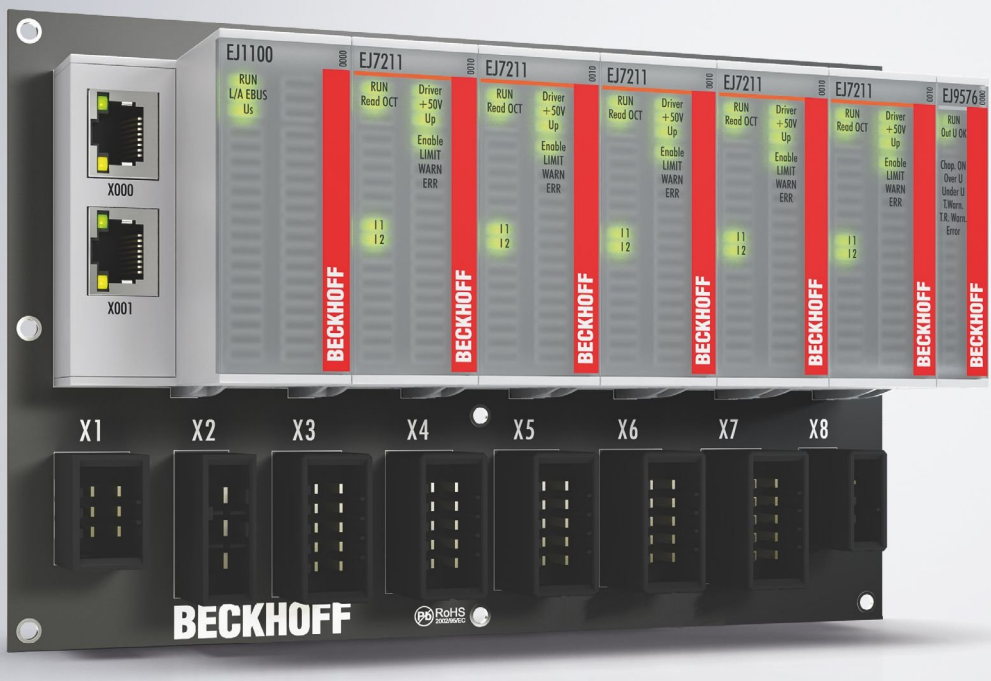
BECKHOFF New Automation Technology

Documentation | EN

EJ7211-0010

Servo motor module for OCT, 48 V DC, 4.5 A (Irms)



2023-06-20 | Version: 1.5

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1 Foreword

1.1 Notes on the documentation

Intended audience

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

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

Disclaimer

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

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

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

Trademarks

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.

NOTICE

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 Intended use

⚠ WARNING

Caution - Risk of injury!

EJ components may only be used for the purposes described below!

1.4 Documentation issue status

Version	Comment
1.5	• Chapter *Note on load voltage supply* added • Update structure
1.4	• Update Technical data • Update chapter *Pinout*
1.3	• Update Technical data • Update chapter *Installation of EJ modules*
1.2	• Structural update
1.1	• New title page • Update Technical data • Update chapter *Pinout* • Chapter Object description and parameterization added • Chapter *Disposal* added • Update revision status • Structural update
1.0	• First publication EJ7211-0010

1.5 Guide through documentation

NOTICE

Further components of documentation

This documentation describes device-specific content. It is part of the modular documentation concept for Beckhoff I/O components. For the use and safe operation of the device / devices described in this documentation, additional cross-product descriptions are required, which can be found in the following table.

Title	Description
EtherCAT System Documentation (PDF)	• System overview • EtherCAT basics • Cable redundancy • Hot Connect • EtherCAT devices configuration
Design Guide EJ8xxx - Signal distribution board for standard EtherCAT plug-in modules (PDF)	Notes on the design of a signal distribution board for standard EtherCAT plug-in modules. • Requirements for the signal distribution board • Backplane mounting guidelines • Module placement • Routing guidelines
Documentation of the corresponding ELxxxx EtherCAT Terminal (s. note on documentation of ELxxxx) [▶ 41]	• Notes on the principle of operation and • descriptions for configuration and parameterization are transferable to the corresponding EtherCAT plug-in modules
Infrastructure for EtherCAT/Ethernet (PDF)	Technical recommendations and notes for design, implementation and testing
Software Declarations I/O (PDF)	Open source software declarations for Beckhoff I/O components

The documentations can be viewed at and downloaded from the Beckhoff website (www.beckhoff.com) via:

- the “Documentation and Download” area of the respective product page,
- the Download finder,
- the Beckhoff Information System.

1.6 Marking of EtherCAT plug-in modules

Designation

A Beckhoff EtherCAT device has a 14-digit **technical designation**, made up as follows (e.g. EJ1008-0000-0017)

- **Order identifier**
  - family key: EJ
  - product designation: The first digit of product designation is used for assignment to a product group (e.g. EJ2xxx = digital output module).
  - Version number: The four digit version number identifies different product variants.
- **Revision number:**
  It is incremented when changes are made to the product.

The Order identifier and the revision number are printed on the side of EtherCAT plug-in modules (s. following illustration (A and B).

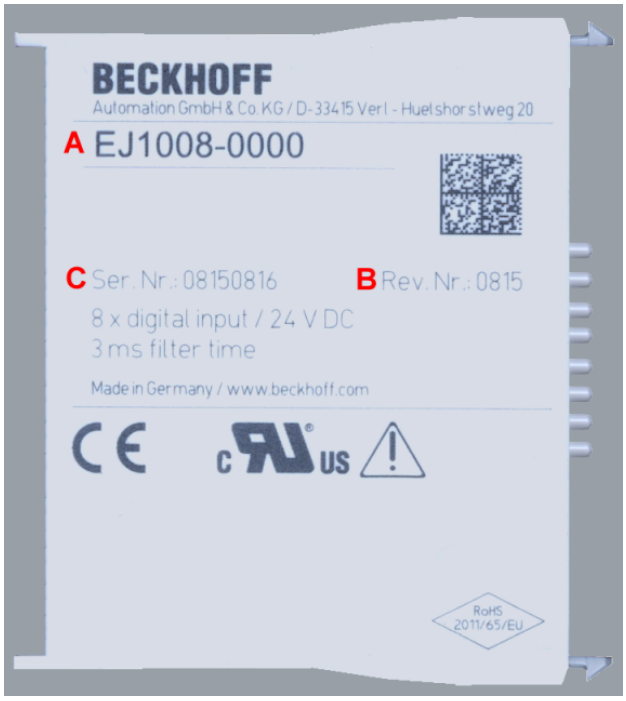


Fig. 1: Order identifier (A), Revision number (B) and serial number (C) using the example of EJ1008

Product group	Example		
	Product designation	Version	Revision
EtherCAT Coupler EJ11xx	EJ1101	-0022 (Coupler with external connectors, power supply module and optional ID switches	-0016
Digital input modules EJ1xxx	EJ1008 8-channel	-0000 (basic type)	-0017
Digital output modules EJ2xxx	EJ2521 1-channel	-0224 (2 x 24 V outputs)	-0016
Analog input modules EJ3xxx	EJ3318 8-channel thermocouple	-0000 (basic type)	-0017
Analog output modules EJ4xxx	EJ4134 4-channel	-0000 (basic type)	-0019
Special function modules EJ5xxx, EJ6xxx	EJ6224 IO-Link master	-0090 (with TwinSAFE SC)	-0016
Motion modules EJ7xxx	EJ7211 servomotor	-9414 (with ECT, STO and TwinSAFE SC)	-0029

Notes

- The elements mentioned above result in the **technical designation**. EJ1008-0000-0017 is used in the example below.
- EJ1008-0000 is the **order identifier**, in the case of “-0000” usually abbreviated to EJ1008.
- The **revision** -0017 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.
- The product designation, version and revision are read as decimal numbers, even if they are technically saved in hexadecimal.

Serial number

The serial number for EtherCAT plug-in modules is usually the 8-digit number printed on the side of the module (see following illustration C). 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.

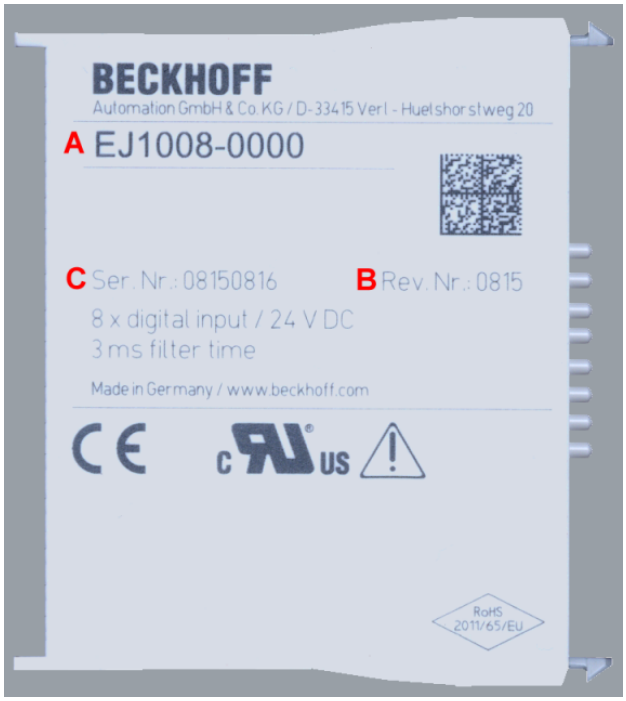


Fig. 2: Order identifier (A), revision number (B) and serial number (C) using the example of EJ1008

Serial number	Example serial number: 08 15 08 16
KK - week of production (CW, calendar week)	08 - week of production: 08
YY - year of production	15 - year of production: 2015
FF - firmware version	08 -f irmware version: 08
HH - hardware version	16 - hardware version: 16

1.6.1 Beckhoff Identification Code (BIC)

The **B**eckhoff **I**dentification **C**ode (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.

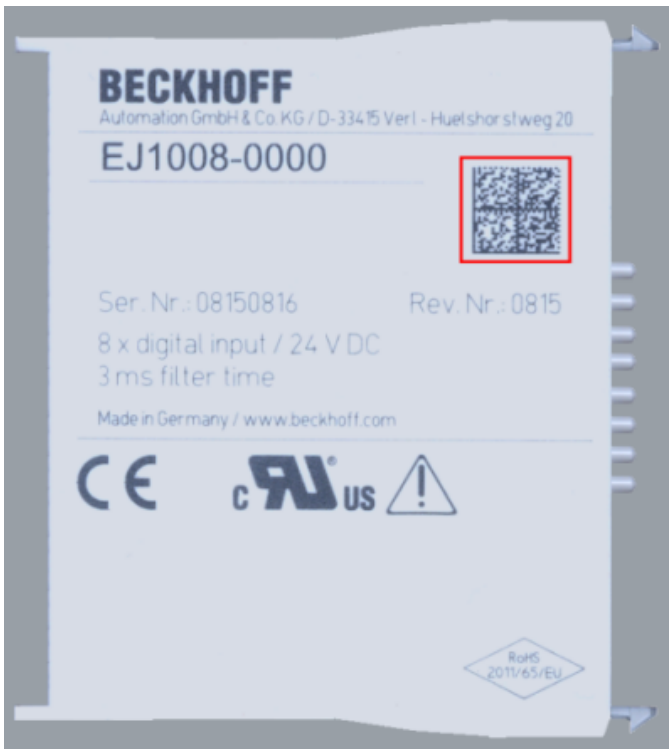


Fig. 3: BIC as data matrix code (DMC, code scheme ECC200)

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, it shall be replaced by spaces. The data under positions 1-4 are always available.

The following information is contained:

Item no.	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**	S	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	51S678294104
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 items 1 - 4 and with the above given example value on positon 6. The data identifiers are marked in bold font for better display:

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

Accordingly as DMC:

Fig. 4: 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, item no. 2). The BTN is a unique serial number consisting of eight characters that will replace all other serial number systems at Beckhoff in the long term (e.g. batch designations on IO components, previous serial number range for safety products, etc.). The BTN will also be introduced step by step, so it may happen that the BTN is not yet coded in the BIC.

NOTICE

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

1.6.2 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.

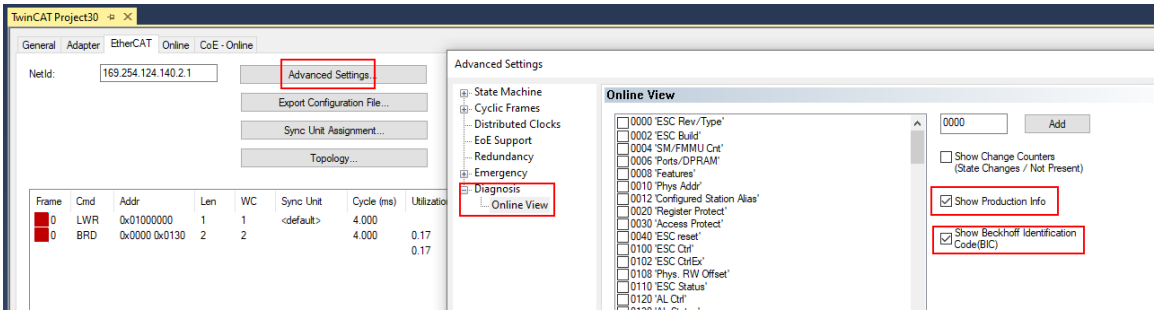
EtherCAT devices (IP20, IP67)

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.

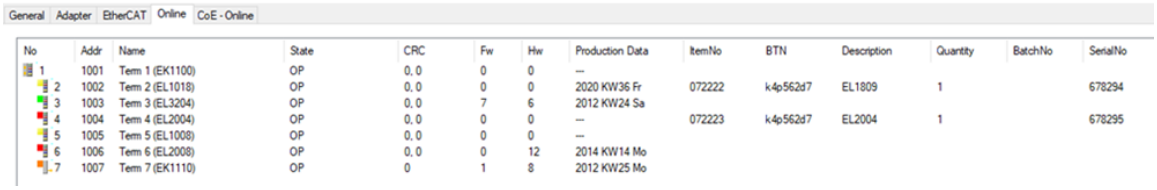
The eBIC is also stored in the ESI-EEPROM. The eBIC was introduced into the Beckhoff I/O production (terminals, box modules) from 2020; widespread implementation is expected in 2021.

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 PREOP/SAFEOP/OP for access:

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

- the object 0x10E2 will be 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 etc.

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

1.6.3 Certificates

- The EhterCAT plug-in modules meet the requirements of the EMC and Low Voltage Directive. The CE mark is printed on the side of the modules.
- The cRUus imprint identifies devices that meet product safety requirements according to U.S. and Canadian regulations.
- The warning symbol is a request to read the corresponding documentation. The documentations for EtherCAT plug-in modules can be downloaded from the Beckhoff homepage.

Fig. 5: Marking for CE and UL using EJ1008 as an example

2 System overview

Electronically, the EJxxxx EtherCAT plug-in modules are based on the EtherCAT I/O system. The EJ system consists of the signal distribution board and EtherCAT plug-in modules. It is also possible to connect an IPC to the EJ system.
The EJ system is suitable for mass production applications, applications with small footprint and applications requiring a low total weight.
The machine complexity can be extended by means of the following:

- reserve slots,
- the use of placeholder modules,
- linking of EtherCAT Terminals and EtherCAT Boxes via an EtherCAT connection.

The following diagram illustrates an EJ system. The components shown are schematic, to illustrate the functionality.

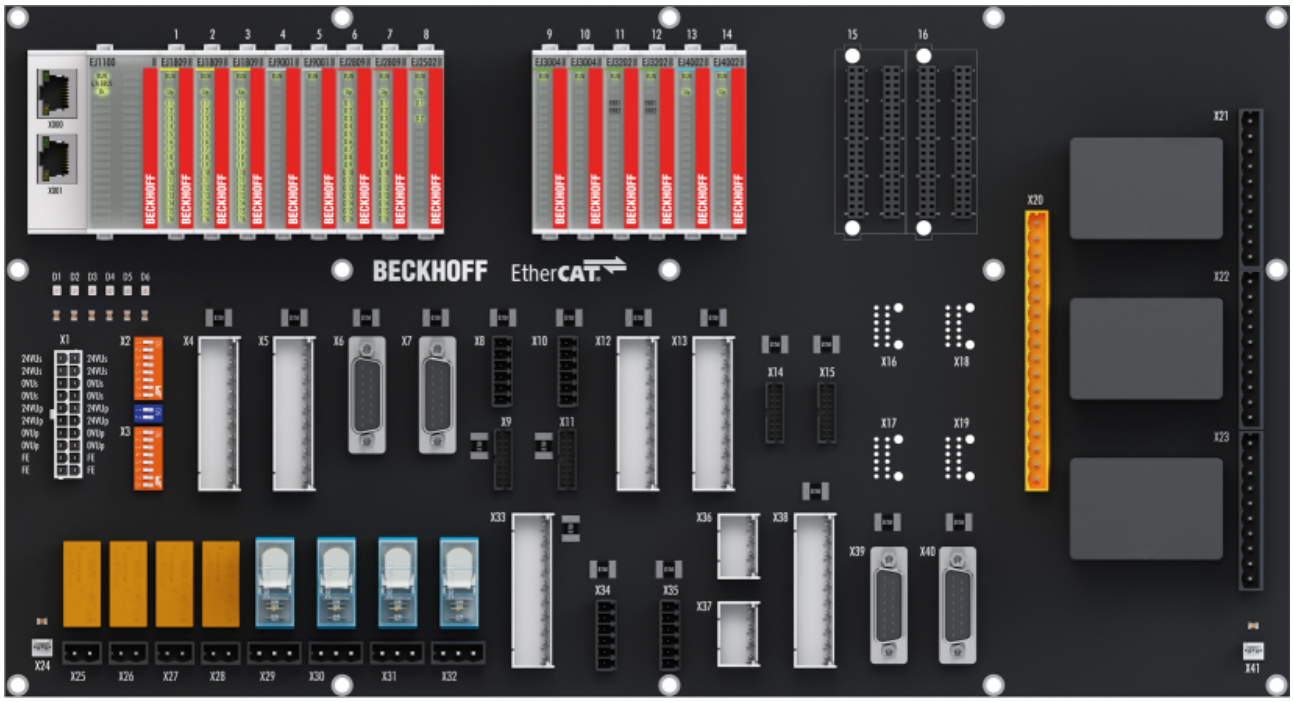


Fig. 6: EJ system sample

Signal distribution board

The signal distribution board distributes the signals and the power supply to individual application-specific plug connectors, in order to connect the controller to further machine modules. Using pre-assembled cable harnesses avoids the need for time-consuming connection of individual wires. Coded components reduce the unit costs and the risk of miswiring.
Beckhoff offers development of signal distribution boards as an engineering service. Customers have the option to develop their own signal distribution board, based on the design guide.

EtherCAT plug-in modules

Similar to the EtherCAT Terminal system, a module strand consists of a bus coupler and I/O modules. Almost all of the EtherCAT Terminals can also be manufactured in the EJ design as EtherCAT plug-in modules. The EJ modules are directly attached to the signal distribution board. The communication, signal distribution and supply take place via the contact pins at the rear of the modules and the PCB tracks of the signal distribution board. The coding pins at the rear serve as mechanical protection against incorrect connection. Color coding on the housing facilitates distinguishing of the modules.

3 EJ7211-0010 - Product description

3.1 Introduction

Fig. 7: EJ7211-0010

Servomotor module with OCT, 48 V_{DC}, 4,5 A (I_{rms})

The servomotor EtherCAT plug-in module EJ7211-0010 with integrated One Cable Technology (OCT) offers high servo performance in a very compact design for the motor types of the AM8100 series, up to 4,5 A (I_{eff}). The One Cable Technology combines a motor cable and an absolute feedback system in a single cable. The integrated electronic type plate of the AM81xx motors can be read in automatically by the servo module to configure the motor parameters automatically. Thus, wiring and commissioning expenditure are minimized.

The fast control technology, based on field-orientated current and PI speed control, supports fast and highly dynamic positioning tasks. The monitoring of numerous parameters, such as overvoltage and undervoltage, overcurrent, terminal temperature or motor load via the calculation of an I²T model, offer maximum operational reliability. EtherCAT, as a high-performance system communication, and CAN-over-EtherCAT (CoE), as the application layer, enable ideal interfacing with PC-based control technology. The latest power semiconductors guarantee minimum power loss and enable feedback into the DC link when braking. The LEDs indicate status, warning and error messages as well as possibly active limitations.

Recommended TwinCAT version

In order to be able to utilize the full power of module, we recommend using the module with TwinCAT 2.11 R3 or higher!

Mandatory hardware

The Module must be operated with a real-time capable computer and distributed clocks.

Approved motors

Trouble-free operation can only be guaranteed with motors approved by Beckhoff.

3.2 Technical data

Technical data	EJ7211-0010
Number of channels	1 servomotor, absolute feedback, motor brake, 2 digital inputs
Connection technology	direct motor connection
Load type	Permanently excited synchronous motors
DC link supply voltage	8 … 48 V_{DC}
Output current I_N	4.5 A (effective) / 6.3 A (peak value)
Peak current I_N	9 A (effective) / 12.6 A (peak value) for 1 second
Frequency range	0 Hz ... 599 Hz
PWM clock frequency	16 kHz
Current controller frequency	double PWM switching frequency
Speed controller frequency	16 kHz
Motor holding brake output voltage	24 V_{DC}
Max. motor holding brake output current	max. 0.5 A
Current consumption via E-bus	typ. 130 mA
Supports NoCoeStorage function	yes
Electrical isolation	500 V (E-bus/signal voltage)
Permissible ambient temperature range during operation	0°C ... + 55°C
Permissible ambient temperature range during storage	-25°C ... + 85°C
Permissible relative air humidity	95 %, no condensation
Operating altitude	max. 2,000 m
Dimensions (W x H x D)	approx. 24 mm x 66 mm x 55 mm
Weight	approx. 50 g
Mounting	On signal distribution board
Degree of pollution	2
Installation position	Installation positions [▶ 29]
Mechanical position coding [▶ 33]	1 and 8
Color coding	orange
Vibration/shock resistance	conforms to EN 60068-2-6 /EN 60068-2-27 (with corresponding signal distribution board)
EMC immunity/emission	conforms to EN 61000-6-2 /EN 61000-6-4 (with corresponding signal distribution board) according to IEC/EN 61800-3 (with corresponding signal distribution board)
EMC category	Category C3 - standard Category C2, C1 - auxiliary filter required
Protection class	EJ module: IP20 EJ system: dependent on the signal distribution board and housing
Approvals/markings*	CE, UKCA, EAC, UL (see note [▶ 19])

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

CE approval

The CE Marking refers to the EtherCAT plug-in module mentioned above.
If the EtherCAT plug-in module is used in the production of a ready-to-use end product (PCB in conjunction with a housing), the manufacturer of the end product must check compliance of the overall system with relevant directives and CE certification.
To operate the EtherCAT plug-in modules, they must be installed in a housing.

