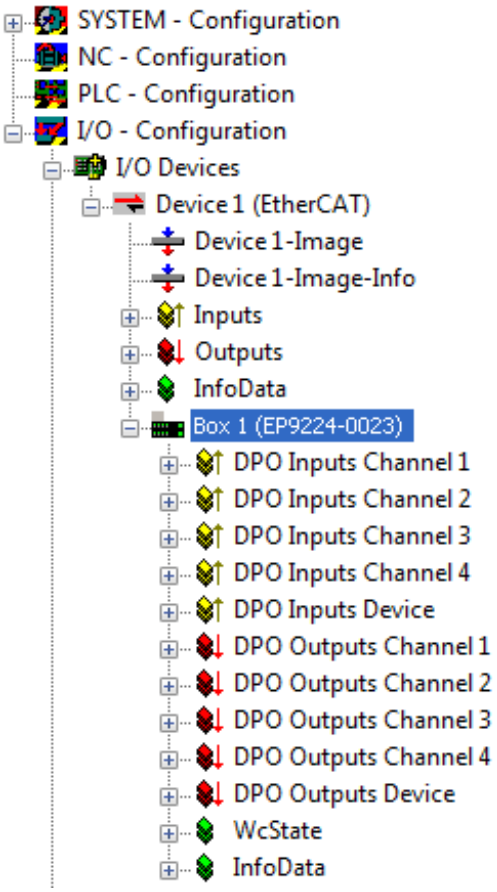
4.5.2.3.17 Index F010 Module list

Index	Name	Meaning	Data type	Flags	Default
F010:0	Module list		UINT8	RW	0x05 (5_{dec})
F010:01	SubIndex 001		UINT32	RW	0x0000010E (270_{dec})
F010:02	SubIndex 002		UINT32	RW	0x0000010E (270_{dec})
F010:03	SubIndex 003		UINT32	RW	0x0000010E (270_{dec})
F010:04	SubIndex 004		UINT32	RW	0x0000010E (270_{dec})
F010:05	SubIndex 005		UINT32	RW	0x00000384 (900_{dec})

4.5.2.3.18 Index F81F DPO Vendor Data Device

Index	Name	Meaning	Data type	Flags	Default
F81F:0	DPO Vendor Data Device		UINT8	RO	0x1A (26_{dec})
F81F:01	Enable Auto Offset Calibration	reserved	boolean	RW	0x00 (0_{dec})
F81F:02	Enable Crosstalk Compensation	reserved	boolean	RW	0x01 (1_{dec})
F81F:10	Enable Calibration Mode	reserved	boolean	RW	0x00 (0_{dec})
F81F:11	GainS	reserved	UINT16	RW	0x4000 (16384_{dec})
F81F:12	OffsetS	reserved	INT16	RW	0x0000 (0_{dec})
F81F:13	GainP	reserved	UINT16	RW	0x4000 (16384_{dec})
F81F:14	OffsetP	reserved	INT16	RW	0x0000 (0_{dec})
F81F:15	Gain US	reserved	UINT16	RW	0x4000 (16384_{dec})
F81F:16	Offset US	reserved	INT16	RW	0x0000 (0_{dec})
F81F:17	Gain UP	reserved	UINT16	RW	0x4000 (16384_{dec})
F81F:18	Offset UP	reserved	INT16	RW	0x0000 (0_{dec})
F81F:19	Gain Temperature	reserved	UINT16	RW	0x4000 (16384_{dec})
F81F:1A	Offset Temperature	reserved	INT16	RW	0x0000 (0_{dec})

4.5.3 EP9224-0023 - Process image



The EP9214 has four output channels, **DPO Inputs Channel n**.

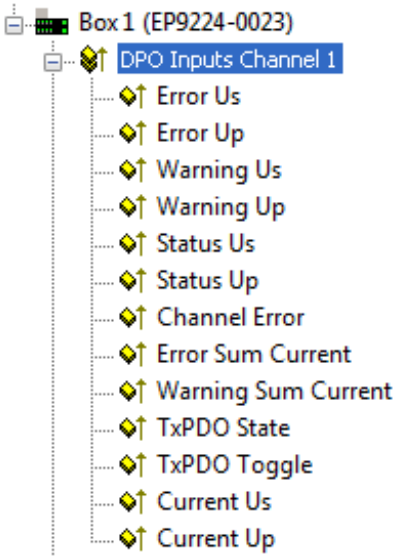
Subsequently, a status channel follows for the complete device **DPO Inputs Device.**

In the output section there are four output channels, **DPO Outputs Channel n.**

An output word follows for the complete device **DPO Outputs Device**.