UL notice - Compact Motion

Notes on motion devices

- *Motor overtemperature*
  Motor overtemperature sensing is not provided by the drive.
- *Application for compact motion devices*
  The modules are intended for use only within Beckhoff`s Programmable Controller system Listed in File E172151.
- *Galvanic isolation from the supply*
  The modules are intended for operation within circuits not connected directly to the supply mains (galvanically isolated from the supply, i.e. on transformer secondary).
- *Requirements for environmental conditions*
  For use in Pollution Degree 2 Environment only.

3.3 Technology

The very compact EL72x1-xxxx servomotor module integrates a complete servo drive for servomotors up to 276 W.

Servomotor

The servomotor is an electrical motor. Together with a servo amplifier the servomotor forms a servo drive. The servomotor is operated in a closed control loop with position, torque or speed control.
The servo module EJ72x1-xxxx supports control of permanent magnet synchronous motors. These consist of three coils which are offset by 120° and a permanent magnet rotor.

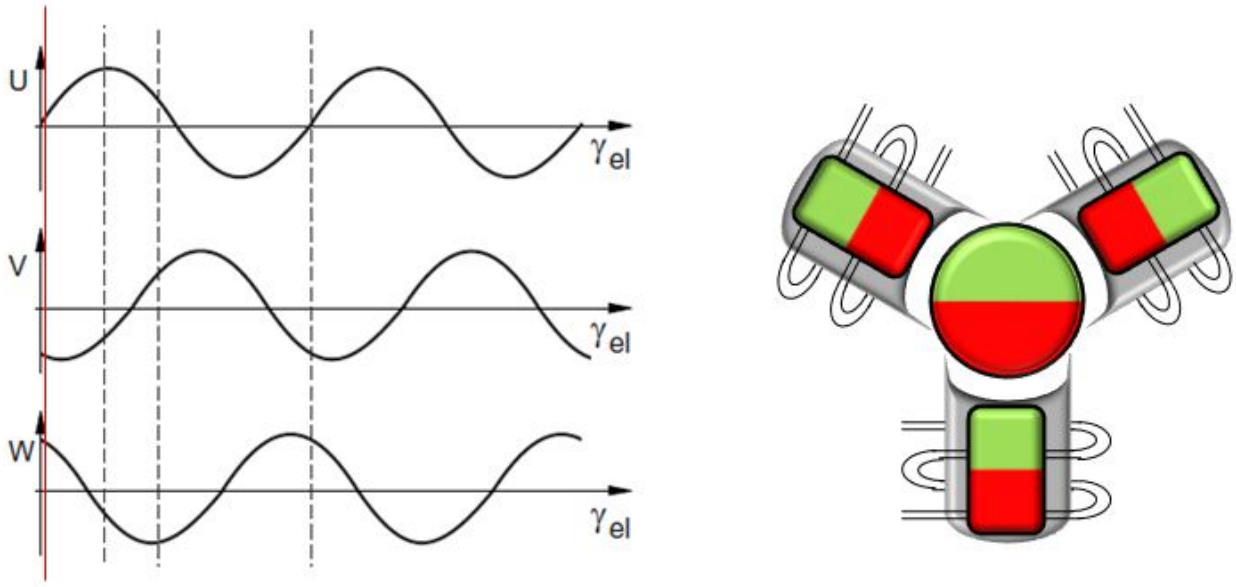


Fig. 8: Three synchronous motor coils, each offset by 120°

Servomotors particularly demonstrate their advantages in highly dynamic and precise positioning applications:

- very high positioning accuracy in applications where maximum precision is required through integrated position feedback
- high efficiency and high acceleration capacity
- servomotors are overload-proof and therefore have far greater dynamics than stepper motors, for example.
- load-independent high torque right up to the higher speed ranges
- maintenance requirements reduced to a minimum

The EtherCAT servomotor module offers users the option to configure compact and cost-effective systems without having to give up the benefits of a servomotor.

The Beckhoff servo module

The EJ72x1-xxxx is a fully capable servo drive for direct connection to servomotors in the lower performance range. There is no need for further modules or cabling to make a connection to the control system. This results in a very compact control system solution. The E-Bus connection of the EJ72x1-xxxx makes the full functionality of EtherCAT available to the user. This includes in particular the short cycle time, low jitter, simultaneity and easy diagnostics provided by EtherCAT. With this performance from EtherCAT the dynamics that a servomotor can achieve can be used optimally.

A rated voltage of max. 48 V_{DC} and a rated current of max. 4.5 A enable the user to drive a servomotor with a rating of up to 276 W. Permanent magnet synchronous motors with a rated current of up to 4.5 A can be connected as loads. The monitoring of numerous parameters, such as overvoltage and undervoltage, overcurrent, module temperature or motor load, offers maximum operational reliability. Modern power semiconductors guarantee minimum power loss and enable feedback into the DC link when braking.

The integrated fast control technology, with a field-orientated current and PI speed control, supports highly dynamic positioning tasks. Apart from the direct connection of motor and resolver, the connection of a motor holding brake is also possible.

The EJ72x1-xx1x EtherCAT plug-in module has two digital inputs that can be used for the “Touch Probe” function. The status of the inputs can be read by “Select Info Data” (MDP742 profile and DS402 profile).

Connection to the control system

A further big advantage of the EJ72x1-xxxx is the easy incorporation into the control solution. The complete integration into the control system simplifies commissioning and parameterization. As with all the other EtherCAT plug-in modules, the EJ72x1-xxxx is simply plugged onto the signal distribution board. Then the full module network can be scanned by the TwinCAT System Manager or manually added by the application engineer. In the System Manager the EJ72x1-xxxx can be linked with the TwinCAT NC and parameterized.

Scalable motion solution

The servo module complements the product range of compact drive technology for Beckhoff I/O systems that are available for stepper motors, AC and DC motors. With the EJ72x1-xxxx servo module, the range of servo drives becomes even more finely scalable: from the miniature servo drive up to 170 W in the EtherCAT plug-in module through to the AX5000 servo drive with 118 kW, Beckhoff offers a wide range including the servomotors.
The AM31xx series was specially developed for the servomotor terminal EL72x1 / the servomotor module EJ72x1.

One Cable Technology (OCT)

In the servomotors from the AM8100-xF**2** x series the feedback signals are transmitted directly via the power supply cable, so that power and feedback system are combined in a single motor connection cable. With the use of the One Cable technology, the information is sent reliably and without interference through a digital interface. Since a cable and plug are omitted at both the motor and controller end, the component and commissioning costs are reduced.

Thermal I²T motor model

The thermal I²T motor model represents the thermal behavior of the motor winding taking into account the absolute thermal resistance R_{th} and the thermal capacity C_{th} of motor and the stator winding.

The model assumes that the motor reaches its maximum continuous operating temperature T_{nom} during continuous operation with rated current I_{nom}. This temperature corresponds to 100% motor load. During operation at rated current the motor model reaches a load of 63% after a time of $\tau_{th}=R_{th}\cdot C_{th}$ and slowly reaches its continuous operating temperature.

If the motor is operated with a current that is greater than the rated current, the model reaches 100% load more quickly.

If the load of the I²T model exceeds 100%, the requested set current is limited to the rated current, in order to protect the motor winding thermally. The load reduces to a maximum of 100%. If the current falls below the rated current, the load falls below 100% and the set current limitation is cancelled.

For a motor that has been cooled to ambient temperature, the time for reaching 100% load with a set current that exceeds the rated current can be estimated with $\tau_{th}\cdot I_{nom}^2/I_{actual}^2$.

The actual load must be known for exact calculation of the time when the 100% load threshold is exceeded.

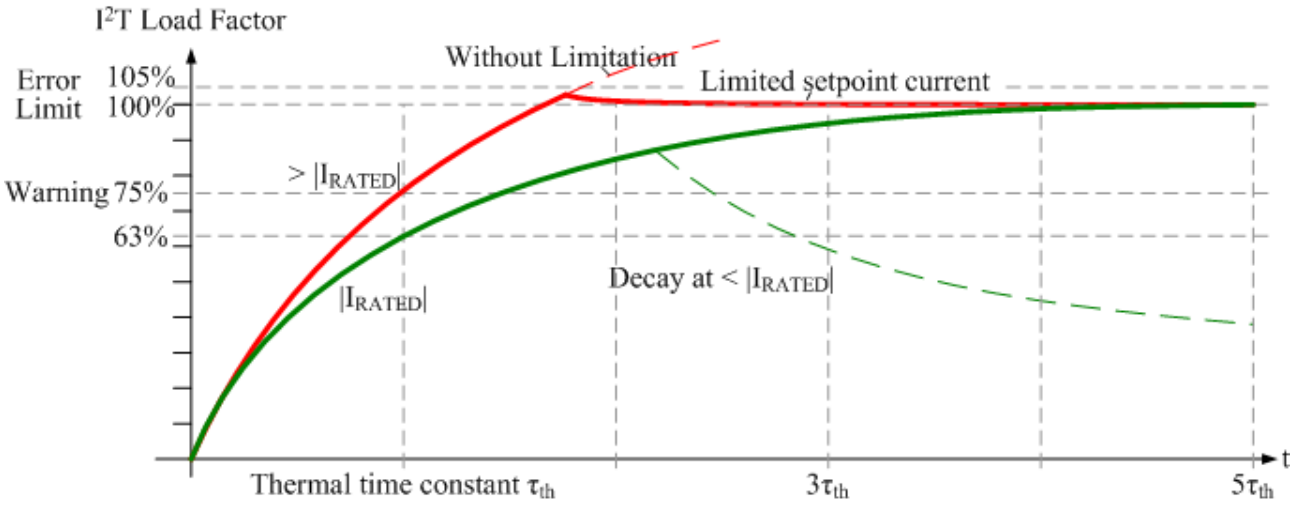


Fig. 9: Limitation to the rated motor current

3.4 Pinout

EJ7211-0010 Left connector (Encoder)				EJ7211-0010 Right connector (Motor)				
Pin#		Signal		Pin#		Signal		
1	2	U_{EBUS}	U_{EBUS}	1	2	NC	NC	**E-Bus contacts** The power supply U_{EBUS} is provided by the coupler and supplied from the supply voltage U_S of the EtherCAT coupler.
3	4	GND	GND	3	4	GND	GND	
5	6	RX0+	TX1+	5	6	NC	NC	
7	8	RX0-	TX1-	7	8	NC	NC	
9	10	GND	GND	9	10	GND	GND	
11	12	TX0+	RX1+	11	12	NC	NC	
13	14	TX0-	RX1-	13	14	NC	NC	
15	16	GND	GND	15	16	GND	GND	
17	18	NC	FB+	17	18	U	U	**Signals and power supply of the motor**
19	20	NC	FB-	19	20	V	V	
21	22	NC	NC	21	22	W	W	
23	24	NC	NC	23	24	Brake+	Brake-	
25	26	NC	DI 1	25	26	48V_Motor	48V_Motor	
27	28	NC	DI 2	27	28	48V_Motor	48V_Motor	
29	30	NC	NC	29	30	GND Motor	GND Motor	
31	32	NC	NC	31	32	GND Motor	GND Motor	
33	34	0V Up	0V Up	33	34	0V Up	0V Up	**U_P-Contacts** The peripheral voltage U_P supplies the electronics on the field side.
35	36	0V Up	24V Up	35	36	0V Up	24V Up	
37	38	24V Up	24V Up	37	38	24V Up	24V Up	
39	40	SGND	SGND	39	40	SGND	SGND	

Left connector (Encoder)		Right connector (Motor)	
Signal	**Description**	**Signal**	**Description**
U_{EBUS}	E-Bus power supply 3.3 V	NC	Do not connect
GND	E-Bus GND signal. Don`t connect with 0V Up!	GND	E-Bus GND signal. Don`t connect with 0V Up!
RXn+	Positive E-Bus receive signal		
RXn-	Negative E-Bus receive signal		
TXn+	Positive E-Bus transmit signal		
TXn-	Negative E-Bus transmit signal		
NC	Do not connect	U	Motor phase U
		V	Motor phase V
		W	Motor phase W
FB+	Positive input of the absolute feedback	Brake+	Motor brake +
		Brake-	Motor brake -
FB-	Negative input of the absolute feedback	48V_Motor	DC link supply +(8 V ... 48 V)
DI 1 ... D I2	Digital Input 1 ... 2	GND Motor	DC link supply (0 V)
0V Up	Field side GND signal	0V Up	Field side GND signal
24V Up	Field side power supply 24 V	24V Up	Field side power supply 24 V
SGND	Shield Ground	SGND	Shield Ground

The PCB footprint can be downloaded from the Beckhoff homepage.

NOTICE

Damage to devices possible!

- The pins named with “NC” must not be connected.
- Before installation and commissioning read the chapters Installation of EJ modules [▶ 25] and Commissioning [▶ 41]!

Shielding

Feedback signal, sensors and actuators should always be connected with shielded, twisted paired wires.

3.5 LEDs

LED No.	EJ7211-0010	
	Left	Right
A	RUN	Driver
B	Read OCT	+48V
C		Up
1		Enable
2		LIMIT
3		WARN
4		ERR
5		
6		
7	I 1	
8	I 2	
9		
10		
11		
12		
13		
14		
15		
16		

Fig. 10: EJ7211-0010 - LEDs

LEDs (left prism)				
LED	**Color**	**Display**	**State**	**Meaning**
RUN	green	off	Init	State of the EtherCAT State Machine: **INIT** = Initialization of the terminal or **BOOTSTRAP** = Function for firmware updates of the terminal
		blinking	Pre-Operational	State of the EtherCAT State Machine: **PREOP** = Setting for mailbox communication and variant standard settings
		single flash	Safe-Operational	State of the EtherCAT State Machine: **SAFEOP** = Channel checking of the Sync-Manager and the Distributed Clocks. Outputs stay in safe operation mode.
		on	Operational	State of the EtherCAT State Machine: **OP** = Normal operation mode, mailbox- and process data communication possible
		flickering	Bootstrap	State of the EtherCAT State Machine: **BOOTSTRAP** = function for firmware updates of the plug-in module.
Read OCT	green	blinking	-	The electronic type plate is read
		off	-	Reading of the electronic type plate was finished
I1 ... I2	green	off	-	Signal voltage “0”
		on	-	Signal voltage “1”

LEDs (right prism)			
LED	**Color**	**Display**	**Meaning**
Driver	green	on	Driver stage ready for operation
+48V	green	off	The power supply voltage (48 V_{DC}) is absent
		on	The power supply voltage (48 V_{DC}) is present
Up	green	off	No power supply 24 V_{DC} is connected
		on	Power supply 24 V_{DC} is connected
Enable	green	on	The LED is linked with bits 1 and 2 of the Status word (MDP742 / DS402) (if “Switched on” or “Operation enabled”) The driver stage is enabled
LIMIT	yellow	on	The LED is linked with bit 11 of the Status word (MDP742 / DS402) (Internal limit active) Limit is reached (e.g. torque or speed limit)
WARN	yellow	blinking	Error while reading the electronic identification plate.
		on	The LED is linked with bit 7 of the Status word (MDP742 / DS402) (Warning) •The “Warning” threshold value is exceeded. •I²T model •80°C temperature exceeded •Voltage
ERR	red	on	The LED is linked with bit 3 of the Status word (MDP742 / DS402) (Fault) •The “Error” threshold value is exceeded •Overcurrent •Voltage not available •Resolver not connected •Max. temperature (100°C) exceeded

4 Installation of EJ modules

4.1 Power supply for the EtherCAT plug-in modules

⚠ WARNING

Power supply from SELV/PELV power supply unit!

SELV/PELV circuits (Safety Extra Low Voltage, Protective Extra Low Voltage) according to IEC 61010-2-201 must be used to supply this device.

Notes:

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

The signal distribution board should have a power supply designed for the maximum possible current load of the module string. Information on the current required from the E-bus supply can be found for each module in the respective documentation in section “Technical data”, online and in the catalog. The power requirement of the module string is displayed in the TwinCAT System Manager.

E-bus power supply with EJ1100 or EJ1101-0022 and EJ940x

The EJ1100 Bus Coupler supplies the connected EJ modules with the E-bus system voltage of 3.3 V. The Coupler can accommodate a load up to 2.2 A. If a higher current is required, a combination of the coupler EJ1101-0022 and the power supply units EJ9400 (2.5 A) or EJ9404 (12 A) should be used. The EJ940x power supply units can be used as additional supply modules in the module string.

Depending on the application, the following combinations for the E-bus supply are available:

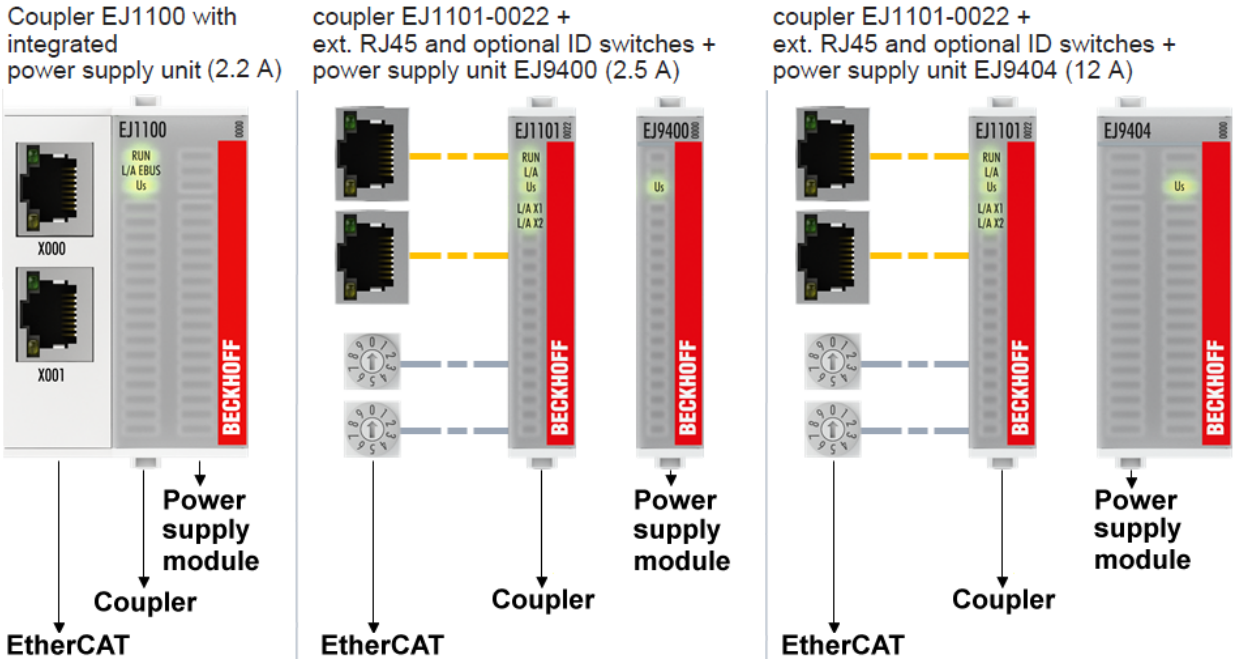


Fig. 11: E-bus power supply with EJ1100 or EJ1101-0022 + EJ940x

In the EJ1101-0022 coupler, the RJ45 connectors and optional ID switches are external and can be positioned anywhere on the signal distribution board, as required. This facilitates feeding through a housing.

The EJ940x power supply plug-in modules provide an optional reset function (see chapter Connection of the documentation for EJ9400 and EJ9404)

E-bus power supply with CXxxxx and EK1110-004x

The Embedded PC supplies the attached EtherCAT Terminals and the EtherCAT EJ coupler

- with a supply voltage Us of 24 V_{DC} (-15 %/+20 %). This voltage supplies the E-bus and the bus terminal electronics.
  The CXxxxx units supply the E-bus with up to 2,000 mA E-bus current. If a higher current is required due to the attached terminals, power feed terminals or power supply plug-in modules must be used for the E-bus supply.
- with a peripheral voltage Up of 24 V_{DC} to supply the field electronics.

The EK1110-004x EtherCAT EJ couplers relay the following parameters to the signal distribution board via the rear connector:

- the E-bus signals,
- the E-bus voltage U_{EBUS} (3.3 V) and
- the peripheral voltage U_P (24 V_{DC}).

Fig. 12: PCB with Embedded PC, EK1110-0043 and EJxxxx, rear view EK1110-0043

4.2 Note on load voltage supply

⚠ WARNING

Load voltage supply

Some devices permit an additional load voltage, e.g. 48 V DC, to be connected for the operation of a motor. In order to avoid stray currents on the protective conductor during operation, EN 60204-1:2018 provides for the possibility that the negative pole of the load voltage does not necessarily have to be connected to the protective conductor system (SELV).
Therefore, the load voltage supply should be designed as an SELV supply.