WcState and **InfoData** are standard EtherCAT system variables.

DPO Inputs Channel 1 to 4



The four channels each have status bits and status LEDs [▶ 24] for displaying the current channel state:
Error Us: Us was switched off due to an error

Error Up: Up was switched off due to an error

Warning Us: If the current value set in CoE object 80n0:12 persists, the channel will be switched off

Warning Up: If the current value set in CoE object 80n0:13 persists, the channel will be switched off

Status Us: Channel switched on or off

Status Up: Channel switched on or off

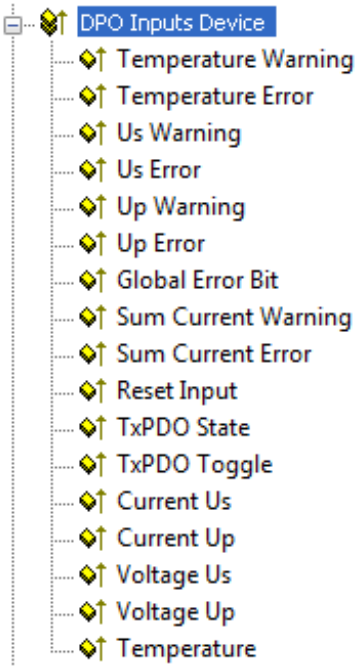
Channel Error: Error Us or Error Up is TRUE

Error Sum Current: The sum value for Is and Ip of the channel set in CoE object 8000:14 has been exceeded for too long.

Warning Sum Current: If the sum value for Is and Ip of the channel set in CoE object 8000:14 persists, the channel will be switched off.

Current Us, Current Up: Present output current of U_S or U_P.
Presentation: 1 mA / LSB.

DPO Inputs Device



Subsequently, a status word follows for the complete device **DPO Inputs Device.**

Temperature Warning: The internal temperature of the EP9224 will soon reach the shut-off point.

Temperature Error: The internal temperature was too high. The output channels were switched off.

Us/Up Warning: The value of the input voltage Us/Up is less than 21.5 V

Us/Up Error: The value of the input voltage Us/Up is less than 19.0 V

Global Error Bit: One of the eight channels is TRUE

Sum Current Warning: The sum value for Is and Ip of the box set in CoE object F80E:12 has been exceeded for too long.

Error Sum Current: If the sum value for Is and Ip of the channel set in CoE object 8000:14 persists, the channel will be switched off.

Reset Input: Reset pin to HIGH (lower M8)

Current Us: Present sum current of the supply input socket U_S.
Presentation: 10 mA / LSB

Current Up: Present sum current of the supply input socket U_P.
Presentation: 10 mA / LSB

Voltage Us: Present input voltage U_S of the supply input socket.
Presentation: 100 mV / LSB

Voltage Up: Present input voltage U_P of the supply input socket.
Presentation: 100 mV / LSB

Temperature: Current internal temperature of the Box.

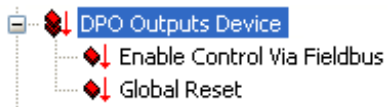
DPO Outputs Channel 1 to 4

The EP9224 has 4 x 16-bit output data of the four output channels **DPO Outputs Channel n**.

Output Us/Up: TRUE - switch the output on, FALSE - switch the output off

Reset Us/Up: TRUE - reset in the event of an error…

DPO Outputs Device



Subsequently, a status word follows for the complete device **DPO outputs Device.**

Enable Control Via Fieldbus: TRUE - control all outputs via the fieldbus / PLC, FALSE - automatic switch-on depending on the CoE entries