4.3 EJxxxx - dimensions

The EJ modules are compact and lightweight thanks to their design. Their volume is approx. 50 % smaller than the volume of the EL terminals. A distinction is made between four different module types, depending on the width and the height:

Module type	Dimensions (W x H x D)	Sample in figure below
Coupler	44 mm x 66 mm x 55 mm	EJ1100 (ej_44_2xrj45_coupler)
Single module	12 mm x 66 mm x 55 mm	EJ1809 (ej_12_16pin_code13)
Double module	24 mm x 66 mm x 55 mm	EJ7342 (ej_24_2x16pin_code18)
Single module (long)	12 mm x 152 mm x 55 mm	EJ1957 (ej_12_2x16pin_extended_code4747)

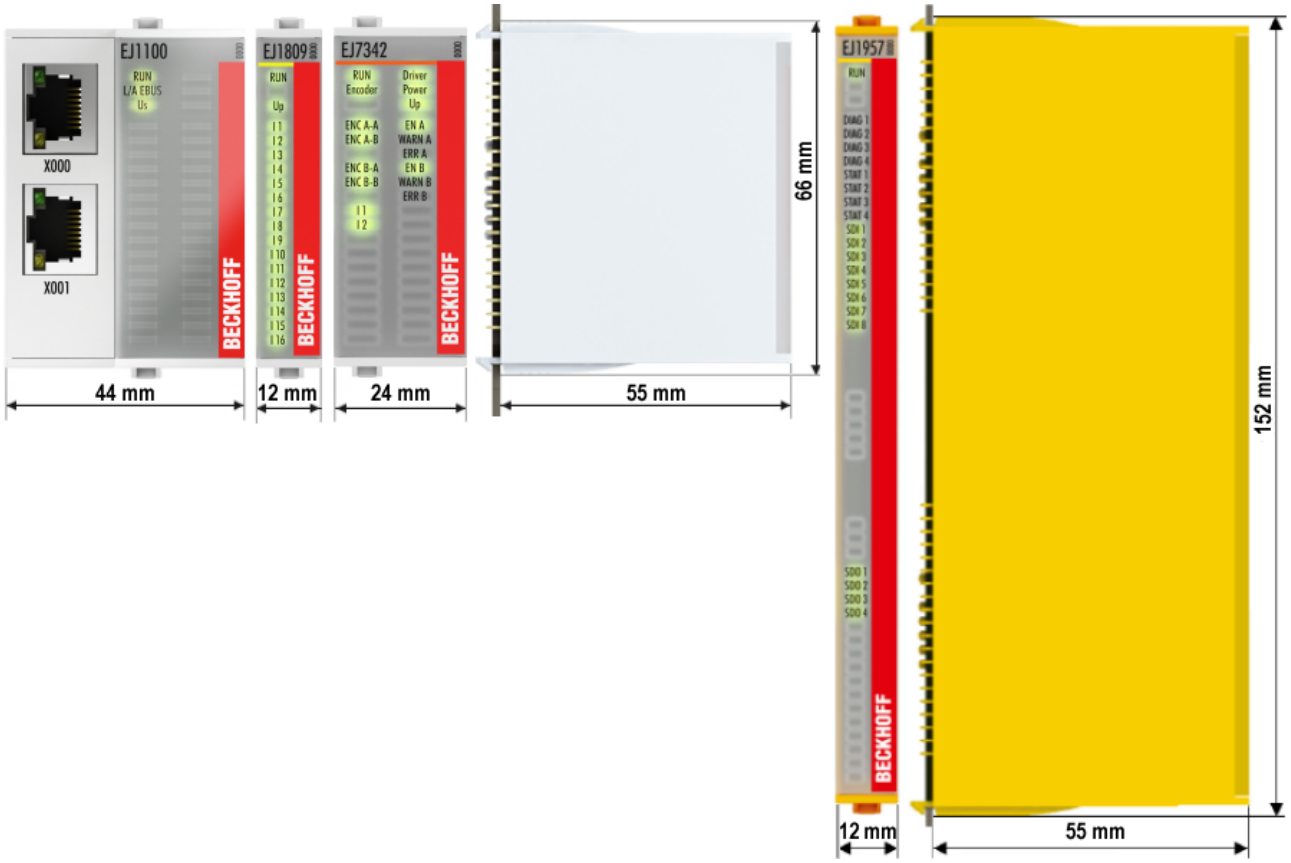


Fig. 13: EJxxxx - Dimensions

The technical drawings can be downloaded from the Beckhoff homepage. The drawings are named as described in the drawing below.

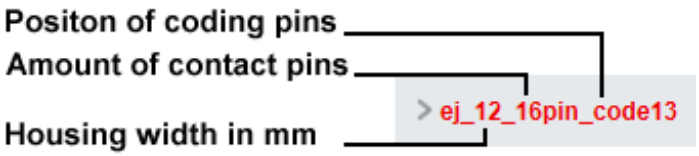


Fig. 14: Naming of the technical drawings

4.4 Installation positions and minimum distances

4.4.1 Minimum distances for ensuring installability

Note the dimensions shown in the following diagram for the design of the signal distribution board to ensure safe latching and simple assembly / disassembly of the modules.

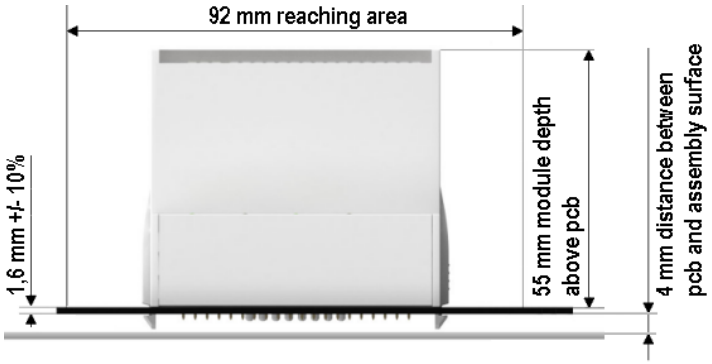


Fig. 15: Mounting distances EJ module - PCB

Observing the reaching area

A minimum reaching area of 92 mm is required for assembly / disassembly, in order to be able to reach the mounting tabs with the fingers.
Adherence to the recommended minimum distances for ventilation (see section Installation position [▶ 29]) ensures an adequate reaching area.

The signal distribution board must have a thickness of 1.6 mm and a minimum distance of 4 mm from the mounting surface, in order to ensure latching of the modules on the board.

4.4.2 Installation positions

NOTICE

Constraints regarding installation position and operating temperature range

Please refer to the technical data [▶ 18] for the installed components to ascertain whether any restrictions regarding the mounting position and/or the operating temperature range have been specified. During installation of modules with increased thermal dissipation, ensure adequate distance above and below the modules to other components in order to ensure adequate ventilation of the modules during operation!

The standard installation position is recommended. If a different installation position is used, check whether additional ventilation measures are required.

Ensure that the specified conditions (see Technical data) are adhered to!

Optimum installation position (standard)

For the optimum installation position the signal distribution board is installed horizontally, and the fronts of the EJ modules face forward (see Fig. *Recommended distances for standard installation position*). The modules are ventilated from below, which enables optimum cooling of the electronics through convection. “From below” is relative to the acceleration of gravity.

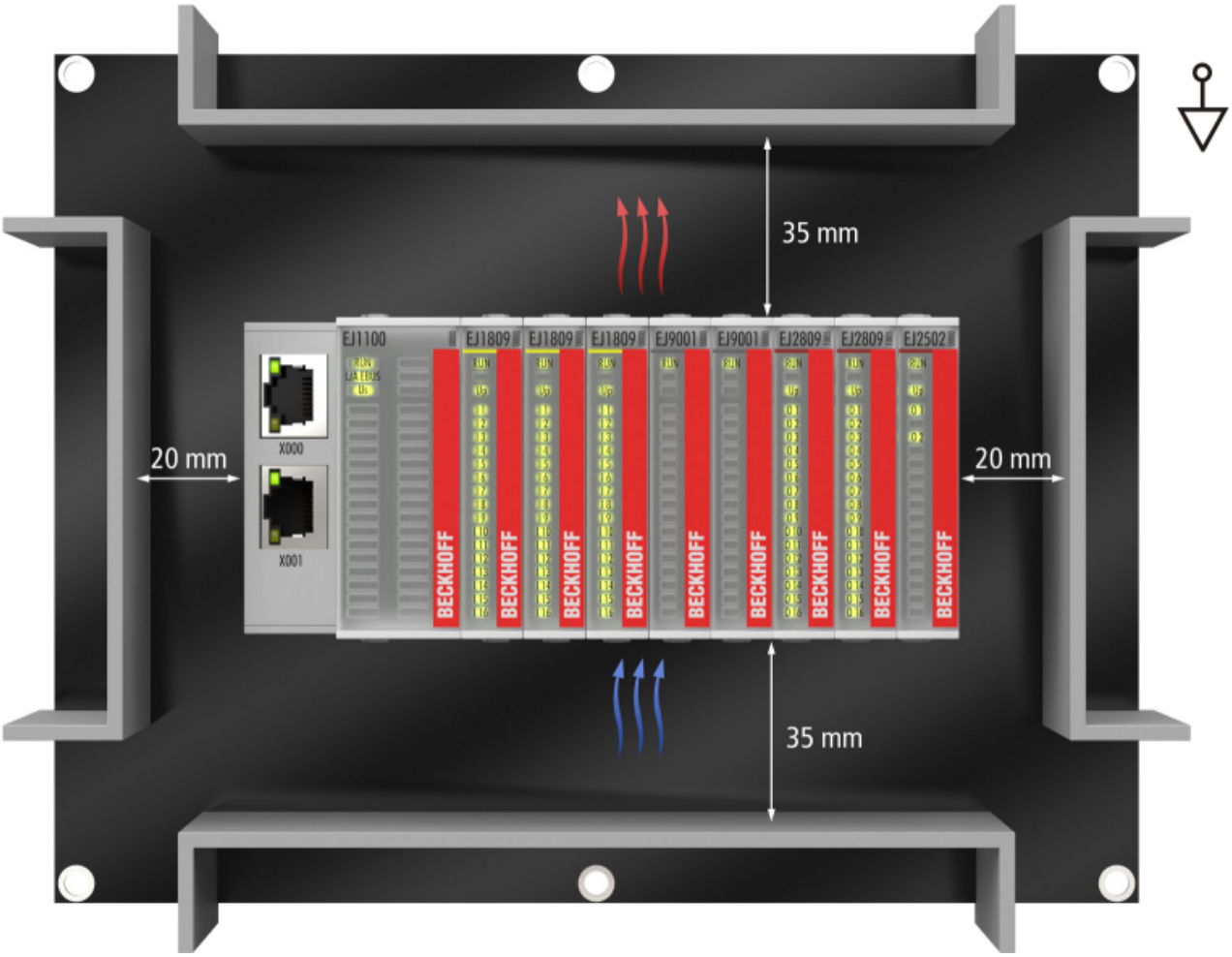


Fig. 16: Recommended distances for standard installation position

Compliance with the distances shown in Fig. *Recommended distances for standard installation position* is recommend. The recommended minimum distances should not be regarded as restricted areas for other components. The customer is responsible for verifying compliance with the environmental conditions described in the technical data. Additional cooling measures must be provided, if required.

Other installation positions

All other installation positions are characterized by a different spatial position of the signal distribution board, see Fig. *Other installation positions.*

The minimum distances to ambient specified above also apply to these installation positions.

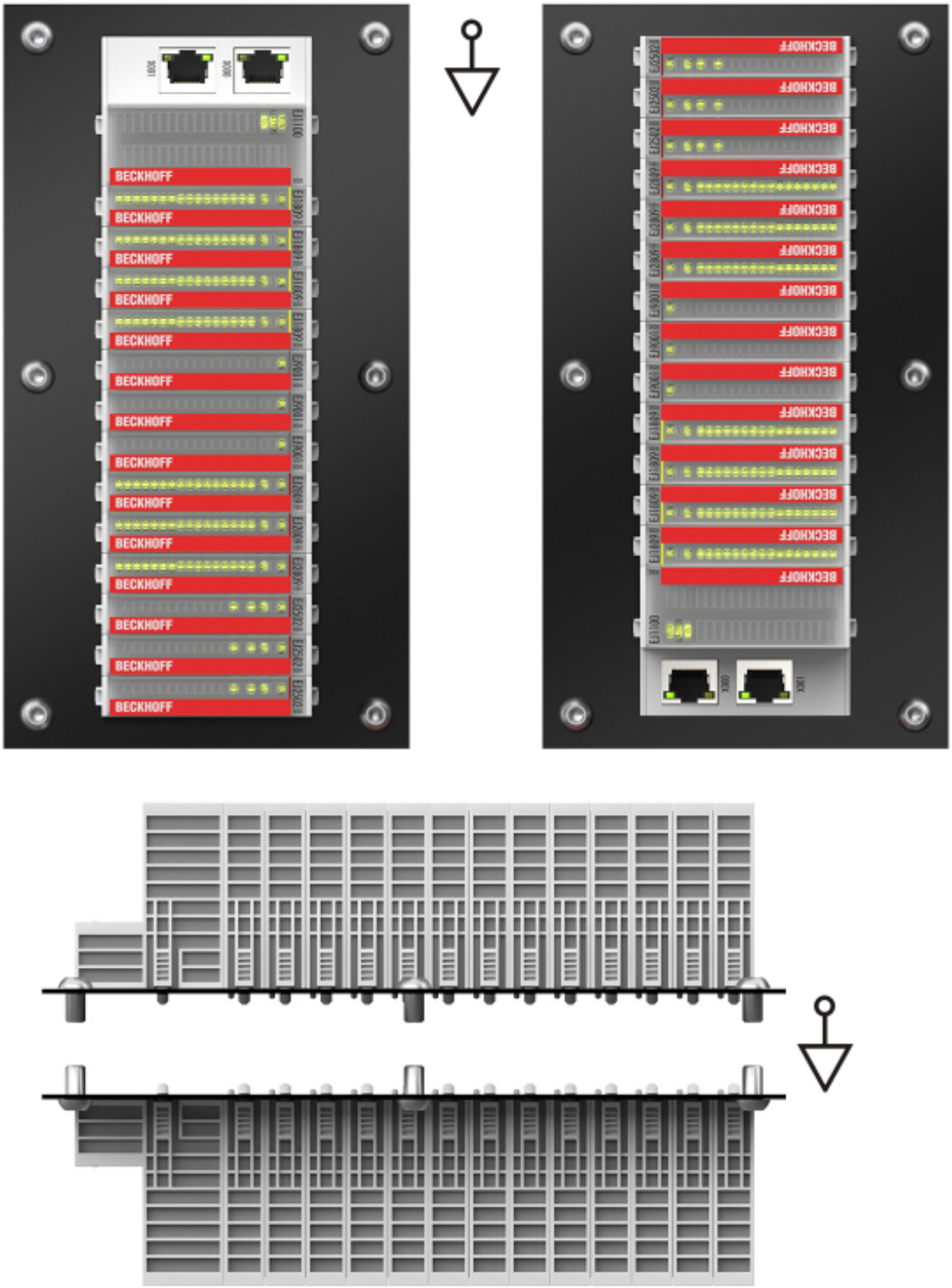


Fig. 17: Other installation positions

4.5 Notes on current measurements using Hall sensors

The device described in this documentation features one or several integrated Hall sensor for the purpose of current measurements.

During this process, the Hall sensor monitors the magnetic field generated by a current flowing through a conductor.

In order to prevent compromising the measurement we recommend screening exterior magnetic fields from the device, or to keep such fields at an adequate distance.

Fig. 18: Note

Background

A current-carrying conductor generates a magnetic field around it according to

$B = \mu_0 * I / (2\pi * d)$

with

B [Tesla] magnetic field

$\mu 0 = 4*\pi*10^{-7}$ [H/m] (assumption: no magnetic shielding)

I [A] current

d [m] distance to conductor

Interference from external magnetic fields

The magnetic field strength should not exceed a permitted level all around the device.
In practice this equates to a recommended minimum distance between a conductor and the device surface as follows:

- Current 10 A: 12 mm
- Current 20 A: 25 mm
- Current 40 A: 50 mm

Unless specified otherwise in the device documentation, stringing together modules (e.g. terminal blocks based on a 12 mm grid) of same type (e.g. EL2212-0000) is permitted.

4.6 Codings

4.6.1 Color coding

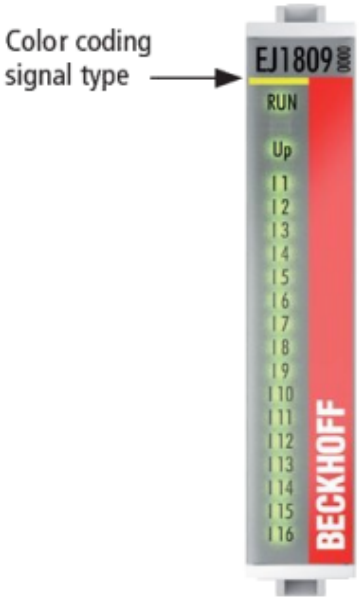


Fig. 19: EJ modules color code; sample: EJ1809

The EJ modules are color-coded for a better overview in the control cabinet (see diagram above). The color code indicates the signal type. The following table provides an overview of the signal types with corresponding color coding.

Signal type	Modules	Color
Coupler	EJ11xx	No color coding
Digital input	EJ1xxx	Yellow
Digital output	EJ2xxx	Red
Analog input	EJ3xxx	Green
Analog output	EJ4xxx	Blue
Position measurement	EJ5xxx	grey
Communication	EJ6xxx	grey
Motion	EJ7xxx	orange
System	EJ9xxx	grey

4.6.2 Mechanical position coding

The modules have two signal-specific coding pins on the underside (see Figs. B1 and B2 below). In conjunction with the coding holes in the signal distribution board (see Figs. A1 and A2 below), the coding pins provide an option for mechanical protection against incorrect connection. This significantly reduces the risk of error during installation and service.
Couplers and placeholder modules have no coding pins.

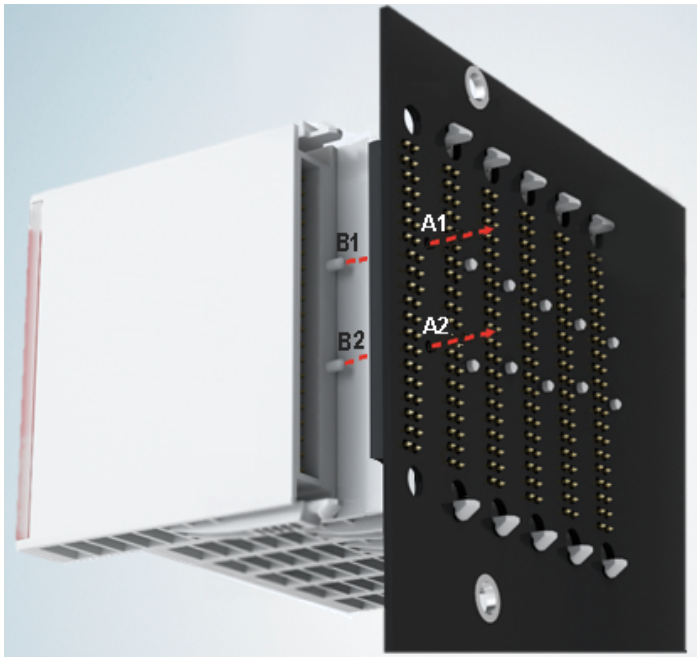


Fig. 20: Mechanical position coding with coding pins (B1 and B2) and coding holes (A1 and A2)

The following diagram shows the position of the position coding with position numbers on the left-hand side. Modules with the same signal type have the same coding. For sample, all digital input modules have the coding pins at positions one and three. There is no plug protection between modules with the same signal type. During installation the module type should therefore be verified based on the device name.

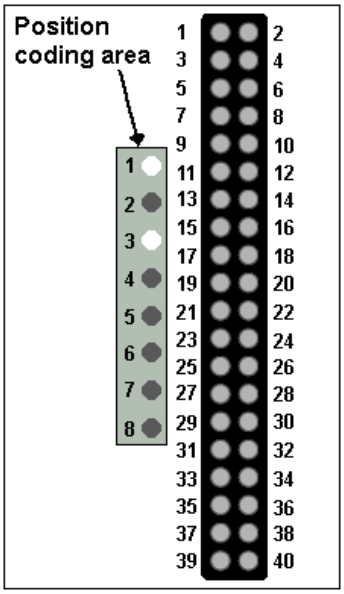


Fig. 21: Pin coding; sample: digital input modules

4.7 Installation on the signal distribution board

EJ modules are installed on the signal distribution board. The electrical connections between coupler and EJ modules are realized via the pin contacts and the signal distribution board.

The EJ components must be installed in a control cabinet or enclosure which must provide protection against fire hazards, environmental conditions and mechanical impact.

⚠ WARNING

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

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

NOTICE

Risk of damage to components through electrostatic discharge!

Observe the regulations for ESD protection.

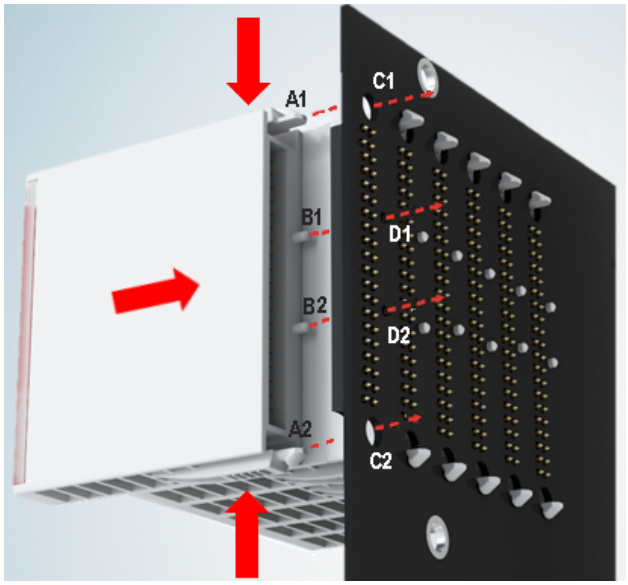


Fig. 22: Installation of EJ modules

A1 / A2	Latching lugs top / bottom	C1 / C2	Mounting holes
B1 / B2	Coding pins	D1 / D2	Coding holes

To install the modules on the signal distribution board proceed as follows:

1. Before the installation, ensure that the signal distribution board is securely connected to the mounting surface. Installation on an unsecured signal distribution board may result in damage to the board.
2. If necessary, check whether the positions of the coding pins (B) match the corresponding holes in the signal distribution board (D).
3. Compare the device name on the module with the information in the installation drawing.
4. Press the upper and the lower mounting tabs simultaneously and push the module onto the board while gently moving it up and down, until the module is latched securely.
   The required contact pressure can only be established and the maximum current carrying capacity ensured if the module is latched securely.
5. Use placeholder modules (EJ9001) to fill gaps in the module strand.

NOTICE

- During installation ensure safe latching of the modules on the signal distribution board! The consequences of inadequate contact pressure include:

⇨ loss of quality of the transferred signals,

⇨ increased power dissipation of the contacts,

⇨ impairment of the service life.

4.8 Extension options

Three options are available for modifications and extensions of the EJ system.

- Replacing the placeholder modules with the function modules provided for the respective slot
- Assigning function modules specified for the respective slots for the reserve slots at the end of the module string
- Linking with EtherCAT Terminals and EtherCAT Box modules via an Ethernet/EtherCAT connection

4.8.1 Using placeholder modules for unused slots

The EJ9001 placeholder modules are used to close temporary gaps in the module strands (see Fig. A1 below). Gaps in the module strand cause interruption in EtherCAT communication and must be equipped with placeholder modules.
In contrast to the passive terminals of the EL series, the placeholder modules actively participate in the data exchange. Several placeholder modules can therefore be connected in series, without impairing the data exchange.
Unused slots at the end of the module strand can be left as reserve slots (see Fig. B1 below).

The machine complexity is extended (extended version) by allocating unused slots (see Figs. A2 below - Exchanging placeholder modules and B2 - Assigning reserve slots) according to the specifications for the signal distribution board.

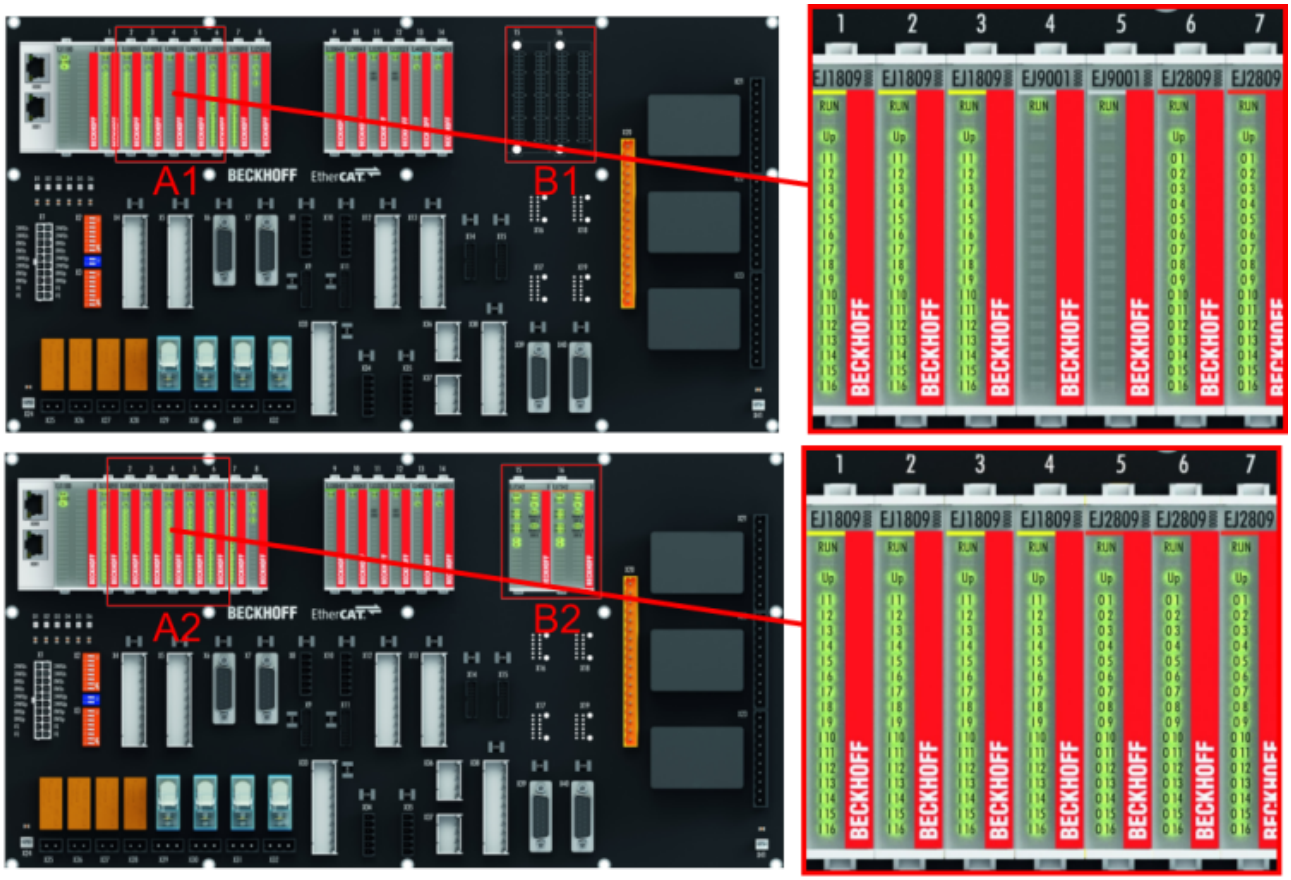


Fig. 23: Sample: Exchanging placeholder modules and assigning reserve slots

E-bus supply

Exchange the placeholder modules with other modules changes the current input from the E-Bus. Ensure that adequate power supply is provided.

4.8.2 Linking with EtherCAT Terminals and EtherCAT Box modules via an Ethernet/EtherCAT connection

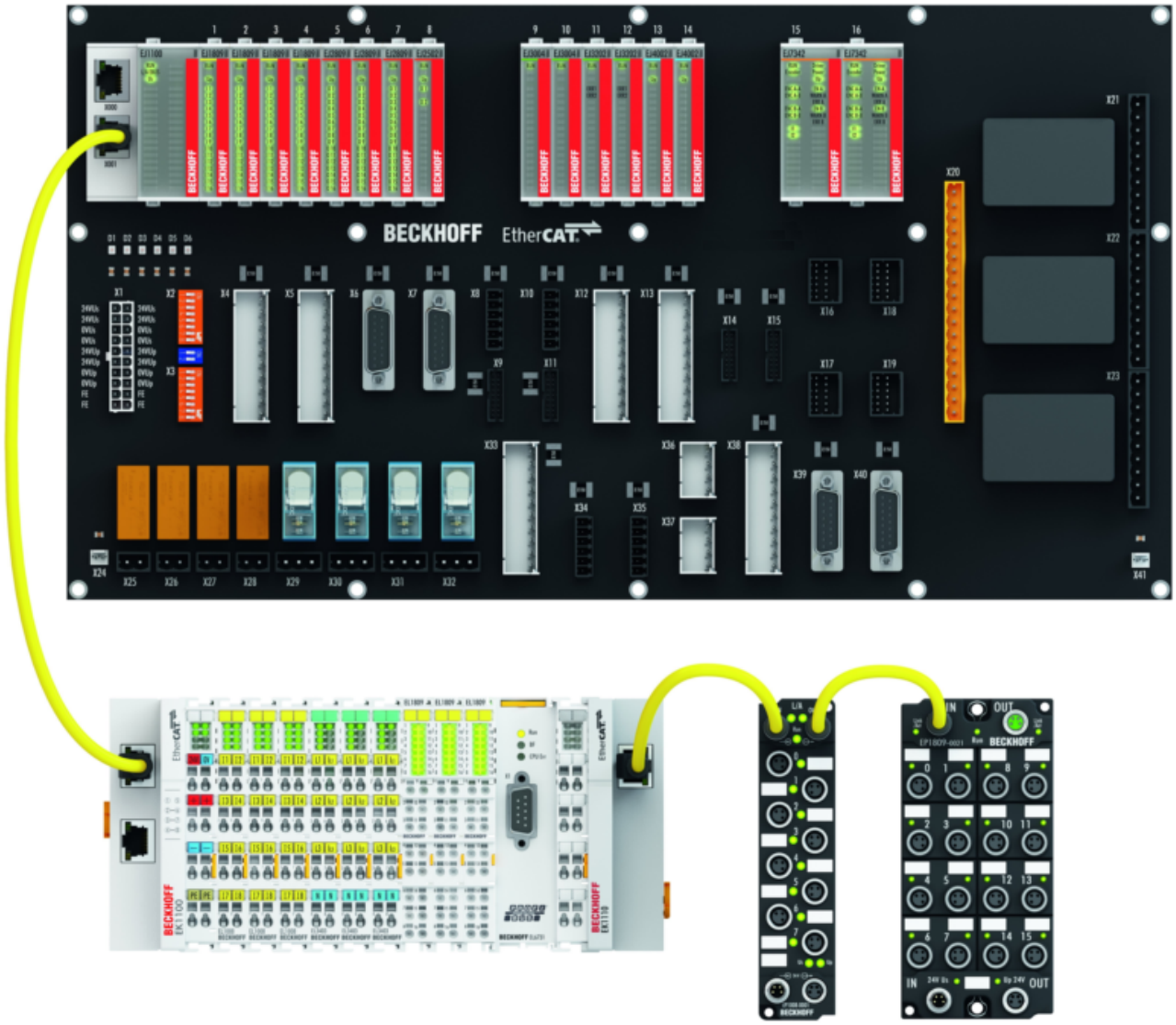


Fig. 24: Example of extension via an Ethernet/EtherCAT connection

4.9 IPC integration

Connection of CX and EL terminals via the EK1110-004x EtherCAT EJ coupler

The EK1110-0043 and EK1110-0044 EtherCAT EJ couplers connect the compact DIN-rail PCs of the CX series and attached EtherCAT Terminals (ELxxxx) with the EJ modules on the signal distribution board.

The EK1110-004x are supplied from the power supply unit of the Embedded PC.
The E-bus signals and the supply voltage of the field side U_P are routed directly to the PCB via a plug connector at the rear of the EtherCAT EJ couplers.

Due to the direct coupling of the Embedded PC and the EL terminals with the EJ modules on the PCB, no EtherCAT Extension (EK1110) or EtherCAT Coupler (EJ1100) is required.

The Embedded PC can be expanded with EtherCAT Terminals that are not yet available in the EJ system, for example.

Fig. 25: Example PCB with Embedded PC, EK1110-0043 and EJxxxx, rear view EK1110-0043

Connection of C6015 / C6017 via the EJ110x-00xx EtherCAT Coupler

Thanks to their ultra-compact design and versatile mounting options, the C6015 and C6017 IPCs are ideally suited for connection to an EJ system.

In combination with the ZS5000-0003 mounting set, it is possible to place the C6015 and C6017 IPCs compactly on the signal distribution board.
The EJ system is optimally connected to the IPC via the corresponding EtherCAT Cable (see following Fig. [A]).
The IPC can be supplied directly via the signal distribution board using the enclosed power plug (see Fig. [B] below).

NOTICE

Positioning on the signal distribution board

The dimensions and distances for placement and other details can be found in the Design Guide and the documentation for the individual components.

The figure below shows the connection of a C6015 IPC to an EJ system as an example. The components shown are schematic, to illustrate the functionality.

Fig. 26: Example for the connection of a C6015 IPC to an EJ system

4.10 Disassembly of the signal distribution board

⚠ WARNING

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

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

Each module is secured through latching on the distribution board, which has to be released for disassembly.

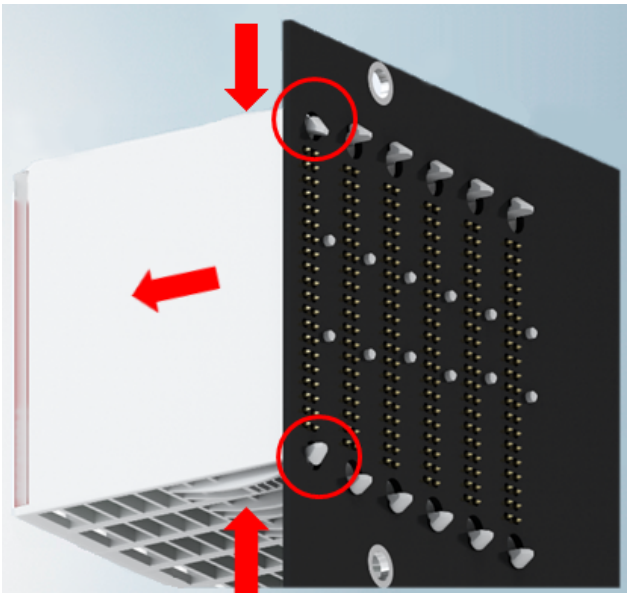


Fig. 27: Disassembly of EJ modules

To disassemble the module from the signal distribution board proceed as follows:

1. Before disassembly, ensure that the signal distribution board is securely connected to the mounting surface. Disassembly of an unsecured signal distribution board may result in damage to the board.
2. Press the upper and lower mounting tabs simultaneously and pull the module from board while gently moving it up and down.

4.11 Disposal

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

5 EtherCAT basics

Please refer to the EtherCAT System Documentation for the EtherCAT fieldbus basics.

6 Commissioning

6.1 Note to EL7211-0010 documentation

Detailed documentation on the commissioning of the EJ72x1-001x module is being prepared.

NOTICE

Damage to devices or loss of data

The descriptions and notes on the commissioning of the EL72x1 EtherCAT Terminal are transferable to the EJ72x1-001x EtherCAT plug-in modules.

Before commissioning, read the detailed descriptions of the process data, operation modes and parameterization in the EL72x1-001x documentation.

6.2 EJ7211-0010 (MDP742) - Object description and parameterization

EtherCAT XML Device Description

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

NOTICE

Parameterization via the CoE list (CAN over EtherCAT)

The EtherCAT device is parameterized via the CoE - Online tab (with a double click on the respective object) or via the Process Data tab (assignment of PDOs). A detailed description can be found in the EtherCAT System-Documentation in chapter “EtherCAT subscriber configuration”

Please note the general CoE notes in the EtherCAT System Documentation in chapter “CoE-interface” when using/manipulating the CoE parameters:
- Keep a startup list if components have to be replaced
- Differentiation between online/offline dictionary,
- existence of current XML description
- use "CoE reload" for resetting changes

NOTICE

Risk of damage to the device!

We strongly advise not to change settings in the CoE objects while the axis is active, since this could impair the control.

6.2.1 Restore object

Index 1011 Restore default parameters

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

6.2.2 Configuration data

Index 8000 FB settings

Index (hex)	Name	Meaning	Data type	Flags	Default
8000:0	FB Settings	Maximum subindex	UINT8	RO	0x17 (23_{dec})
8000:01	Invert feedback direction	Inverting the count direction	BOOLEAN	RW	0x00 (0_{dec})
8000:02	Referenced	Can be set to TRUE by the user. Is automatically set to FALSE as soon as a motor with a deviating serial number is recognized or if the feedback is single-turn.	BOOLEAN	RW	0x00 (0_{dec})
8000:0D	Offset position actual value source	Permitted values • 0: Offset disabled No position offset is used. • 1: Encoder memory The position offset from the feedback memory is used (0x9008:20 [▶ 56]) • 2: Drive memory (default) The position offset from the servo drive is used (0x8000:17)	UINT8	RW	0x02 (2_{dec})
8000:11	Device type	3: OCT (not changeable)	UINT32	RW	0x00000003 (3_{dec})
8000:12	Single-turn bits	Number of single-turn bits	UINT8	RW	0x14 (20_{dec})
8000:13	Multi-turn bits	Number of multi-turn bits	UINT8	RW	0x0C (12_{dec})
8000:14	Observer bandwidth	Bandwidth of the speed observer [Hz]	UINT16	RW	0x01F4 (500_{dec})
8000:15	Observer feed-forward	Load ratio [%] 100% = load-free 50% = mass moments of inertia of input and output are equal	UINT8	RW	0x00 (0_{dec})
8000:17	Position offset	The position offset is subtracted from the raw position of the encoder. It can only be written with the axis stopped.	UINT32	RW	0x00000000 (0_{dec})

Index 8001 FB Touch probe Settings

Index (hex)	Name	Meaning	Data type	Flags	Default
8001:0	FB Touch probe Settings	Maximum subindex	UINT8	RO	0x12 (18_{dec})
8001:11	Touch probe 1 source	Permitted values: 1: Touch probe input 1	UINT16	RW	0x0001 (1_{dec})
8001:12	Touch probe 2 source	Permitted values: 2: Touch probe input 2	UINT16	RW	0x0002 (2_{dec})

Index 8008 FB OCT Settings

Index (hex)	Name	Meaning	Data type	Flags	Default
8008:0	FB OCT Settings	Maximum subindex	UINT8	RO	0x03 (3_{dec})
8008:01	Enable autoconfig	Configuration takes place automatically after the reading of the electronic identification plate (see Automatic scanning of the electronic identification plates)	BOOLEAN	RW	0x00 (0_{dec})
8008:02	Reconfig identical motor	When replacing identical motors, reconfiguration takes place automatically after reading the electronic identification plate. *Enable autoconfig* must be activated. (see Automatic scanning of the electronic identification plates)	BOOLEAN	RW	0x00 (0_{dec})
8008:03	Reconfig non-identical motor	When replacing non-identical motors, reconfiguration takes place automatically after reading the electronic identification plate. *Enable autoconfig* must be activated. (see Automatic scanning of the electronic identification plates)	BOOLEAN	RW	0x00 (0_{dec})

Index 8010 DRV Amplifier Settings

Index (hex)	Name	Meaning	Data type	Flags	Default
8010:0	DRV Amplifier Settings	Maximum subindex	UINT8	RO	0x66 (102_{dec})
8010:01	Enable TxPDOToggle	Show TxPDO toggle in status word (bit 10)	BOOLEAN	RW	0x00 (0_{dec})
8010:02	Enable input cycle counter	1: enabled Two-bit counter that is incremented with each process data cycle up to a maximum value of 3, after which it starts again at 0 The low bit is represented in bit 10 and the high bit in bit 14 of the Status word.	BOOLEAN	RW	0x00 (0_{dec})
8010:11	Device type	1: Servo drive (cannot be changed)	UINT32	RW	0x00000001 (1_{dec})
8010:12*	Current loop integral time	Integral component of current controller **Unit**: 0.1 ms This value is affected by automatic scanning. (see Automatic scanning of the electronic identification plates)	UINT16	RW	0x000A (10_{dec})
8010:13*	Current loop proportional gain	Proportional component of current controller **Unit**: 0.1 V/A This value is affected by automatic scanning. (see Automatic scanning of the electronic identification plates)	UINT16	RW	0x0064 (100_{dec})
8010:14	Velocity loop integral time	Integral component of velocity controller **Unit**: 0.1 ms	UINT32	RW	0x00000032 (50_{dec})
8010:15	Velocity loop proportional gain	Proportional component of velocity controller **Unit**: mA / (rad/s)	UINT32	RW	0x00000096 (150_{dec})
8010:17	Position loop proportional gain	Proportional component position controller **Unit**: (rad/s) / rad	UINT32	RW	0x0000000A (10_{dec})
8010:19	Nominal DC link voltage	Nominal DC link voltage **Unit**: mV	UINT32	RW	0x0000BB80 (48000_{dec})
8010:1A	Min DC link voltage	Minimum DC link voltage **Unit**: mV	UINT32	RW	0x00001A90 (6800_{dec})
8010:1B	Max DC link voltage	Maximum DC link voltage **Unit**: mV	UINT32	RW	0x0000EA60 (60000_{dec})
8010:29	Amplifier I2T warn level	I²T model warning threshold **Unit**: %	UINT8	RW	0x50 (80_{dec})
8010:2A	Amplifier I2T error level	I²T model error threshold **Unit**: %	UINT8	RW	0x69 (105_{dec})
8010:2B	Amplifier Temperature warn level	Overtemperature warning threshold **Unit**: 0.1 °C	UINT16	RW	0x0320 (800_{dec})
8010:2C	Amplifier Temperature error level	Overtemperature error threshold **Unit**: 0.1 °C	UINT16	RW	0x03E8 (1000_{dec})
8010:31	Velocity limitation	Velocity limitation **Unit**: rpm	UINT32	RW	0x00040000 (262144_{dec})
8010:32	Short-Circuit Brake duration max	Max. duration of armature short circuit brake **Unit**: ms	UINT16	RW	0x03E8 (1000_{dec})
8010:33	Stand still window	Standstill window **Unit**: rpm	UINT16	RW	0x0000 (0_{dec})

*) see object Information / diagnostic data [▶ 57] "FB OCT Nameplate"