Global Reset: Resets all errors in the Box

4.6 Restoring the delivery state

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

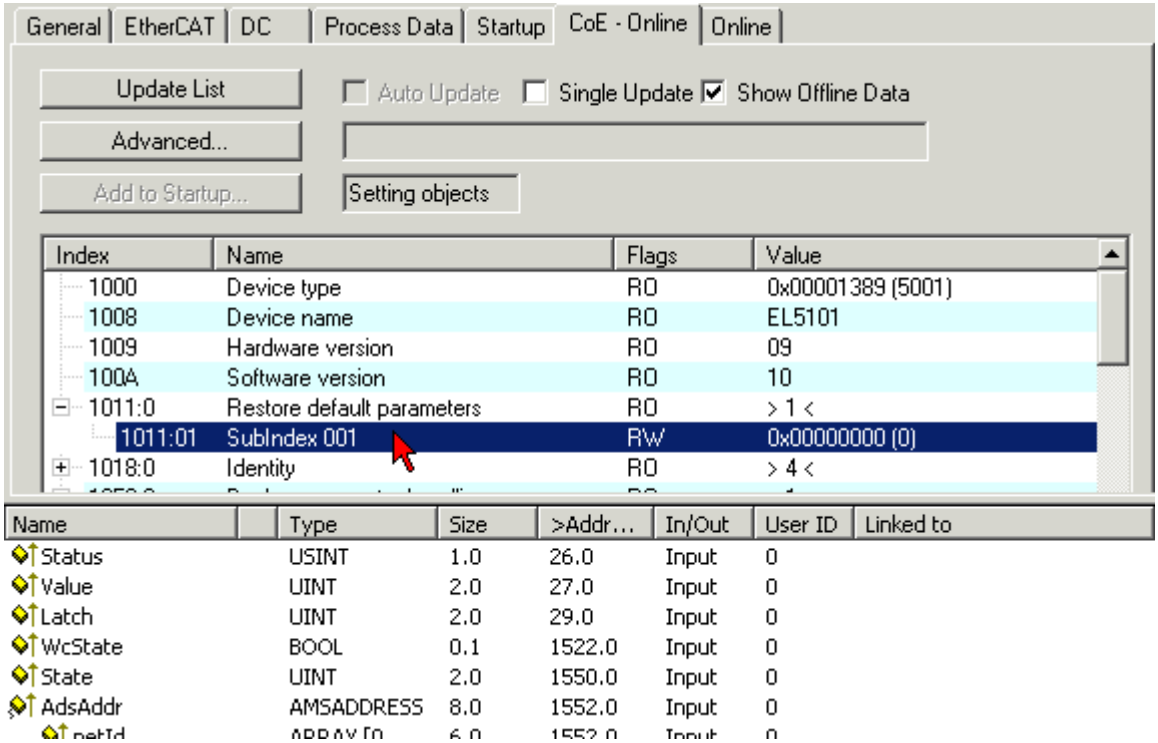


Fig. 38: Selecting the Restore default parameters PDO

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.

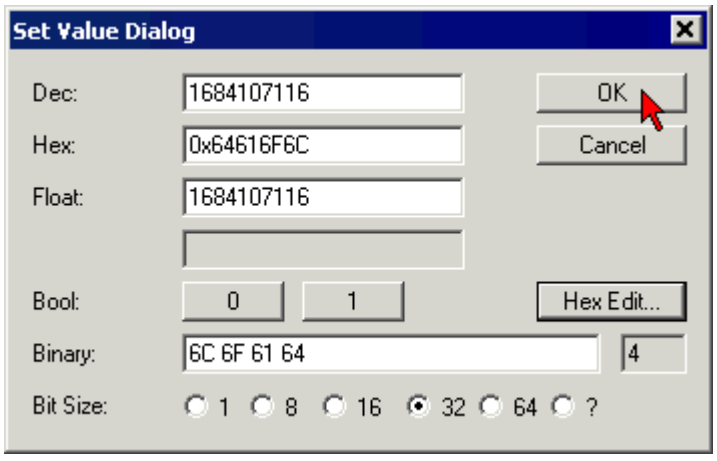


Fig. 39: Entering a restore value in the Set Value dialog

Alternative restore value

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

An incorrect entry for the restore value has no effect.

5 Appendix

5.1 General operating conditions

Protection degrees (IP-Code)

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

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

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

*) These protection classes define only protection against water!

Chemical Resistance

The Resistance relates to the Housing of the IP67 modules and the used metal parts. In the table below you will find some typical resistance.

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

Key

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

5.2 Accessories

Mounting

Ordering information	Description	Link
ZS5300-0011	Mounting rail	Website

Labeling material, protective caps

Ordering information	Description
ZS5000-0010	Protective cap for M8 sockets, IP67 (50 pieces)
ZS5100-0000	Inscription labels, unprinted, 4 strips of 10
ZS5000-xxxx	Printed inscription labels on enquiry

Cables

A complete overview of pre-assembled cables for fieldbus components can be found here.