Index (hex)	Name	Meaning	Data type	Flags	Default
8010:39	Select info data 1	Selection "Info data 1" Optional display of additional information in the cyclic process data. Permitted values: 1: Torque current (filtered 1 ms) [1000th of rated current] 2: DC link voltage (mV) 4: PCB temperature (0.1 °C) 5: Errors 6: Warnings 7: I2T Motor [%] 8: I2T Amplifier [%] 10: Input level 11: Feature Bits	UINT8	RW	0x01 (1_{dec})
8010:3A	Select info data 2	Selection "Info data 2" Optional display of additional information in the cyclic process data. Permitted values: 1: Torque current (filtered 1 ms) [1000th of rated current] 2: DC link voltage (mV) 4: PCB temperature (0.1 °C) 5: Errors 6: Warnings 7: I2T Motor [%] 8: I2T Amplifier [%] 10: Input level 11: Feature Bits	UINT8	RW	0x01 (1_{dec})
8010:41	Low-pass filter frequency	Low-pass filter frequency **Unit**: Hz The following values can be set: 0 Hz = off 320 Hz 640 Hz	UINT16	RW	0x0140 (320_{dec})
8010:49	Halt ramp deceleration	Halt ramp deceleration **Unit**: 0.1 rad / s²	UINT32	RW	0x0000F570 (62832_{dec})
8010:50	Following error window	Following error monitor: Following error window **Unit**: the given value must be multiplied by the corresponding scaling factor. 0xFFFFFFFF (-1_{dec}) = following error monitor off Any other value = following error monitor on	UINT32	RW	0xFFFFFFFF (-1_{dec})
8010:51	Following error time out	Following error monitor: Timeout **Unit:** ms If the following error is larger than the following error window for a time that exceeds the timeout, this leads to an error reaction.	UINT16	RW	0x0000 (0_{dec})
8010:52	Fault reaction option code	Permitted values 0: Disable drive function, motor is free to rotate 1: Slow down on slow down ramp	UINT16	RW	0x0000 (0_{dec})
8010:54	Feature bits	The adjustable motor current values can be interpreted as peak values or rms values. The feature bit enables the conversion. Peak value → bit 0 = 0 RMS value → bit 0 = 1 normal output current → bit 1 = 0 increased output current → bit 1 = 1 From these, the following combinations can be set: 0_{dec} → normal output current interpreted as peak value 1_{dec} → normal output current interpreted as rms value 2_{dec} → increased output current interpreted as peak value 3_{dec} → increased output current interpreted as rms value	UINT32	RW	0x00000000 (0_{dec})
8010:57	Velocity feed forward gain	Velocity pre-control **Unit:** %	UINT8	RW	0x64 (100_{dec})
8010:65	Invert direction of rotation	Invert direction of rotation	BOOLEAN	RW	0x00 (0_{dec})
8010:66	Enable cogging torque compensation	Enable cogging torque compensation	BOOLEAN	RW	0x00 (0_{dec})

Index 8011 DRV Motor Settings

Index (hex)	Name	Meaning	Data type	Flags	Default
8011:0	DRV Motor Settings	Maximum subindex	UINT8	RO	0x2D (45_{dec})
8011:11*	Max current	Peak current **Unit**: mA The adjustable motor current values can be interpreted as peak values or rms values. The Feature bit (0x8010:54) enables the conversion. Peak value → bit 0 = 0 RMS value → bit 0 = 1 This value is affected by automatic scanning. (see Automatic scanning of the electronic identification plates)	UINT32	RW	0x00001770 (6000_{dec})
8011:12*	Rated current	Rated current **Unit**: mA The adjustable motor current values can be interpreted as peak values or rms values. The Feature bit (0x8010:54) enables the conversion. Peak value → bit 0 = 0 RMS value → bit 0 = 1 This value is affected by automatic scanning. (see Automatic scanning of the electronic identification plates).	UINT32	RW	0x000003E8 (1000_{dec})
8011:13*	Motor pole pairs	Number of pole pairs This value is affected by automatic scanning. (see Automatic scanning of the electronic identification plates).	UINT8	RW	0x03 (3_{dec})
8011:15*	Commutation offset	Commutation offset (between electrical zero position and mechanical single-turn zero position) **Unit**: ° This value is affected by automatic scanning. (see Automatic scanning of the electronic identification plates).	INT16	RW	0x0000 (0_{dec})
8011:16*	Torque constant	Torque constant **Unit**: mNm / A This value is affected by automatic scanning. (see Automatic scanning of the electronic identification plates	UINT32	RW	0x00000000 (0_{dec})
8011:18*	Rotor moment of inertia	Mass moment of inertia of the motor **Unit**: g cm^2 This value is affected by automatic scanning. (see Automatic scanning of the electronic identification plates).	UINT32	RW	0x00000000 (0_{dec})
8011:19*	Winding inductance	Inductance **Unit**: 0.1 mH This value is affected by automatic scanning. (see Automatic scanning of the electronic identification plates).	UINT16	RW	0x000E (14_{dec})
8011:1B*	Motor speed limitation	Velocity limitation **Unit**: rpm This value is affected by automatic scanning. (see Automatic scanning of the electronic identification plates)	UINT32	RW	0x00040000 (262144_{dec})

*) see object 0x9009 [▶ 57] "FB OCT Nameplate"

Index (hex)	Name	Meaning	Data type	Flags	Default
8011:29	I2T warn level	I2T model warning threshold **Unit**: %	UINT8	RW	0x50 (80_{dec})
8011:2A	I2T error level	I2T model error threshold **Unit**: %	UINT8	RW	0x69 (105_{dec})
8011:2B*	Motor Temperature warn level	Overtemperature warning threshold **Unit**: 0.1 °C This value is affected by automatic scanning. (see Automatic scanning of the electronic identification plates)	UINT16	RW	0x03E8 (1000_{dec})
8011:2C*	Motor Temperature error level	Overtemperature error threshold **Unit**: 0.1 °C This value is affected by automatic scanning. (see Automatic scanning of the electronic identification plates).	UINT16	RW	0x05DC (1500_{dec})
8011:2D*	Motor thermal time constant	Thermal time constant **Unit**: 0.1 s This value is affected by automatic scanning. (see Automatic scanning of the electronic identification plates).	UINT16	RW	0x0028 (40_{dec})

*) see object 0x9009 [▶ 57] "FB OCT Nameplate"

Index 8012 DRV brake settings

Index (hex)	Name	Meaning	Data type	Flags	Default
8012:0	DRV Brake Settings	Maximum subindex	UINT8	RO	0x14 (20_{dec})
8012:01	Enable manual override	Enable manual actuation of the motor holding brake via 0x8012:02	BOOLEAN	RW	0x00 (0_{dec})
8012:02	Manual brake state	• 0: Release Release the brake • 1: Apply Apply the brake	BOOLEAN	RW	0x00 (0_{dec})
8012:11*	Release delay	Time that the holding brake requires to open (release) after power was applied. This value is affected by automatic scanning. (see Automatic scanning of the electronic identification plates).	UINT16	RW	0x0000 (0_{dec})
8012:12*	Application delay	Time that the holding brake requires to close (hold) after the power was switched off **Unit**: ms This value is affected by automatic scanning. (see Automatic scanning of the electronic identification plates).	UINT16	RW	0x0000 (0_{dec})
8012:13	Emergency application timeout	Time that the amplifier waits until the speed has reached the standstill window after the stop request (set speed 0 after halt ramp or *Torque off*). The holding brake is triggered irrespective of the speed if the set waiting time is exceeded. **Unit**: ms • **Note:** In the case of rotary axes and the setting *Torque off :* for the error case, this parameter must be adjusted at least to the longest "coast-down" time of the axis. • In the case of suspended axes and the setting *Torque off :* for the error case, this parameter should be set to a very short time in order to prevent sagging of the axis/load.	UINT16	RW	0x0000 (0_{dec})
8012:14*	Brake moment of inertia	Mass moment of inertia of the brake **Unit**: g cm^2 This value is affected by automatic scanning. (see Automatic scanning of the electronic identification plates).	UINT16	RW	0x0000 (0_{dec})

*) see object Information / diagnostic data [▶ 57] "FB OCT Nameplate"

The following note relates to the DMC objects 0x6030, 0x7030, 0x8030 and 0x8031.

Data type INT64 for all positions in the travel distance control

The data type INT64 is used for all positions in the travel distance control.

- The single-turn position is located in the lower 32 bits.
- The multi-turn position is located in the upper 32 bits.

Index 8030 DMC settings

Index (hex)	Name	Meaning	Data type	Flags	Default
8030:0	DMC Settings	Maximum subindex	UINT8	RO	0x14 (20_{dec})
8030:07	Emergency deceleration	Deceleration for the emergency stop ramp. (In ms from rated motor speed to standstill) **Unit:** 1 ms	UINT16	RW	0x64 (100_{dec})
8030:08	Calibration position	If homing is successful, the "Actual position" is set to this value.	INT64	RW	0x0000000000000000 (0_{dec})
8030:09	Calibration velocity (towards plc cam)	Velocity on contact with the cam in 10000ths of the rated motor speed	INT16	RW	0x0064 (100_{dec})
8030:0A	Calibration velocity (off plc cam)	Velocity on separation from the cam in 10000ths of the rated motor speed	INT16	RW	0x000A (10_{dec})
8030:0E	Modulo factor	Feedback increments for one mechanical revolution	INT64	RW	0x0000000100000000 (4294967296_{dec})
8030:12	Block calibration torque limit	Torque limitation for approaching the end stop. In 1000ths of the rated motor current.	UINT16	RW	0x64 (100_{dec})
8030:13	Block calibration stop distance	After reaching the calibration position, the axis moves out of the end position by this distance.	INT64	RW	0x0000000100000000 (4294967296_{dec})
8030:14	Block calibration lag threshold	If this lag distance is exceeded, the axis is in the end position	INT64	RW	0x0000000100000000 (4294967296_{dec})
8030:15	Target position window	Target position window: The In-Target bit is set when the axis is within this window for at least the time set under 0x8030:16.	INT64	RW	0x16c16c1
8030:16	Target position monitor time	s. 0x8030:15 time in **Unit:** ms	UINT16	RW	0x0014 (20_{dec})
8030:17	Target position timeout	When the set value generator has reached its end position and the axis is not in the target window after this time has elapsed, the task is terminated and the in-target bit is not set.	UINT16	RW	0x1770 (6000_{dec})

Index 8031 DMC features

Index (hex)	Name	Meaning	Data type	Flags	Default
8031:0	DMC Features	Maximum subindex	UINT8	RO	0x1B (27_{dec})
8031:13	Invert calibration cam search direction	Invert travel direction to search for limit switch (Default: FALSE = search with positive direction of rotation)	BOOLEAN	RW	0x00 (0_{dec})
8031:14	Invert sync impulse search direction	Direction of rotation to leave the limit switch (Default: TRUE = leave in the negative direction of rotation)	BOOLEAN	RW	0x01 (1_{dec})
8031:19	Calibration cam source	Source for the reference switch 0: Input 1 1: Input 2	ENUM8	RW	0x00 (0_{dec})
8031:1A	Calibration cam active level	State of the reference switch in the actuated state 0: Hi 1: Low	ENUM8	RW	0x00 (0_{dec})
8031:B	Latch source	Source for the latch unit 0: Input 1 1: Input 2	ENUM8	RW	0x00 (0_{dec})

6.2.3 Configuration data (vendor-specific)

Index 801F DRV Vendor data

Index (hex)	Name	Meaning	Data type	Flags	Default
801F:0	DRV Vendor data	Maximum subindex	UINT8	RO	0x15 (21_{dec})
801F:11	Amplifier peak current	Peak current of the amplifier (peak value) **Unit**: mA	UINT32	RW	0x00001F40 (8000_{dec})
801F:12	Amplifier rated current	Rated current of the amplifier (peak value) **Unit**: mA	UINT32	RW	0x00000FA0 (4000_{dec})
801F:13	Amplifier thermal time constant	Thermal time constant of the amplifier **Unit**: 0.1 ms	UINT16	RW	0x0023 (35_{dec})
801F:14	Amplifier overcurrent threshold	Threshold value for short-circuit detection **Unit**: mA	UINT32	RW	0x00002EE0 (12000_{dec})
801F:15	Max rotary field frequency	Max. rotary field frequency– **Unit**: Hz	UINT16	RW	0x0257 (599_{dec})

6.2.4 Command object

Index FB00 command

Index (hex)	Name	Meaning			Data type	Flags	Default
FB00:0	Command	Max. Subindex			UINT8	RO	0x03 (3_{dec})
FB00:01	Request	0x1100	Get build number	Read out the build number	OCTET-STRING[2]	RW	{0}
		0x1101	Get build date	Read out the build date			
		0x1102	Get build time	Read out the build time			
FB00:02	Status	0	Finished, no error, no response	Command terminated without error and without response	UINT8	RO	0x00 (0_{dec})
		1	Finished, no error, response	Command terminated without error and with response			
		2	Finished, error, no response	Command terminated with error and without response			
		3	Finished, error, response	Command terminated with error and with response			
		255	Executing	Command is being executed			
FB00:03	Response	dependent on the request			OCTET-STRING[4]	RO	{0}

6.2.5 Input data

Index 6000 FB inputs

Index (hex)	Name	Meaning	Data type	Flags	Default
6000:0	FB Inputs	Maximum subindex	UINT8	RO	0x11 (17_{dec})
6000:0E	TxPDO State	TRUE: The position data are invalid FALSE: The position data are valid	BOOLEAN	RO	0x00 (0_{dec})
6000:0F	Input cycle counter	Incremented with each process data cycle, switches to 0 after reaching the maximum value of 3	BIT2	RO	0x00 (0_{dec})
6000:11	Position	Position	UINT32	RO	0x00000000 (0_{dec})

Index 6001 FB Touch probe inputs

Index (hex)	Name	Meaning	Data type	Flags	Default
6001:0	FB Touch probe inputs	Maximum subindex	UINT8	RO	0x14 (20_{dec})
6001:01	TP1 Enable	Touch probe 1 enabled	BOOLEAN	RO	0x00 (0_{dec})
6001:02	TP1 Pos value stored	Positive value of Touch probe 1 stored	BOOLEAN	RO	0x00 (0_{dec})
6001:03	TP1 Neg value stored	Negative value of Touch probe 1 stored	BOOLEAN	RO	0x00 (0_{dec})
6001:08	TP1 Input	Digital input Touch probe 1 The input must be addressed with a single conductor + 24 V signal	BOOLEAN	RO	0x00 (0_{dec})
6001:09	TP2 Enable	Touch probe 2 enabled	BOOLEAN	RO	0x00 (0_{dec})
6001:0A	TP2 Pos value stored	Positive value of Touch probe 2 stored	BOOLEAN	RO	0x00 (0_{dec})
6001:0B	TP2 neg value stored	Negative value of Touch probe 2 stored	BOOLEAN	RO	0x00 (0_{dec})
6001:10	TP2 Input	Digital input Touch probe 2 The input must be addressed with a single conductor + 24 V signal	BOOLEAN	RO	0x00 (0_{dec})
6001:11	TP1 Pos position	Positive value of Touch probe 1 **Unit**: the given value must be multiplied by the corresponding scaling factor	UINT32	RO	0x00000000 (0_{dec})
6001:12	TP1 Neg position	Negative value of Touch probe 1 **Unit**: the given value must be multiplied by the corresponding scaling factor	UINT32	RO	0x00000000 (0_{dec})
6001:13	TP2 Pos position	Positive value of Touch probe 2 **Unit**: the given value must be multiplied by the corresponding scaling factor	UINT32	RO	0x00000000 (0_{dec})
6001:14	TP2 Neg position	Negative value of Touch probe 2 **Unit**: the given value must be multiplied by the corresponding scaling factor	UINT32	RO	0x00000000 (0_{dec})

Index 6010 DRV Inputs

Index (hex)	Name	Meaning	Data type	Flags	Default
6010:0	DRV Inputs	Maximum subindex	UINT8	RO	0x13 (19_{dec})
6010:01	Statusword	Statusword Bit 0: Ready to switch on Bit 1: Switched on Bit 2: Operation enabled Bit 3: Fault Bit 4: reserved Bit 5: Quick stop (inverse) Bit 6: Switch on disabled Bit 7: Warning Bit 8 + 9: reserved Bit 10: TxPDOToggle (selection/deselection via 0x8010:01) Bit 11: Internal limit active Bit 12: Drive follows the command value Bit 13: Following error or input cycle counter; configurable via Index 0x8010:02 [▶ 43] Bit 14-15: reserved	UINT16	RO	0x0000 (0_{dec})
6010:03	Modes of operation display	Modes of operation display. Permitted values: 9: **C**yclic **s**ynchronous **v**elocity mode (CSV) 10: **C**yclic **s**ynchronous **t**orque mode (CST) 11: **C**yclic **s**ynchronous **t**orque mode with **c**ommutation **a**ngle (CSTCA)	UINT8	RO	0x00 (0_{dec})
6010:06	Following error actual value	Following error **Unit**: the given value must be multiplied by the corresponding scaling factor	INT32	RO	0x00000000 (0_{dec})
6010:07	Velocity actual value	Display of the current velocity value **Unit:** see Index 0x9010:14 [▶ 58]	INT32	RO	0x00000000 (0_{dec})
6010:08	Torque actual value	Display of current torque value The value is specified in 1000th of the *rated current* (0x8011:12 [▶ 45]) • Equation for index 0x8010:54 [▶ 43] = 0 : M = ((actual torque value / 1000) x (rated current / √2)) x torque constant (0x8011:16 [▶ 45]) • Equation for index 0x8010:54 [▶ 43] = 1 : M = ((actual torque value / 1000) x rated current)) x torque constant (0x8011:16 [▶ 45])	INT16	RO	0x0000 (0_{dec})
6010:12	Info data 1	Synchronous information (selection via subindex 0x8010:39 [▶ 43])	UINT16	RO	0x0000 (0_{dec})
6010:13	Info data 2	Synchronous information (selection via subindex 0x8010:3A [▶ 43])	UINT16	RO	0x0000 (0_{dec})

The following note relates to the DMC objects 0x6030, 0x7030, 0x8030 and 0x8031.

Data type INT64 for all positions in the travel distance control

The data type INT64 is used for all positions in the travel distance control.

- The single-turn position is located in the lower 32 bits.
- The multi-turn position is located in the upper 32 bits.

Index 6030 DMC inputs

Index (hex)	Name	Meaning	Data type	Flags	Default
6030:0	DMC Inputs	Maximum subindex	UINT8	RO	0x3C (60_{dec})
6030:02	DMC_FeedbackStatus__Latch extern valid	An edge was detected on the external input and latched	BOOLEAN	RO	0x00 (0_{dec})
6030:03	DMC_FeedbackStatus__Set counter done	The setting of the feedback position was successful. This bit remains present until "Set counter" is released again	BOOLEAN	RO	0x00 (0_{dec})
6030:0D	DMC_FeedbackStatus__Status of extern Latch	Status of the external latch input	BOOLEAN	RO	0x00 (0_{dec})
6030:11	DMC_DriveStatus__Ready to enable	The drive hardware is ready for activation.	BOOLEAN	RO	0x00 (0_{dec})
6030:12	DMC_DriveStatus__Ready	The drive hardware is activated.	BOOLEAN	RO	0x00 (0_{dec})
6030:13	DMC_DriveStatus__Warning	A warning is pending in the drive.	BOOLEAN	RO	0x00 (0_{dec})
6030:14	DMC_DriveStatus__Error	An error is pending in the drive. The "Ready to enable" bit and the "Ready" bit are set to FALSE.	BOOLEAN	RO	0x00 (0_{dec})
6030:15	DMC_DriveStatus__Moving positive	The axis moves in positive direction.	BOOLEAN	RO	0x00 (0_{dec})
6030:16	DMC_DriveStatus__Moving negative	The axis moves in negative direction	BOOLEAN	RO	0x00 (0_{dec})
6030:1C	DMC_DriveStatus__Digital Input 1	Status of the first digital input	BOOLEAN	RO	0x00 (0_{dec})
6030:1D	DMC_DriveStatus__Digital Input 2	Status of the second digital input	BOOLEAN	RO	0x00 (0_{dec})
6030:21	DMC_PositioningStatus__Busy	The positioning task is running.	BOOLEAN	RO	0x00 (0_{dec})
6030:22	DMC_PositioningStatus__In-Target	The axis is at the target position.	BOOLEAN	RO	0x00 (0_{dec})
6030:23	DMC_PositoningStatus__Warning	Warning	BOOLEAN	RO	0x00 (0_{dec})
6030:24	DMC_PositoningStatus__Error	error	BOOLEAN	RO	0x00 (0_{dec})
6030:25	DMC_PositoningStatus__Calibrated	The axis is calibrated.	BOOLEAN	RO	0x00 (0_{dec})
6030:26	DMC_PositioningStatus__Accelerate	The axis accelerates.	BOOLEAN	RO	0x00 (0_{dec})
6030:27	DMC_PositioningStatus__Decelerate	The axis is decelerating.	BOOLEAN	RO	0x00 (0_{dec})
6030:28	DMC_PositoningStatus__Ready to execute	The path control is ready to accept a command. This bit is FALSE if: • The drive has a fault • The drive is not activated • As long as "PositioningControl__Execute" is pending.	BOOLEAN	RO	0x00 (0_{dec})
6030:31	DMC__Set position	Current target position specified by the ramp generator in feedback increments	INT64	RO	0x0000000000000000 (0_{dec})
6030:32	DMC__Set velocity	Current velocity specified by the ramp generator in 10000ths of the rated motor speed	INT16	RO	0x0000 (0_{dec})

Index (hex)	Name	Meaning	Data type	Flags	Default
6030:33	DMC__Actual drive time	Time since the start of the motion command in ms. Stops when the target position is reached	UINT32	RO	0x00000000 (0_{dec})
6030:34	DMC__Actual position lag	Following error	INT64	RO	0x0000000000000000 (0_{dec})
6030:35	DMC__Actual velocity	Current velocity in 10000ths of the rated motor speed	INT16	RO	0x0000 (0_{dec})
6030:36	DMC__Actual position	Current position from the feedback (incl. possible offsets due to homing, ...)	INT64	RO	0x0000000000000000 (0_{dec})
6030:37	DMC__Error id	Error Id (identical to Diag History)	UINT32	RO	0x00000000 (0_{dec})
6030:38	DMC__Input cycle counter	Incremented with each process data cycle	UINT8	RO	0x00 (0_{dec})
6030:3A	DMC__Latch value	Feedback position at latch time	INT64	RO	0x0000000000000000 (0_{dec})
6030:3B	DMC__Cyclic info data 1	Synchronous info data	INT16	RO	0x0000 (0_{dec})
6030:3C	DMC__ Cyclic info data 2	Synchronous info data	INT16	RO	0x0000 (0_{dec})

6.2.6 Output data

Index 7001 FB Touch probe outputs

Index (hex)	Name	Meaning	Data type	Flags	Default
7001:0	FB Touch probe outputs	Maximum subindex	UINT8	RO	0x0E (14_{dec})
7001:01	TP1 Enable	Enable Touch probe 1	BOOLEAN	RO	0x00 (0_{dec})
7001:02	TP1 Continous	0: triggered only on the first event 1. Triggered on every event	BOOLEAN	RO	0x00 (0_{dec})
7001:03	TP1 Trigger mode	Input 1 is triggered (not changeable)	BIT2	RO	0x00 (0_{dec})
7001:05	TP1 Enable pos edge	Trigger on positive edge	BOOLEAN	RO	0x00 (0_{dec})
7001:06	TP1 Enable neg edge	Trigger on negative edge	BOOLEAN	RO	0x00 (0_{dec})
7001:09	TP2 Enable	Enable Touch probe 2	BOOLEAN	RO	0x00 (0_{dec})
7001:0A	TP2 Continous	0: triggered only on the first event 1. Triggered on every event	BOOLEAN	RO	0x00 (0_{dec})
7001:0B	TP2 Trigger mode	Input 2 is triggered (not changeable)	BIT2	RO	0x00 (0_{dec})
7001:0D	TP2 Enable pos edge	Trigger on positive edge	BOOLEAN	RO	0x00 (0_{dec})
7001:0E	TP2 Enable neg edge	Trigger on negative edge	BOOLEAN	RO	0x00 (0_{dec})

Index 7010 DRV Outputs

Index (hex)	Name	Meaning	Data type	Flags	Default
7010:0	DRV Outputs	Maximum subindex	UINT8	RO	0x0E (14_{dec})
7010:01	Controlword	Controlword Bit 0: Switch on Bit 1: Enable voltage Bit 2: Quick stop (inverse) Bit 3: Enable operation Bit 4 - 6: reserved Bit 7: Fault reset Bit 8 - 15: reserved	UINT16	RO	0x0000 (0_{dec})
7010:03	Modes of operation	Permitted values: 0x08: **C**yclic **s**ynchronous **p**osition mode (CSP) 0x09: **C**yclic **s**ynchronous **v**elocity mode (CSV) 0x0A: **C**yclic **s**ynchronous **t**orque mode (CST) 0x0B: **C**yclic **s**ynchronous **t**orque mode with **c**ommutation **a**ngle (CSTCA)	UINT8	RW	0x09 (0_{dec})
7010:05	Target position	Configured target position **Unit**: the value must be multiplied by the corresponding scaling factor	UINT32	RW	0x00000000 (0_{dec})
7010:06	Target velocity	Configured target velocity The velocity scaling can be found in object 0x9010:14 [▶ 58] (Velocity encoder resolution)	INT32	RO	0x00000000 (0_{dec})
7010:09	Target torque	Configured input value for torque monitoring The value is specified in 1000th of the *rated current* (0x8011:12 [▶ 45]) • Equation for index 0x8010:54 [▶ 43] = 0 : M = ((actual torque value / 1000) x (rated current / √2)) x torque constant (0x8011:16 [▶ 45]) • Equation for index 0x8010:54 [▶ 43] = 1 : M = ((actual torque value / 1000) x rated current)) x torque constant (0x8011:16 [▶ 45])	INT16	RO	0x0000 (0_{dec})
7010:0A	Torque offset	Torque value offset The value is specified in 1000th of the *rated current* (0x8011:12 [▶ 45]) Equation for index 0x8010:54 [▶ 43] = 0 : M = ((actual torque value / 1000) x (rated current / √2)) x torque constant (0x8011:16 [▶ 45]) Equation for index 0x8010:54 [▶ 43] = 1 : M = ((actual torque value / 1000) x rated current)) x torque constant (0x8011:16 [▶ 45])	INT16	RO	0x0000 (0_{dec})
7010:0B	Torque limitation	Torque threshold value for torque monitoring (bipolar limit) The value is specified in 1000th of the *rated current* (0x8011:12 [▶ 45]) • Equation for index 0x8010:54 [▶ 43] = 0 : M = ((actual torque value / 1000) x (rated current / √2)) x torque constant (0x8011:16 [▶ 45]) • Equation for index 0x8010:54 [▶ 43] = 1 : M = ((actual torque value / 1000) x rated current)) x torque constant (0x8011:16 [▶ 45])	UINT16	RW	0x7FFF (32767_{dec})
7010:0E	Commutation angle	Commutation angle (for CSTCA mode) **Unit:** 360° / 2^{16}	UINT16	RO	0x0000 (0_{dec})

The following note relates to the DMC objects 0x6030, 0x7030, 0x8030 and 0x8031.

Data type INT64 for all positions in the travel distance control

The data type INT64 is used for all positions in the travel distance control.

- The single-turn position is located in the lower 32 bits.
- The multi-turn position is located in the upper 32 bits.

Index 7030 DMC outputs

Index (hex)	Name	Meaning	Data type	Flags	Default
7030:0	DMC Outputs	Maximum subindex	UINT8	RO	0x36 (54_{dec})
7030:02	DMC_FeedbackControl__Enable latch extern on positive edge	Latches to the positive edge of the external input	BOOLEAN	RO	0x00 (0_{dec})
7030:03	DMC_FeedbackControl__Set counter	With a rising edge, "Actual position" is set to the value of "Set counter value".	BOOLEAN	RO	0x00 (0_{dec})
7030:04	DMC_FeedbackControl__Enable latch extern on negative edge	Latches to the negative edge of the external input	BOOLEAN	RO	0x00 (0_{dec})
7030:11	DMC_DriveControl__Enable	Activate drive	BOOLEAN	RO	0x00 (0_{dec})
7030:12	DMC_DriveControl__Reset	Perform a reset of the drive hardware	BOOLEAN	RO	0x00 (0_{dec})
7030:21	DMC_PositionControl__Execute	Start motion command with rising edge The task runs as long as this bit is set or until the command is completed. If the level drops during travel, the axis is brought to a standstill with the deceleration specified for the task.	BOOLEAN	RO	0x00 (0_{dec})
7030:22	DMC_PositionControl__Emergency stop	In the event of a rising edge, decelerate to a standstill with the emergency stop ramp	BOOLEAN	RO	0x00 (0_{dec})
7030:31	DMC__Set counter value	s. 0x7030:03	INT64	RO	0x0000000000000000 (0_{dec})
7030:32	DMC__Target position	Position specification in feedback increments	INT64	RO	0x0000000000000000 (0_{dec})
7030:33	DMC__Target velocity	Maximum velocity during the motion command in 10000ths of the rated motor speed	INT16	RO	0x0000 (0_{dec})
7030:34	DMC__Start type	Type of positioning task: 0x0001: Absolute 0x0002: Relative 0x0003: Endless + 0x0004: Endless - 0x0105: Modulo short 0x0205: Modulo + 0x0305: Modulo - 0x6000: Cali PLC cam 0x6200: Cali Block 0x6E00: Cali set 0x6F00: Cali clear	UINT16	RO	0x0000 (0_{dec})
7030:35	DMC__Target acceleration	Acceleration: Time in ms from standstill to reaching the rated motor speed	UINT16	RO	0x0000 (0_{dec})
7030:36	DMC__Target deceleration	Delay: Time in ms for deceleration from rated motor speed to standstill	UINT16	RO	0x0000 (0_{dec})

6.2.7 Information / diagnostic data

Index 10F3 Diagnosis History

Index (hex)	Name	Meaning	Data type	Flags	Default
10F3:0	Diagnosis History	Maximum subindex	UINT8	RO	0x37 (55_{dec})
10F3:01	Maximum Messages	Maximum number of stored messages. A maximum of 50 messages can be stored	UINT8	RO	0x00 (0_{dec})
10F3:02	Newest Message	Subindex of the latest message	UINT8	RO	0x00 (0_{dec})
10F3:03	Newest Acknowledged Message	Subindex of the last confirmed message	UINT8	RW	0x00 (0_{dec})
10F3:04	New Messages Available	Indicates that a new message is available	BOOLEAN	RO	0x00 (0_{dec})
10F3:05	Flags	not used	UINT16	RW	0x0000 (0_{dec})
10F3:06	Diagnosis Message 001	Message 1	OCTET-STRING[28]	RO	{0}
...	...	...	...	...	...
10F3:37	Diagnosis Message 050	Message 50	OCTET-STRING[28]	RO	{0}

Index 10F8 Actual Time Stamp

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

Index 9008 FB OCT Info data

(these data are always read in automatically from the electronic identification plate of the motor and serve purely informative purposes)

Index (hex)	Name	Meaning	Data type	Flags	Default
9008:0	FB OCT Info data	Maximum subindex	UINT8	RO	0x20 (32_{dec})
9008:11	Encoder type	Feedback type 2: rotary encoder, unipolar counting	UINT16	RO	0x0000 (0_{dec})
9008:12	Resolution	Resolution of the feedback **Unit**: Steps per revolution	UINT32	RO	0x00000000 (0_{dec})
9008:13	Range	Working area of the feedback. On leaving this range there is an overflow of the position. **Unit**: Revolutions	UINT32	RO	0x00000000 (0_{dec})
9008:14	Type Code Name	Name of the feedback	STRING	RO	
9008:15	Serial No	Serial number of the feedback	STRING	RO	
9008:16	Firmware Revision No	Revision of the firmware	STRING	RO	
9008:17	Firmware Date	Date of the firmware	STRING	RO	
9008:18	EEPROM Size	EEPROM size	UINT16	RO	0x0000 (0_{dec})
9008:19	Temperature	Temperature **Unit**: 0.1°C	INT16	RO	0x0000 (0_{dec})
9008:1A	LED Current	Current of the feedback LED **Unit**: 0.1 mA	UINT16	RO	0x0000 (0_{dec})
9008:1B	Supply voltage	Supply voltage of the feedback **Unit**: mV	UINT32	RO	0x00000000 (0_{dec})
9008:1C	Life- time	Operating hour counter **Unit**: Minutes	UINT32	RO	0x00000000 (0_{dec})
9008:1D	Received Signal Strength Indicator	Received signal strength at the terminal **Unit**: %	UINT16	RO	0x0000 (0_{dec})
9008:1E	Slave Received Signal Strength Indicator	Received signal strength at the encoder **Unit**: %	UINT16	RO	0x0000 (0_{dec})
9008:1F	Line delay	Running time of the signal in the cable **Unit**: ns	UINT16	RO	0x0000 (0_{dec})
9008:20	Encoder position offset	Position offset stored in the motor feedback	UINT32	RO	0x00000000 (0_{dec})

Index 9009 FB OCT Nameplate

The parameters described in this index are always read from the electronic identification plate of the connected motor. These parameters automatically lead to the parameters marked with an asterisk (*) in this chapter, if automatic scanning of the electronic type plate is switched on (index 0x8008 [▶ 42]).

Index (hex)	Name	Meaning	Data type	Flags	Default
9009:0	FB OCT Nameplate	Maximum subindex	UINT8	RO	0x24 (36_{dec})
9009:01	Motor vendor	Motor vendor	STRING	RO	
9009:02	Electric motor type	Motor type	STRING	RO	
9009:03	Serial No	Serial number	STRING	RO	
9009:04	Order code	Order number (In case of Autoconfig a check is made on the basis of this index as to whether the motor is identical to the predecessor)	STRING	RO	
9009:05	Motor construction	Type of motor	STRING	RO	
9009:06	Pole pairs	Number of pole pairs	UINT32	RO	0x00000000 (0_{dec})
9009:07	Standstill current (rms)	Effective holding current **Unit**: mA	UINT32	RO	0x00000000 (0_{dec})
9009:08	Rated current (rms)	Effective rated current **Unit**: mA	UINT32	RO	0x00000000 (0_{dec})
9009:09	Peak current (rms)	Effective peak current **Unit**: mA	UINT32	RO	0x00000000 (0_{dec})
9009:0A	Nominal voltage (rms)	Effective nominal voltage **Unit**: mV	UINT32	RO	0x00000000 (0_{dec})
9009:0B	Max voltage (rms)	Maximum voltage **Unit**: mV	UINT32	RO	0x00000000 (0_{dec})
9009:0C	Max winding du/dt	Maximum permissible voltage rise on the winding **Unit**: kV/s	UINT32	RO	0x00000000 (0_{dec})
9009:0D	Max torque	Maximum torque **Unit**: mNm	UINT16	RO	0x0000 (0_{dec})
9009:0E	Torque constant	Torque constant **Unit**: mNm / A	UINT16	RO	0x0000 (0_{dec})
9009:0F	EMF (rms)	Countervoltage **Unit**: mV / (rpm)	UINT32	RO	0x00000000 (0_{dec})
9009:10	Winding resistance Ph-Ph 20 °C	Coil resistance **Unit**: mOhm	UINT16	RO	0x0000 (0_{dec})
9009:11	Ld Ph-Ph	Inductance in the direction of flow **Unit**: 0.1 mH	UINT16	RO	0x0000 (0_{dec})
9009:12	Lq Ph-Ph	Inductance in the torque-forming direction **Unit**: 0.1 mH	UINT16	RO	0x0000 (0_{dec})
9009:13	Max speed	Maximum velocity **Unit**: rpm	UINT32	RO	0x00000000 (0_{dec})
9009:14	Moment of inertia	Mass moment of inertia **Unit**: g cm^2	UINT16	RO	0x0000 (0_{dec})
9009:15	T motor warn limit	Motor temperature warning threshold **Unit**: 0.1 °C	UINT16	RO	0x0000 (0_{dec})
9009:16	T motor shut down	Motor temperature error threshold **Unit**: 0.1 °C	UINT16	RO	0x0000 (0_{dec})
9009:17	Time constant i2t	Time constant I2T model **Unit**: 0.1 s	UINT16	RO	0x0000 (0_{dec})
9009:18	Motor thermal constant	Thermal time constant of the motor **Unit**: 0.1 s	UINT16	RO	0x0000 (0_{dec})
9009:1B	Brake type	Brake type • no brake • holding brake	STRING	RO	
9009:1C	Min brake voltage	Minimum brake voltage **Unit**: mV	UINT32	RO	0x00000000 (0_{dec})
9009:1D	Max brake voltage	Maximum brake voltage **Unit**: mV	UINT32	RO	0x00000000 (0_{dec})
9009:1E	Min brake monitor current	Minimum current for the monitoring of the brake **Unit**: mA	UINT32	RO	0x00000000 (0_{dec})

Index (hex)	Name	Meaning	Data type	Flags	Default
9009:1F	Brake holding torque	Brake holding torque **Unit**: mNm	UINT32	RO	0x00000000 (0_{dec})
9009:20	Brake T on	Time until the brake is applied **Unit**: ms	UINT16	RO	0x0000 (0_{dec})
9009:21	Brake T off	Time until the brake is released **Unit**: ms	UINT16	RO	0x0000 (0_{dec})
9009:22	Brake reduced holding voltage	Reduced brake voltage **Unit**: mV	UINT32	RO	0x00000000 (0_{dec})
9009:23	Brake time to red. holding volt.	Time from which the brake holds with reduced voltage **Unit**: ms	UINT16	RO	0x0000 (0_{dec})
9009:24	Motor temp sensor connection	Temperature sensor connection Feedback port (not changeable)	STRING	RO	

Index 9010 DRV Info data

Index (hex)	Name	Meaning	Data type	Flags	Default
9010:0	DRV Info data	Maximum subindex	UINT8	RO	0x16 (22_{dec})
9010:11	Amplifier temperature	Internal terminal temperature **Unit**: 0.1 °C	UINT16	RO	0x0000 (0_{dec})
9010:12	DC link voltage	DC link voltage **Unit**: mV	UINT32	RO	0x00000000 (0_{dec})
9010:13	Supported drive modes	Information about supported drive modes. (DS402: Object 0x6502) Only modes *CSV*, *CST*, *CSTCA and CSP* are supported Bit 0: PP Bit 1: VL Bit 2: PV Bit 3: TQ Bit 4: R Bit 5: HM Bit 6: IP Bit 7: CSP Bit 8: CSV Bit 9: CST Bit 10: CSTCA Bit 11 - 15: reserved Bit 16-31: Manufacturer-specific	UINT32	RO	0x00000000 (0_{dec})
9010:14	Velocity encoder resolution	Display of the configured encoder increments/s and motor revolutions/s. The "Velocity Encoder Resolution" is calculated according to the following equation: Velocity Encoder Resolution = (encoder_increments / s) / (motor_revolutions / s)	UINT32	RO	0x00041893 (268435_{dec})
9010:15	Position encoder resolution increments	Feedback increments per motor revolution	UINT32	RO	0x00000000 (0_{dec})
9010:16	Position encoder resolution revolutions	Motor revolutions Position encoder resolution = encoder increments (Index 9010:15) / motor revolutions (Index 9010:16)	UINT32	RO	0x00000000 (0_{dec})
9010:17	Cogging compensation supported	The cogging compensation data are available in the motor's electronic identification plate.	BOOLEAN	RO	0x00 (0_{dec})

Index 9018 DRV Info data

Index (hex)	Name	Meaning	Data type	Flags	Default
9018:0	DRV Info data	Maximum subindex	UINT8	RO	0x11 (17_{dec})
9018:11	Auxiliary voltage (10 V)	Auxiliary voltage **Unit**: mV	UINT32	RO	0x00000000 (0_{dec})

Index A010 DRV Amplifier Diag data

Index (hex)	Name	Meaning	Data type	Flags	Default
A010:0	DRV Amplifier Diag data	Maximum subindex	UINT8	RO	0x11 (17_{dec})
A010:11	Amplifier I2T temperature	I2T model load **Unit**: %	UINT8	RO	0x00 (0_{dec})

Index A011 DRV Motor Diag data

Index (hex)	Name	Meaning	Data type	Flags	Default
A011:0	DRV Motor Diag data	Maximum subindex	UINT8	RO	0x13 (19_{dec})
A011:11	Motor I2T temperature	I2T model load **Unit**: %	UINT8	RO	0x00 (0_{dec})
A011:13	Motor temperature	Temperature utilization ratio **Unit**: 0.1°	INT16	RO	0x0000 (0_{dec})

Index B001 FB OCT Memory interface

Index (hex)	Name	Meaning	Data type	Flags	Default
B001:0	FB OCT Memory interface	Maximum subindex	UINT8	RO	0x06 (6_{dec})
B001:01	cmd	3_{dec}: Enc Write 6_{dec}: Enc Read Direct 7_{dec}: Enc Read Indirect (Default) 9_{dec}: Enc Reset 10_{dec}: IP Write 15_{dec}: IP Read 16_{dec}: Write encoder position offset	INT16	RW	0x0007 (7_{dec})
B001:02	Len		INT16	RW	0x0000 (0_{dec})
B001:03	Adr		UINT32	RW	0x00000000 (0_{dec})
B001:04	Offset		UINT32	RW	0x00000000 (0_{dec})
B001:05	Ctrl/Status	0_{dec}: Init (Default) 1_{dec}: Execute 2_{dec}: Busy 3_{dec}: Done 4_{dec}: Error	INT16	RW	0x0000 (0_{dec})
B001:06	Data		OCTET-STRING[32]	RW	0x00000000 (0_{dec})

6.2.8 Standard objects

Index 1000 Device type

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

Index 1008 Device name

Index (hex)	Name	Meaning	Data type	Flags	Default
1008:0	Device name	Device name of the EtherCAT slave	STRING	RO	EJ7211-0010

Index 1009 Hardware version

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

Index 100A Software version

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

Index 1018 Identity

Index (hex)	Name	Meaning	Data type	Flags	Default
1018:0	Identity	Information for identifying the slave	UINT8	RO	0x04 (4_{dec})
1018:01	Vendor ID	Vendor ID of the EtherCAT slave	UINT32	RO	0x00000002 (2_{dec})
1018:02	Product code	Product code of the EtherCAT slave	UINT32	RO	0x1C2B2852 (472590418_{dec})
1018:03	Revision	Revision number of the EtherCAT slave; the Low Word (bit 0-15) indicates the special device number, the High Word (bit 16-31) refers to the device description	UINT32	RO	0x00000000 (0_{dec})
1018:04	Serial number	Serial number of the EtherCAT slave; the Low Byte (bit 0-7) of the Low Word contains the year of production, the High Byte (bit 8-15) of the Low Word contains the week of production, the High Word (bit 16-31) is 0	UINT32	RO	0x00000000 (0_{dec})

Index 10E2 Manufacturer-specific Identification Code

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

Index 10F0 Backup parameter handling

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

Index 1430 DMC RxPDO-Par Outputs

Index (hex)	Name	Meaning	Data type	Flags	Default
1430:0	DMC RxPDO-Par Outputs	PDO Parameter RxPDO 10	UINT8	RO	0x06 (6_{dec})
1430:06	Exclude RxPDOs	Specifies the RxPDOs (index of RxPDO mapping objects) that must not be transferred together with RxPDO 10	OCTET-STRING[6]	RO	00 16 01 16 02 16 03 16 04 16 05 16 06 16 07 16 08 16 31 16

Index 1431 DMC RxPDO-Par Outputs 32-bit

Index (hex)	Name	Meaning	Data type	Flags	Default
1431:0	DMC RxPDO-Par Outputs 32 Bit	PDO Parameter RxPDO 11	UINT8	RO	0x06 (6_{dec})
1431:06	Exclude RxPDOs	Specifies the RxPDOs (index of RxPDO mapping objects) that must not be transferred together with RxPDO 11	OCTET-STRING[6]	RO	00 16 01 16 02 16 03 16 04 16 05 16 06 16 07 16 08 16 30 16