Ordering information	Description	Link
ZK1090-3xxx-xxxx	EtherCAT cable M8, green	Website
ZK1093-3xxx-xxxx	EtherCAT cable M8, yellow	Website
ZK2000-2xxx-xxxx	Sensor cable M8, 3-pin	Website
ZK2020-3xxx-xxxx	Power cable M8, 4-pin	Website
ZK203x-xxxx-xxxx	Power cable 7/8 ", 5-pin	Website

Tools

Ordering information	Description
ZB8801-0000	Torque wrench for plugs, 0.4…1.0 Nm
ZB8801-0001	Torque cable key for M8 / wrench size 9 for ZB8801-0000

Further accessories

Further accessories can be found in the price list for fieldbus components from Beckhoff and online at https://www.beckhoff.com.

5.3 Version identification of EtherCAT devices

5.3.1 General notes on marking

Designation

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

- family key
- type
- version
- revision

Example	Family	Type	Version	Revision
EL3314-0000-0016	EL terminal (12 mm, non-pluggable connection level)	3314 (4-channel thermocouple terminal)	0000 (basic type)	0016
ES3602-0010-0017	ES terminal (12 mm, pluggable connection level)	3602 (2-channel voltage measurement)	0010 (high-precision version)	0017
CU2008-0000-0000	CU device	2008 (8-port fast ethernet switch)	0000 (basic type)	0000

Notes

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

5.3.2 Version identification of EP/EPI/EPP/ER/ERI boxes

The serial number/ data code for Beckhoff IO devices is usually the 8-digit number printed on the device or on a sticker. The serial number indicates the configuration in delivery state and therefore refers to a whole production batch, without distinguishing the individual modules of a batch.

Structure of the serial number: **KK YY FF HH**	Example with serial number 12 06 3A 02:
KK - week of production (CW, calendar week)	12 - production week 12
YY - year of production	06 - production year 2006
FF - firmware version	3A - firmware version 3A
HH - hardware version	02 - hardware version 02

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

Syntax: D ww yy x y z u

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

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

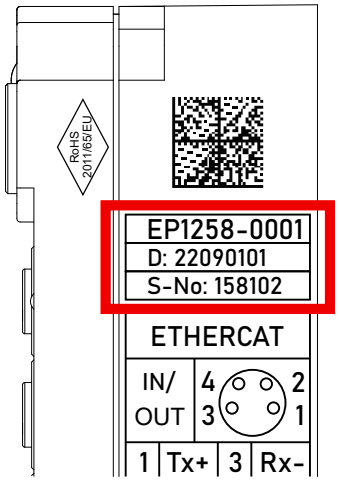


Fig. 40: EP1258-00001 IP67 EtherCAT Box with batch number/DateCode 22090101 and unique serial number 158102

5.3.3 Beckhoff Identification Code (BIC)

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

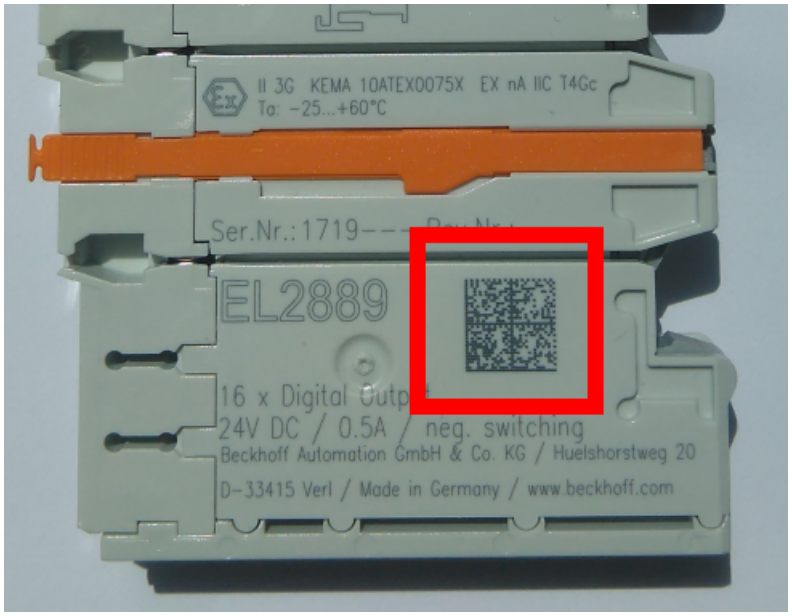


Fig. 41: BIC as data matrix code (DMC, code scheme ECC200)

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

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

- on the packaging unit
- directly on the product (if space suffices)
- on the packaging unit and the product

The BIC is machine-readable and contains information that can also be used by the customer for handling and product management.