Index 1600 DRV RxPDO-map control word

Index (hex)	Name	Meaning	Data type	Flags	Default
1600:0	DRV RxPDO-Map Controlword	PDO Mapping RxPDO 1	UINT8	RO	0x01 (1_{dec})
1600:01	SubIndex 001	1. PDO Mapping entry (object 0x7010 (DRV Outputs), entry 0x01 (Controlword))	UINT32	RO	0x7010:01, 16

Index 1601 DRV RxPDO-map target velocity

Index (hex)	Name	Meaning	Data type	Flags	Default
1601:0	DRV RxPDO-Map Target velocity	PDO Mapping RxPDO 2	UINT8	RO	0x01 (1_{dec})
1601:01	SubIndex 001	1. PDO Mapping entry (object 0x7010 (DRV Outputs), entry 0x06 (Target velocity))	UINT32	RO	0x7010:06, 32

Index 1602 DRV RxPDO-Map Target torque

Index (hex)	Name	Meaning	Data type	Flags	Default
1602:0	DRV RxPDO-Map Target torque	PDO Mapping RxPDO 3	UINT8	RO	0x01 (1_{dec})
1602:01	SubIndex 001	1. PDO Mapping entry (object 0x7010 (DRV Outputs), entry 0x09 (Target torque))	UINT32	RO	0x7010:09, 16

Index 1603 DRV RxPDO-map commutation angle

Index (hex)	Name	Meaning	Data type	Flags	Default
1603:0	DRV RxPDO-Map Commutation angle	PDO Mapping RxPDO 4	UINT8	RO	0x01 (1_{dec})
1603:01	SubIndex 001	1. PDO Mapping entry (object 0x7010 (DRV Outputs), entry 0x0E (Commutation angle))	UINT32	RO	0x7010:0E, 16

Index 1604 DRV RxPDO-map torque limitation

Index (hex)	Name	Meaning	Data type	Flags	Default
1604:0	DRV RxPDO-Map Torque limitation	PDO Mapping RxPDO 5	UINT8	RO	0x01 (1_{dec})
1604:01	SubIndex 001	1. PDO Mapping entry (object 0x7010 (DRV Outputs), entry 0x0B (Torque limitation))	UINT32	RO	0x7010:0B, 16

Index 1605 DRV RxPDO-map torque offset

Index (hex)	Name	Meaning	Data type	Flags	Default
1605:0	DRV RxPDO-Map Torque offset	PDO Mapping RxPDO 6	UINT8	RO	0x01 (1_{dec})
1605:01	SubIndex 001	1. PDO Mapping entry (object 0x7010 (DRV Outputs), entry 0x0A (Torque offset))	UINT32	RO	0x7010:0A, 16

Index 1606 DRV RxPDO-Map Target position

Index (hex)	Name	Meaning	Data type	Flags	Default
1606:0	DRV RxPDO-Map Target position	PDO Mapping RxPDO 7	UINT8	RO	0x01 (1_{dec})
1606:01	SubIndex 001	1. PDO Mapping entry (object 0x7010 (DRV Outputs), entry 0x05 (Target position))	UINT32	RO	0x7010:05, 32

Index 1607 FB RxPDO-Map Touch probe control

Index (hex)	Name	Meaning	Data type	Flags	Default
1607:0	FB RxPDO-Map Touch probe control	PDO Mapping RxPDO 8	UINT8	RO	0x0C (12_{dec})
1607:01	SubIndex 001	1. PDO Mapping entry (object 0x7001 (FB Touch probe outputs), entry 0x01 (TP1 Enable))	UINT32	RO	0x7001:01, 1
1607:02	SubIndex 002	2. PDO Mapping entry (object 0x7001 (FB Touch probe outputs), entry 0x02 (TP1 Continous))	UINT32	RO	0x7001:02, 1
1607:03	SubIndex 003	3. PDO Mapping entry (object 0x7001 (FB Touch probe outputs), entry 0x03 (TP1 Trigger mode))	UINT32	RO	0x7001:03, 2
1607:04	SubIndex 004	4. PDO Mapping entry (object 0x7001 (FB Touch probe outputs), entry 0x05 (TP1 Enable pos edge))	UINT32	RO	0x7001:05, 1
1607:05	SubIndex 005	5. PDO Mapping entry (object 0x7001 (FB Touch probe outputs), entry 0x06 (TP1 Enable neg edge))	UINT32	RO	0x7001:06, 1
1607:06	SubIndex 006	6. PDO Mapping entry (2 bits align)	UINT32	RO	0x0000:00, 2
1607:07	SubIndex 007	7. PDO Mapping entry (object 0x7001 (FB Touch probe outputs), entry 0x09 (TP2 Enable))	UINT32	RO	0x7001:09, 1
1607:08	SubIndex 008	8. PDO Mapping entry (object 0x7001 (FB Touch probe outputs), entry 0x0A (TP2 Continous))	UINT32	RO	0x7001:0A, 1
1607:09	SubIndex 009	9. PDO Mapping entry (object 0x7001 (FB Touch probe outputs), entry 0x0B (TP2 Trigger mode))	UINT32	RO	0x7001:0B, 2
1607:0A	SubIndex 010	10. PDO Mapping entry (object 0x7001 (FB Touch probe outputs), entry 0x0D (TP2 Enable pos edge))	UINT32	RO	0x7001:0D, 1
1607:0B	SubIndex 011	11. PDO Mapping entry (object 0x7001 (FB Touch probe outputs), entry 0x0E (TP2 Enable neg edge))	UINT32	RO	0x7001:0E, 1
1607:0C	SubIndex 012	12. PDO Mapping entry (2 bits align)	UINT32	RO	0x0000:00, 2

Index 1608 DRV RxPDO-Map Modes of operation

Index (hex)	Name	Meaning	Data type	Flags	Default
1608:0	DRV RxPDO-Map Modes of operation	PDO Mapping RxPDO 9	UINT8	RO	0x01 (1_{dec})
1608:01	SubIndex 001	1. PDO Mapping entry (object 0x7010 (DRV Outputs), entry 0x03 (Modes of operation))	UINT32	RO	0x7010:03, 8

Index 1630 DMC RxPDO-Map Outputs

Index (hex)	Name	Meaning	Data type	Flags	Default
1630:0	DMC RxPDO-Map Outputs	PDO Mapping RxPDO 10	UINT8	RO	0x12 (18_{dec})
1630:01	SubIndex 001	1. PDO Mapping entry (1 bit align)	UINT32	RO	0x0000:00, 1
1630:02	SubIndex 002	2. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x02 (DMC_FeedbackControl __Enable latch extern on positive edge))	UINT32	RO	0x7030:02, 1
1630:03	SubIndex 003	3. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x03 (DMC_FeedbackControl __Set counter))	UINT32	RO	0x7030:03, 1
1630:04	SubIndex 004	4. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x04 (DMC_FeedbackControl __Enable latch extern on negative edge))	UINT32	RO	0x7030:04, 1
1630:05	SubIndex 005	5. PDO Mapping entry (12 bits align)	UINT32	RO	0x0000:00, 12
1630:06	SubIndex 006	6. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x11 (DMC_DriveControl __Enable))	UINT32	RO	0x7030:11, 1
1630:07	SubIndex 007	7. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x12 (DMC_DriveControl __Reset))	UINT32	RO	0x7030:12, 1
1630:08	SubIndex 008	8. PDO Mapping entry (14 bits align)	UINT32	RO	0x0000:00, 14
1630:09	SubIndex 009	9. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x21 (DMC_PositionControl __Execute))	UINT32	RO	0x7030:21, 1
1630:0A	SubIndex 010	10. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x22 (DMC_PositionControl __Emergency stop))	UINT32	RO	0x7030:22, 1
1630:0B	SubIndex 011	11. PDO Mapping entry (14 bits align)	UINT32	RO	0x0000:00, 14
1630:0C	SubIndex 012	12. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x31 (DMC__Set counter value))	UINT32	RO	0x7030:31, 64
1630:0D	SubIndex 013	13. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x32 (DMC__Target position))	UINT32	RO	0x7030:32, 64
1630:0E	SubIndex 014	14. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x33 (DMC__Target velocity))	UINT32	RO	0x7030:33, 16
1630:0F	SubIndex 015	15. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x34 (DMC__Start types))	UINT32	RO	0x7030:34, 16
1630:10	SubIndex 016	16. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x35 (DMC__Target acceleration))	UINT32	RO	0x7030:35, 16
1630:11	SubIndex 017	17. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x36 (DMC__Target deceleration))	UINT32	RO	0x7030:36, 16
1630:12	SubIndex 018	18. PDO Mapping entry (80 bits align)	UINT32	RO	0x0000:00, 80

Index 1631 DMC RxPDO-Map Outputs 32-bit

Index (hex)	Name	Meaning	Data type	Flags	Default
1631:0	DMC RxPDO-Map Outputs 32	PDO Mapping RxPDO 11	UINT8	RO	0x14 (20_{dec})
1631:01	SubIndex 001	1. PDO Mapping entry (1 bit align)	UINT32	RO	0x0000:00, 1
1631:02	SubIndex 002	2. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x02 (DMC_FeedbackControl __Enable latch extern on positive edge))	UINT32	RO	0x7030:02, 1
1631:03	SubIndex 003	3. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x03 (DMC_FeedbackControl __Set counter))	UINT32	RO	0x7030:03, 1
1631:04	SubIndex 004	4. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x04 (DMC_FeedbackControl __Enable latch extern on negative edge))	UINT32	RO	0x7030:04, 1
1631:05	SubIndex 005	5. PDO Mapping entry (12 bits align)	UINT32	RO	0x0000:00, 12
1631:06	SubIndex 006	6. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x11 (DMC_DriveControl __Enable))	UINT32	RO	0x7030:11, 1
1631:07	SubIndex 007	7. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x12 (DMC_DriveControl __Reset))	UINT32	RO	0x7030:12, 1
1631:08	SubIndex 008	8. PDO Mapping entry (14 bits align)	UINT32	RO	0x0000:00, 14
1631:09	SubIndex 009	9. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x21 (DMC_PositionControl __Execute))	UINT32	RO	0x7030:21, 1
1631:0A	SubIndex 010	10. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x22 (DMC_PositionControl __Emergency stop))	UINT32	RO	0x7030:22, 1
1631:0B	SubIndex 011	11. PDO Mapping entry (14 bits align)	UINT32	RO	0x0000:00, 14
1631:0C	SubIndex 012	12. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x31 (DMC__Set counter value))	UINT32	RO	0x7030:31, 32
1631:0D	SubIndex 013	13. PDO Mapping entry (32 bits align)	UINT32	RO	0x0000:00, 32
1631:0E	SubIndex 014	14. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x32 (DMC__Target position))	UINT32	RO	0x7030:32, 16
1631:0F	SubIndex 015	15. PDO Mapping entry (32 bits align)	UINT32	RO	0x0000:00, 32
1631:10	SubIndex 016	16. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x33 (DMC__Target velocity))	UINT32	RO	0x7030:33, 16
1631:11	SubIndex 017	17. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x34 (DMC__Start types))	UINT32	RO	0x7030:34, 16
1631:12	SubIndex 018	18. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x35 (DMC__Target acceleration))	UINT32	RO	0x7030:35, 16
1631:13	SubIndex 019	19. PDO Mapping entry (object 0x7030 (DMC outputs), entry 0x36 (DMC__Target deceleration))	UINT32	RO	0x7030:36, 16
1631:14	SubIndex 020	20. PDO Mapping entry (80 bits align)	UINT32	RO	0x0000:00, 80

Index 1830 DMC TxPDO-Par Inputs

Index (hex)	Name	Meaning	Data type	Flags	Default
1830:0	DMC TxPDO-Par Inputs	PDO Parameter TxPDO 15	UINT8	RO	0x06 (6_{dec})
1830:06	Exclude TxPDOs	Specifies the TxPDOs (index of TxPDO mapping objects) that must not be transferred together with TxPDO 15	OCTET-STRING[32]	RO	00 1A 01 1A 02 1A 03 1A 04 1A 05 1A 06 1A 07 1A 08 1A 09 1A 0A 1A 0B 1A 0C 1A 0E 1A 31 1A

Index 1831 DMC TxPDO-Par Inputs 32-bit

Index (hex)	Name	Meaning	Data type	Flags	Default
1831:0	DMC TxPDO-Par Inputs 32 Bit	PDO Parameter TxPDO 16	UINT8	RO	0x06 (6_{dec})
1831:06	Exclude TxPDOs	Specifies the TxPDOs (index of TxPDO mapping objects) that must not be transferred together with TxPDO 16	OCTET-STRING[32]	RO	00 1A 01 1A 02 1A 03 1A 04 1A 05 1A 06 1A 07 1A 08 1A 09 1A 0A 1A 0B 1A 0C 1A 0E 1A 30 1A

Index 1A00 FB TxPDO-Map Position

Index (hex)	Name	Meaning	Data type	Flags	Default
1A00:0	FB TxPDO-Map Position	PDO Mapping TxPDO 1	UINT8	RO	0x01 (1_{dec})
1A00:01	SubIndex 001	1. PDO Mapping entry (object 0x6000 (FB Inputs), entry 0x11 (Position))	UINT32	RO	0x6000:11, 32

Index 1A01 DRV TxPDO-Map Statusword

Index (hex)	Name	Meaning	Data type	Flags	Default
1A01:0	DRV TxPDO-Map Statusword	PDO Mapping TxPDO 2	UINT8	RO	0x01 (1_{dec})
1A01:01	SubIndex 001	1. PDO Mapping entry (object 0x6010 (DRV Inputs), entry 0x01 (Statusword))	UINT32	RO	0x6010:01, 16

Index 1A02 DRV TxPDO-Map Velocity actual value

Index (hex)	Name	Meaning	Data type	Flags	Default
1A02:0	DRV TxPDO-Map Velocity actual value	PDO Mapping TxPDO 3	UINT8	RO	0x01 (1_{dec})
1A02:01	SubIndex 001	1. PDO Mapping entry (object 0x6010 (DRV Inputs), entry 0x07 (Velocity actual value))	UINT32	RO	0x6010:07, 32

Index 1A03 DRV TxPDO-Map Torque actual value

Index (hex)	Name	Meaning	Data type	Flags	Default
1A03:0	DRV TxPDO-Map Torque actual value	PDO Mapping TxPDO 4	UINT8	RO	0x01 (1_{dec})
1A03:01	SubIndex 001	1. PDO Mapping entry (object 0x6010 (DRV Inputs), entry 0x08 (Torque actual value))	UINT32	RO	0x6010:08, 16

Index 1A04 DRV TxPDO-Map Info data 1

Index (hex)	Name	Meaning	Data type	Flags	Default
1A04:0	DRV TxPDO-Map Info data 1	PDO Mapping TxPDO 5	UINT8	RO	0x01 (1_{dec})
1A04:01	SubIndex 001	1. PDO Mapping entry (object 0x6010 (DRV Inputs), entry 0x12 (Info data 1))	UINT32	RO	0x6010:12, 16

Index 1A05 DRV TxPDO-Map Info data 2

Index (hex)	Name	Meaning	Data type	Flags	Default
1A05:0	DRV TxPDO-Map Info data 2	PDO Mapping TxPDO 6	UINT8	RO	0x01 (1_{dec})
1A05:01	SubIndex 001	1. PDO Mapping entry (object 0x6010 (DRV Inputs), entry 0x13 (Info data 2))	UINT32	RO	0x6010:13, 16

Index 1A06 DRV TxPDO-Map Following error actual value

Index (hex)	Name	Meaning	Data type	Flags	Default
1A06:0	DRV TxPDO-Map Following error actual value	PDO Mapping TxPDO 7	UINT8	RO	0x01 (1_{dec})
1A06:01	SubIndex 001	1. PDO Mapping entry (object 0x6010 (DRV Inputs), entry 0x06 (Following error actual value))	UINT32	RO	0x6010:06, 32

Index 1A07 FB TxPDO-Map Touch probe status

Index (hex)	Name	Meaning	Data type	Flags	Default
1A07:0	FB TxPDO-Map Touch probe status	PDO Mapping TxPDO 8	UINT8	RO	0x0A (10_{dec})
1A07:01	SubIndex 001	1. PDO Mapping entry (object 0x6001 (FB Touch probe inputs), entry 0x01 (TP1 Enable))	UINT32	RO	0x6001:01, 1
1A07:02	SubIndex 002	2. PDO Mapping entry (object 0x6001 (FB Touch probe inputs), entry 0x02 (TP1 pos. value stored))	UINT32	RO	0x6001:02, 1
1A07:03	SubIndex 003	3. PDO Mapping entry (object 0x6001 (FB Touch probe inputs), entry 0x03 (TP1 Neg. value stored))	UINT32	RO	0x6001:03, 1
1A07:04	SubIndex 004	4. PDO Mapping entry (4 bits align)	UINT32	RO	0x0000:00, 4
1A07:05	SubIndex 005	5. PDO Mapping entry (object 0x6001 (FB Touch probe inputs), entry 0x08 (TP1 Input))	UINT32	RO	0x6001:08, 1
1A07:06	SubIndex 006	6. PDO Mapping entry (object 0x6001 (FB Touch probe inputs), entry 0x09 (TP2 Enable))	UINT32	RO	0x6001:09, 1
1A07:07	SubIndex 007	7. PDO Mapping entry (object 0x6001 (FB Touch probe inputs), entry 0x0A (TP2 pos value stored))	UINT32	RO	0x6001:0A, 1
1A07:08	SubIndex 008	8. PDO Mapping entry (object 0x6001 (FB Touch probe inputs), entry 0x0B (TP2 neg value stored))	UINT32	RO	0x6001:0B, 1
1A07:09	SubIndex 009	9. PDO Mapping entry (4 bits align)	UINT32	RO	0x0000:00, 4
1A07:0A	SubIndex 009	8. PDO Mapping entry (object 0x6001 (FB Touch probe inputs), entry 0x10 (TP2 Input))	UINT32	RO	0x6001:10, 1

Index 1A08 FB TxPDO-Map Touch probe 1 pos position

Index (hex)	Name	Meaning	Data type	Flags	Default
1A08:0	FB TxPDO-Map Touch probe 1 pos position	PDO Mapping TxPDO 9	UINT8	RO	0x01 (1_{dec})
1A08:01	SubIndex 001	1. PDO Mapping entry (object 0x6001 (FP Touch probe inputs), entry 0x11 (TP1 Pos position))	UINT32	RO	0x6001:11, 32

Index 1A09 FB TxPDO-Map Touch probe 1 neg position

Index (hex)	Name	Meaning	Data type	Flags	Default
1A09:0	FB TxPDO-Map Touch probe 1 neg position	PDO Mapping TxPDO 10	UINT8	RO	0x01 (1_{dec})
1A09:01	SubIndex 001	1. PDO Mapping entry (object 0x6001 (FB Touch probe inputs), entry 0x12 (TP1 Neg position))	UINT32	RO	0x6001:12, 32

Index 1A0A FB TxPDO-Map Touch probe 2 pos position

Index (hex)	Name	Meaning	Data type	Flags	Default
1A0A:0	FB TxPDO-Map Touch probe 2 pos position	PDO Mapping TxPDO 11	UINT8	RO	0x01 (1_{dec})
1A0A:01	SubIndex 001	1. PDO Mapping entry (object 0x6001 (FB Touch probe inputs), entry 0x13 (TP2 Pos position))	UINT32	RO	0x6001:13, 32

Index 1A0B FB TxPDO-Map Touch probe 2 neg position

Index (hex)	Name	Meaning	Data type	Flags	Default
1A0B:0	FB TxPDO-Map Touch probe 2 neg position	PDO Mapping TxPDO 12	UINT8	RO	0x01 (1_{dec})
1A0B:01	SubIndex 001	1. PDO Mapping entry (object 0x6001 (FB Touch probe inputs), entry 0x14 (TP2 neg position))	UINT32	RO	0x6001:14, 32

Index 1A0C FB TxPDO-Map Status

Index (hex)	Name	Meaning	Data type	Flags	Default
1A0C:0	FB TxPDO-Map Touch probe 2 neg position	PDO Mapping TxPDO 13	UINT8	RO	0x03 (3_{dec})
1A0C:01	SubIndex 001	1. PDO Mapping entry (13 bits align)	UINT32	RO	0x0000:00, 13
1A0C:02	SubIndex 002	2. PDO Mapping entry (object 0x6000 (FB inputs), entry 0x0E (TxPDO State))	UINT32	RO	0x6000:0E, 1
1A0C:03	SubIndex 003	3. PDO Mapping entry (object 0x6000 (FB inputs), entry 0x0F (Input Cycle Counter))	UINT32	RO	0x6000:0F, 2

Index 1A0E DRV TxPDO-Map Modes of operation display

Index (hex)	Name	Meaning	Data type	Flags	Default
1A0E:0	DRV TxPDO-Map Modes of operation display	PDO Mapping TxPDO 14	UINT8	RO	0x01 (1_{dec})
1A0E:01	SubIndex 001	1. PDO Mapping entry (object 0x6010 (DRV inputs), entry 0x03 (Modes of operation display))	UINT32	RO	0x6010:03, 8