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

Following information is possible, positions 1 to 4 are always present, the other according to need of production:

Position	Type of information	Explanation	Data identifier	Number of digits incl. data identifier	Example
1	Beckhoff order number	**Beckhoff order number**	1P	8	1P072222
2	Beckhoff Traceability Number (BTN)	**Unique serial number, see note below**	SBTN	12	SBTNk4p562d7
3	Article description	**Beckhoff article description, e.g. EL1008**	1K	32	1KEL1809
4	Quantity	**Quantity in packaging unit, e.g. 1, 10, etc.**	Q	6	Q1
5	Batch number	Optional: Year and week of production	2P	14	2P401503180016
6	ID/serial number	Optional: Present-day serial number system, e.g. with safety products	51S	12	51S678294
7	Variant number	Optional: Product variant number on the basis of standard products	30P	32	30PF971, 2*K183
...					

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

Structure of the BIC

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

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

Accordingly as DMC:

Fig. 42: Example DMC **1P**072222**S**BTNk4p562d7**1K**EL1809 **Q**1 **51S**678294

BTN

An important component of the BIC is the Beckhoff Traceability Number (BTN, position 2). The BTN is a unique serial number consisting of eight characters that will replace all other serial number systems at Beckhoff in the long term (e.g. batch designations on IO components, previous serial number range for safety products, etc.). The BTN will also be introduced step by step, so it may happen that the BTN is not yet coded in the BIC.

NOTE

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

5.3.4 Electronic access to the BIC (eBIC)

Electronic BIC (eBIC)

The Beckhoff Identification Code (BIC) is applied to the outside of Beckhoff products in a visible place. If possible, it should also be electronically readable.

Decisive for the electronic readout is the interface via which the product can be electronically addressed.

K-bus devices (IP20, IP67)

Currently, no electronic storage and readout is planned for these devices.

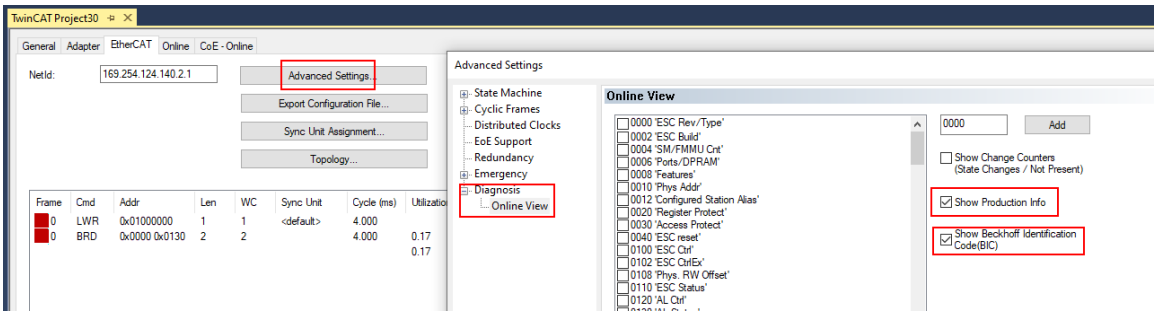
EtherCAT devices (IP20, IP67)

All Beckhoff EtherCAT devices have a so-called ESI-EEPROM, which contains the EtherCAT identity with the revision number. Stored in it is the EtherCAT slave information, also colloquially known as ESI/XML configuration file for the EtherCAT master. See the corresponding chapter in the EtherCAT system manual (Link) for the relationships.

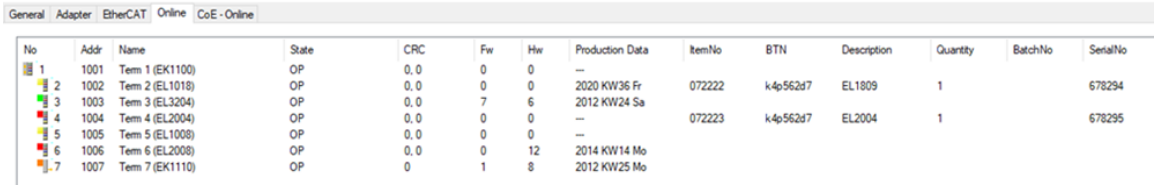
The eBIC is also stored in the ESI-EEPROM. The eBIC was introduced into the Beckhoff I/O production (terminals, boxes) from 2020; widespread implementation is expected in 2021.

The user can electronically access the eBIC (if existent) as follows:

- With all EtherCAT devices, the EtherCAT master (TwinCAT) can read the eBIC from the ESI-EEPROM
  - From TwinCAT 3.1 build 4024.11, the eBIC can be displayed in the online view.
  - To do this,
    check the checkbox "Show Beckhoff Identification Code (BIC)" under
    EtherCAT → Advanced Settings → Diagnostics:



  - The BTN and its contents are then displayed:



  - Note: as can be seen in the illustration, the production data HW version, FW version and production date, which have been programmed since 2012, can also be displayed with "Show Production Info".
  - From TwinCAT 3.1. build 4024.24 the functions *FB_EcReadBIC* and *FB_EcReadBTN* for reading into the PLC and further eBIC auxiliary functions are available in the Tc2_EtherCAT Library from v3.3.19.0.
- In the case of EtherCAT devices with CoE directory, the object 0x10E2:01 can additionally by used to display the device's own eBIC; the PLC can also simply access the information here:

- The device must be in SAFEOP/OP for access:

Index	Name	Flags	Value
1000	Device type	RO	0x015E1389 (22942601)
1008	Device name	RO	ELM3704-0000
1009	Hardware version	RO	00
100A	Software version	RO	01
100B	Bootloader version	RO	J0.1.27.0
1011:0	Restore default parameters	RO	> 1 <
1018:0	Identity	RO	> 4 <
10E2:0	Manufacturer-specific Identification C...	RO	> 1 <
10E2:01	SubIndex 001	RO	1P158442SBTN0008jekp1KELM3704 Q1 2P482001000016
10F0:0	Backup parameter handling	RO	> 1 <
10F3:0	Diagnosis History	RO	> 21 <
10F8	Actual Time Stamp	RO	0x170bfb277e

- the object 0x10E2 will be introduced into stock products in the course of a necessary firmware revision.
- From TwinCAT 3.1. build 4024.24 the functions *FB_EcCoEReadBIC* and *FB_EcCoEReadBTN* for reading into the PLC and further eBIC auxiliary functions are available in the Tc2_EtherCAT Library from v3.3.19.0.

- Note: in the case of electronic further processing, the BTN is to be handled as a string(8); the identifier "SBTN" is not part of the BTN.
- Technical background
  The new BIC information is additionally written as a category in the ESI-EEPROM during the device production. The structure of the ESI content is largely dictated by the ETG specifications, therefore the additional vendor-specific content is stored with the help of a category according to ETG.2010. ID 03 indicates to all EtherCAT masters that they must not overwrite these data in case of an update or restore the data after an ESI update.
  The structure follows the content of the BIC, see there. This results in a memory requirement of approx. 50..200 bytes in the EEPROM.
- Special cases
  - If multiple, hierarchically arranged ESCs are installed in a device, only the top-level ESC carries the eBIC Information.
  - If multiple, non-hierarchically arranged ESCs are installed in a device, all ESCs carry the eBIC Information.
  - If the device consists of several sub-devices with their own identity, but only the top-level device is accessible via EtherCAT, the eBIC of the top-level device is located in the CoE object directory 0x10E2:01 and the eBICs of the sub-devices follow in 0x10E2:nn.

Profibus/Profinet/DeviceNet... Devices

Currently, no electronic storage and readout is planned for these devices.

5.4 Support and Service

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

Beckhoff's branch offices and representatives

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

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

You will also find further documentation for Beckhoff components there.

Beckhoff Support

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

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- and extensive training program for Beckhoff system components

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Fax:	+49 5246 963 9157
e-mail:	support@beckhoff.com

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- repair service
- spare parts service
- hotline service

Hotline:	+49 5246 963 460
Fax:	+49 5246 963 479
e-mail:	service@beckhoff.com

Beckhoff Headquarters

Beckhoff Automation GmbH & Co. KG

Huelshorstweg 20
33415 Verl
Germany

Phone:	+49 5246 963 0
Fax:	+49 5246 963 198
e-mail:	info@beckhoff.com
web:	https://www.beckhoff.com

Beckhoff Automation GmbH & Co. KG
Hülshorstweg 20
33415 Verl
Germany
Phone: +49 5246 9630
info@beckhoff.com
www.beckhoff.com