Index 1A30 DMC TxPDO-Map Inputs

Index (hex)	Name	Meaning	Data type	Flags	Default
1A30:0	DMC RxPDO-Map Inputs	PDO Mapping TxPDO 15	UINT8	RO	0x38 (26_{dec})
1A30:01	SubIndex 001	1. PDO Mapping entry (1 bit align)	UINT32	RO	0x0000:00, 1
1A30:02	SubIndex 002	2. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x02 (DMC_FeedbackStatus __Latch extern valid))	UINT32	RO	0x6030:02, 1
1A30:03	SubIndex 003	3. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x03 (DMC_FeedbackStatus __Set counter done))	UINT32	RO	0x6030:03, 1
1A30:04	SubIndex 004	4. PDO Mapping entry (9 bits align)	UINT32	RO	0x0000:00, 9
1A30:05	SubIndex 005	5. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x0D (DMC_FeedbackStatus __Status of extern latch))	UINT32	RO	0x6030:0D, 1
1A30:06	SubIndex 006	6. PDO Mapping entry (3 bits align)	UINT32	RO	0x0000:00, 3
1A30:07	SubIndex 007	7. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x11 (DMC_DriveStatus __Ready to enable))	UINT32	RO	0x6030:11, 1
1A30:08	SubIndex 008	8. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x12 (DMC_DriveStatus __Ready))	UINT32	RO	0x6030:12, 1
1A30:09	SubIndex 009	9. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x13 (DMC_DriveStatus __Warning))	UINT32	RO	0x6030:13, 1
1A30:0A	SubIndex 010	10. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x14 (DMC_DriveStatus __Error))	UINT32	RO	0x6030:14, 1
1A30:0B	SubIndex 011	11. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x15 (DMC_DriveStatus __Moving positive))	UINT32	RO	0x6030:15, 1
1A30:0C	SubIndex 012	12. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x16 (DMC_DriveStatus __Moving negative))	UINT32	RO	0x6030:16, 1
1A30:0D	SubIndex 013	13. PDO Mapping entry (5 bits align)	UINT32	RO	0x0000:00, 5
1A30:0E	SubIndex 014	14. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x1C (DMC_DriveStatus __Digital input 1))	UINT32	RO	0x6030:1C, 1
1A30:0F	SubIndex 015	15. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x1D (DMC_DriveStatus __Digital input 2))	UINT32	RO	0x6030:1D, 1
1A30:10	SubIndex 016	16. PDO Mapping entry (3 bits align)	UINT32	RO	0x0000:00, 3
1A30:11	SubIndex 017	17. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x21 (DMC_PositioningStatus __Busy))	UINT32	RO	0x6030:21, 1
1A30:12	SubIndex 018	18. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x22 (DMC_PositioningStatus __In-Target))	UINT32	RO	0x6030:22, 1
1A30:13	SubIndex 019	19. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x23 (DMC_PositioningStatus __Warning))	UINT32	RO	0x6030:23, 1
1A30:14	SubIndex 020	20. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x24 (DMC_PositioningStatus __Error))	UINT32	RO	0x6030:24, 1
1A30:15	SubIndex 021	21. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x25 (DMC_PositioningStatus __Calibrated))	UINT32	RO	0x6030:25, 1
1A30:16	SubIndex 022	22. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x26 (DMC_PositioningStatus __Accelerate))	UINT32	RO	0x6030:26, 1
1A30:17	SubIndex 023	23. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x27 (DMC_PositioningStatus __Decelerate))	UINT32	RO	0x6030:27, 1
1A30:18	SubIndex 024	24. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x28 (DMC_PositioningStatus __Ready to execute))	UINT32	RO	0x6030:28, 1
1A30:19	SubIndex 025	25. PDO Mapping entry (8 bits align)	UINT32	RO	0x0000:00, 8
1A30:1A	SubIndex 026	26. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x31 (DMC_Set position))	UINT32	RO	0x6030:31, 64
1A30:1B	SubIndex 027	27. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x32 (DMC_Set velocity))	UINT32	RO	0x6030:32, 16
1A30:1C	SubIndex 028	28. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x33 (DMC_Actual dirve time))	UINT32	RO	0x6030:33, 32
1A30:1D	SubIndex 029	29. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x34 (DMC_Actual position lag))	UINT32	RO	0x6030:34, 64
1A30:1E	SubIndex 030	30. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x35 (DMC_Actual velocity))	UINT32	RO	0x6030:35, 16
1A30:1F	SubIndex 031	31. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x36 (DMC_Actual position))	UINT32	RO	0x6030:36, 64

Index (hex)	Name	Meaning	Data type	Flags	Default
1A30:20	SubIndex 032	32. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x37 (DMC_Error id))	UINT32	RO	0x6030:37, 32
1A30:21	SubIndex 033	33. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x38 (DMC_Input cycle counter))	UINT32	RO	0x6030:38, 8
1A30:22	SubIndex 034	34. PDO Mapping entry (8 bits align)	UINT32	RO	0x0000:00, 8
1A30:23	SubIndex 035	35. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x3A (DMC_Latch value))	UINT32	RO	0x6030:3A, 64
1A30:24	SubIndex 036	36. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x3B (DMC_Cyclic info data 1))	UINT32	RO	0x6030:3B, 16
1A30:25	SubIndex 037	37. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x3C (DMC_Cyclic info data 2))	UINT32	RO	0x6030:3C, 16
1A30:26	SubIndex 038	38. PDO Mapping entry (64 bits align)	UINT32	RO	0x0000:00, 64

Index 1A31 DMC TxPDO-Map Inputs 32-bit

Index (hex)	Name	Meaning	Data type	Flags	Default
1A31:0	DMC TxPDO-Map Inputs 32 Bit	PDO Mapping TxPDO 16	UINT8	RO	0x42 ($2A_{dec}$)
1A31:01	SubIndex 001	1. PDO Mapping entry (1 bit align)	UINT32	RO	0x0000:00, 1
1A31:02	SubIndex 002	2. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x02 (DMC_FeedbackStatus __Latch extern valid))	UINT32	RO	0x6030:02, 1
1A31:03	SubIndex 003	3. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x03 (DMC_FeedbackStatus __Set counter done))	UINT32	RO	0x6030:03, 1
1A31:04	SubIndex 004	4. PDO Mapping entry (9 bits align)	UINT32	RO	0x0000:00, 9
1A31:05	SubIndex 005	5. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x0D (DMC_FeedbackStatus __Status of extern latch))	UINT32	RO	0x6030:0D, 1
1A31:06	SubIndex 006	6. PDO Mapping entry (3 bits align)	UINT32	RO	0x0000:00, 3
1A31:07	SubIndex 007	7. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x11 (DMC_DriveStatus __Ready to enable))	UINT32	RO	0x6030:11, 1
1A31:08	SubIndex 008	8. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x12 (DMC_DriveStatus __Ready))	UINT32	RO	0x6030:12, 1
1A31:09	SubIndex 009	9. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x13 (DMC_DriveStatus __Warning))	UINT32	RO	0x6030:13, 1
1A31:0A	SubIndex 010	10. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x14 (DMC_DriveStatus __Error))	UINT32	RO	0x6030:14, 1
1A31:0B	SubIndex 011	11. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x15 (DMC_DriveStatus __Moving positive))	UINT32	RO	0x6030:15, 1
1A31:0C	SubIndex 012	12. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x16 (DMC_DriveStatus __Moving negative))	UINT32	RO	0x6030:16, 1
1A31:0D	SubIndex 013	13. PDO Mapping entry (5 bits align)	UINT32	RO	0x0000:00, 5
1A31:0E	SubIndex 014	14. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x1C (DMC_DriveStatus __Digital input 1))	UINT32	RO	0x6030:1C, 1
1A31:0F	SubIndex 015	15. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x1D (DMC_DriveStatus __Digital input 2))	UINT32	RO	0x6030:1D, 1
1A31:10	SubIndex 016	16. PDO Mapping entry (3 bits align)	UINT32	RO	0x0000:00, 3
1A31:11	SubIndex 017	17. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x21 (DMC_PositioningStatus __Busy))	UINT32	RO	0x6030:21, 1
1A31:12	SubIndex 018	18. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x22 (DMC_PositioningStatus __In-Target))	UINT32	RO	0x6030:22, 1
1A31:13	SubIndex 019	19. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x23 (DMC_PositioningStatus __Warning))	UINT32	RO	0x6030:23, 1
1A31:14	SubIndex 020	20. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x24 (DMC_PositioningStatus __Error))	UINT32	RO	0x6030:24, 1
1A31:15	SubIndex 021	21. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x25 (DMC_PositioningStatus __Calibrated))	UINT32	RO	0x6030:25, 1
1A31:16	SubIndex 022	22. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x26 (DMC_PositioningStatus __Accelerate))	UINT32	RO	0x6030:26, 1
1A31:17	SubIndex 023	23. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x27 (DMC_PositioningStatus __Decelerate))	UINT32	RO	0x6030:27, 1
1A31:18	SubIndex 024	24. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x28 (DMC_PositioningStatus __Ready to execute))	UINT32	RO	0x6030:28, 1
1A31:19	SubIndex 025	25. PDO Mapping entry (8 bits align)	UINT32	RO	0x0000:00, 8
1A31:1A	SubIndex 026	26. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x31 (DMC_Set position))	UINT32	RO	0x6030:31, 32
1A31:1B	SubIndex 027	27. PDO Mapping entry (32 bits align)	UINT32	RO	0x0000:00, 32
1A31:1C	SubIndex 028	28. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x32 (DMC_Set velocity))	UINT32	RO	0x6030:32, 16
1A31:1D	SubIndex 029	29. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x33 (DMC_Actual dirve time))	UINT32	RO	0x6030:33, 32
1A31:1E	SubIndex 030	30. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x34 (DMC_Actual position lag))	UINT32	RO	0x6030:34, 32
1A31:1F	SubIndex 031	31. PDO Mapping entry (32 bits align)	UINT32	RO	0x0000:00, 32
1A31:20	SubIndex 032	32. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x35 (DMC_Actual velocity))	UINT32	RO	0x6030:35, 16

Index (hex)	Name	Meaning	Data type	Flags	Default
1A31:21	SubIndex 033	33. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x36 (DMC_Actual position))	UINT32	RO	0x6030:36, 32
1A31:22	SubIndex 034	34. PDO Mapping entry (32 bits align)	UINT32	RO	0x0000:00, 32
1A31:23	SubIndex 035	35. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x37 (DMC_Error id))	UINT32	RO	0x6030:37, 32
1A31:24	SubIndex 036	36. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x38 (DMC_Input cycle counter))	UINT32	RO	0x6030:38, 8
1A31:25	SubIndex 037	37. PDO Mapping entry (8 bits align)	UINT32	RO	0x0000:00, 8
1A31:26	SubIndex 038	38. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x3A (DMC_Latch value))	UINT32	RO	0x6030:3A, 32
1A31:27	SubIndex 039	39. PDO Mapping entry (32 bits align)	UINT32	RO	0x0000:00, 32
1A31:28	SubIndex 040	40. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x3B (DMC_Cyclic info data 1))	UINT32	RO	0x6030:3B, 16
1A31:29	SubIndex 041	41. PDO Mapping entry (object 0x6030 (DMC inputs), entry 0x3C (DMC_Cyclic info data 2))	UINT32	RO	0x6030:3C, 16
1A31:2A	SubIndex 042	42. PDO Mapping entry (64 bits align)	UINT32	RO	0x0000:00, 64

Index 1C00 Sync manager type

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

Index 1C12 RxPDO assign

Index (hex)	Name	Meaning	Data type	Flags	Default
1C12:0	RxPDO assign	PDO Assign Outputs	UINT8	RW	0x02 (2_{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})

Index 1C13 TxPDO assign

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

Index 1C32 SM output parameter

Index (hex)	Name	Meaning	Data type	Flags	Default
1C32:0	SM output parameter	Synchronization parameters for the outputs	UINT8	RO	0x20 (32_{dec})
1C32:01	Sync mode	Current synchronization mode: • 0: Free Run • 1: Synchron with SM 2 Event • 2: DC-Mode - Synchron with SYNC0 Event • 3: DC-Mode - Synchron with SYNC1 Event	UINT16	RW	0x0002 (2_{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	0x0003D090 (250000_{dec})
1C32:03	Shift time	Time between SYNC0 event and output of the outputs (in ns, DC mode only)	UINT32	RO	0x00000000 (0_{dec})
1C32:04	Sync modes supported	Supported synchronization modes: • Bit 0 = 1: free run is supported • Bit 1 = 1: Synchron with SM 2 Event is supported • Bit 2-3 = 01: DC mode is supported • Bit 4-5 = 10: Output Shift with SYNC1 event (only DC mode) • Bit 14 = 1: dynamic times (measurement through writing of Standard objects [▶ 72])	UINT16	RO	0x4806 (18438_{dec})
1C32:05	Minimum cycle time	Minimum cycle time (in ns)	UINT32	RO	0x0001E848 (125000_{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	Minimum time between SYNC1 event and output of the outputs (in ns)	UINT32	RO	0x00000000 (0_{dec})
1C32:08	Command	• 0: Measurement of the local cycle time is stopped • 1: Measurement of the local cycle time is started The entries 0x1C32:03, 0x1C32:05, 0x1C32:06, 0x1C32:09, Standard objects [▶ 73], Standard objects [▶ 72], Standard objects [▶ 73] are updated with the maximum measured values. For a subsequent measurement the measured values are reset	UINT16	RW	0x0000 (0_{dec})
1C32:09	Maximum delay time	Time between SYNC1 event and output of the outputs (in ns, DC mode only)	UINT32	RO	0x00000000 (0_{dec})
1C32:0B	SM event missed counter	Number of missed SM events in OPERATIONAL (DC mode only)	UINT16	RO	0x0000 (0_{dec})
1C32:0C	Cycle exceeded counter	Number of occasions the cycle time was exceeded in OPERATIONAL (cycle was not completed in time or the next cycle began too early)	UINT16	RO	0x0000 (0_{dec})
1C32:0D	Shift too short counter	Number of occasions that the interval between SYNC0 and SYNC1 event was too short (DC mode only)	UINT16	RO	0x0000 (0_{dec})
1C32:20	Sync error	The synchronization was not correct in the last cycle (outputs were output too late; DC mode only)	BOOLEAN	RO	0x00 (0_{dec})

Index 1C33 SM input parameter

Index (hex)	Name	Meaning	Data type	Flags	Default
1C33:0	SM input parameter	Synchronization parameters for the inputs	UINT8	RO	0x20 (32_{dec})
1C33:01	Sync mode	Current synchronization mode: • 0: Free Run • 1: 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	UINT16	RW	0x0002 (2_{dec})
1C33:02	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	0x0003D090 (250000_{dec})
1C33:03	Shift time	Time between SYNC0 event and reading of the inputs (in ns, only DC mode)	UINT32	RO	0x00000000 (0_{dec})
1C33:04	Sync modes supported	Supported synchronization modes: • Bit 0: free run is supported • Bit 1: Synchron with SM 2 Event is supported (outputs available) • Bit 1: Synchron with SM 3 Event is supported (no outputs available) • Bit 2-3 = 01: DC mode is supported • Bit 4-5 = 01: Input Shift through local event (outputs available) • Bit 4-5 = 10: Input Shift with SYNC1 event (no outputs available) • Bit 14 = 1: dynamic times (measurement through writing of Standard objects [▶ 72] or Standard objects [▶ 73])	UINT16	RO	0x4806 (18483_{dec})
1C33:05	Minimum cycle time	Minimum cycle time (in ns)	UINT32	RO	0x0001E848 (125000_{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	0x0001E848 (125000_{dec})
1C33:07	Minimum delay time	Min. time between SYNC1 event and the reading of the inputs (in ns, DC mode only)	UINT32	RO	0x00000000 (0_{dec})
1C33:08	Command	• 0: Measurement of the local cycle time is stopped • 1: Measurement of the local cycle time is started The entries Standard objects [▶ 72], Standard objects [▶ 72], Standard objects [▶ 72], Standard objects [▶ 72], 0x1C33:03, 0x1C33:06, 0x1C33:09 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	0x00000000 (0_{dec})
1C33:0B	SM event missed counter	Number of missed SM events in OPERATIONAL (DC mode only)	UINT16	RO	0x0000 (0_{dec})
1C33:0C	Cycle exceeded counter	Number of occasions the cycle time was exceeded in OPERATIONAL (cycle was not completed in time or the next cycle began too early)	UINT16	RO	0x0000 (0_{dec})
1C33:0D	Shift too short counter	Number of occasions that the interval between SYNC0 and SYNC1 event was too short (DC mode only)	UINT16	RO	0x0000 (0_{dec})
1C33:20	Sync error	The synchronization was not correct in the last cycle (outputs were output too late; DC mode only)	BOOLEAN	RO	0x00 (0_{dec})

Index F000 Modular device profile

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

Index F008 Code word

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

Index F010 Module list

Index (hex)	Name	Meaning	Data type	Flags	Default
F010:0	Module list	Maximum subindex	UINT8	RW	0x04 (4_{dec})
F010:01	SubIndex 001	Encoder profile number	UINT32	RW	0x00000201 (513_{dec})
F010:02	SubIndex 002	Servo drive profile number	UINT32	RW	0x000002E6 (742_{dec})
F010:03	SubIndex 003		UINT32	RW	0x00000000 (0_{dec})
F010:04	SubIndex 004	Profile number travel distance control	UINT32	RW	0x000002EE (750_{dec})

Index F081 Download revision

Index (hex)	Name	Meaning	Data type	Flags	Default
F081:0	Download revision	Max. Subindex	UINT8	RO	0x01 (1_{dec})
F081:01	Revision number	The subindex 0xF081:01 (Download revision) describes the revision level of the module.	UINT32	RW	0x00000000 (0_{dec})

Index FB13 DRV Key Code

Index (hex)	Name	Meaning	Data type	Flags	Default
FB13:0	DRV Key code		UINT8	RO	0x01 (1_{dec})
FB13:01	Code	Release code for an output frequency >599 Hz (dual use) The release code is available on request.	OCTET-STRING[32]	RW	0x0000000 (0_{dec})

Index FB40 Memory interface

Index (hex)	Name	Meaning	Data type	Flags	Default
FB40:0	Memory interface	Maximum subindex	UINT8	RO	0x03 (3_{dec})
FB40:01	Address	reserved	UINT32	RW	0x00000000 (0_{dec})
FB40:02	Length	reserved	UINT16	RW	0x0000 (0_{dec})
FB40:03	Data	reserved	OCTET-STRING[8]	RW	{0}

7 Diagnostics - basic principles of diag messages

DiagMessages designates a system for the transmission of messages from the EtherCAT Slave to the EtherCAT Master/TwinCAT. The messages are stored by the device in its own CoE under 0x10F3 and can be read by the application or the System Manager. An error message referenced via a code is output for each event stored in the device (warning, error, status change).

Definition

The *DiagMessages* system is defined in the ETG (EtherCAT Technology Group) in the guideline ETG.1020, chapter 13 “Diagnosis handling”. It is used so that pre-defined or flexible diagnostic messages can be conveyed from the EtherCAT Slave to the Master. In accordance with the ETG, the process can therefore be implemented supplier-independently. Support is optional. The firmware can store up to 250 DiagMessages in its own CoE.

Each DiagMessage consists of

- Diag Code (4-byte)
- Flags (2-byte; info, warning or error)
- Text ID (2-byte; reference to explanatory text from the ESI/XML)
- Timestamp (8-byte, local slave time or 64-bit Distributed Clock time, if available)
- Dynamic parameters added by the firmware

The DiagMessages are explained in text form in the ESI/XML file belonging to the EtherCAT device: on the basis of the Text ID contained in the DiagMessage, the corresponding plain text message can be found in the languages contained in the ESI/XML. In the case of Beckhoff products these are usually German and English.

Via the entry *NewMessagesAvailable* the user receives information that new messages are available.

DiagMessages can be confirmed in the device: the last/latest unconfirmed message can be confirmed by the user.

In the CoE both the control entries and the history itself can be found in the CoE object 0x10F3:

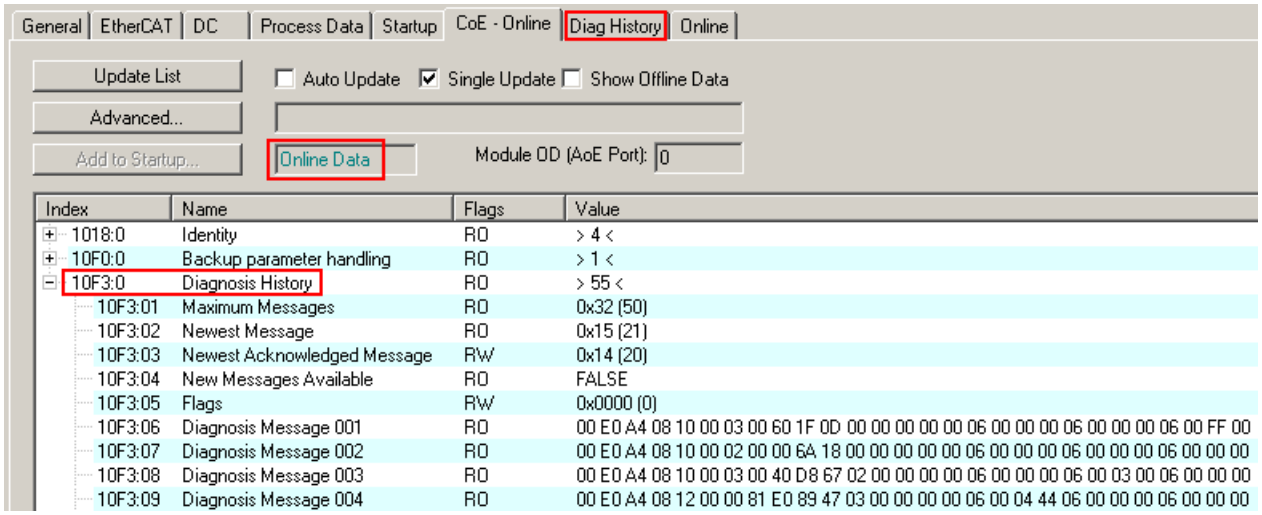


Fig. 28: DiagMessages in the CoE

The subindex of the latest *DiagMessage* can be read under 0x10F3:02.

Support for commissioning

The DiagMessages system is to be used above all during the commissioning of the plant. The diagnostic values e.g. in the StatusWord of the device (if available) are helpful for online diagnosis during the subsequent continuous operation.

TwinCAT System Manager implementation

From TwinCAT 2.11 DiagMessages, if available, are displayed in the device's own interface. Operation (collection, confirmation) also takes place via this interface.

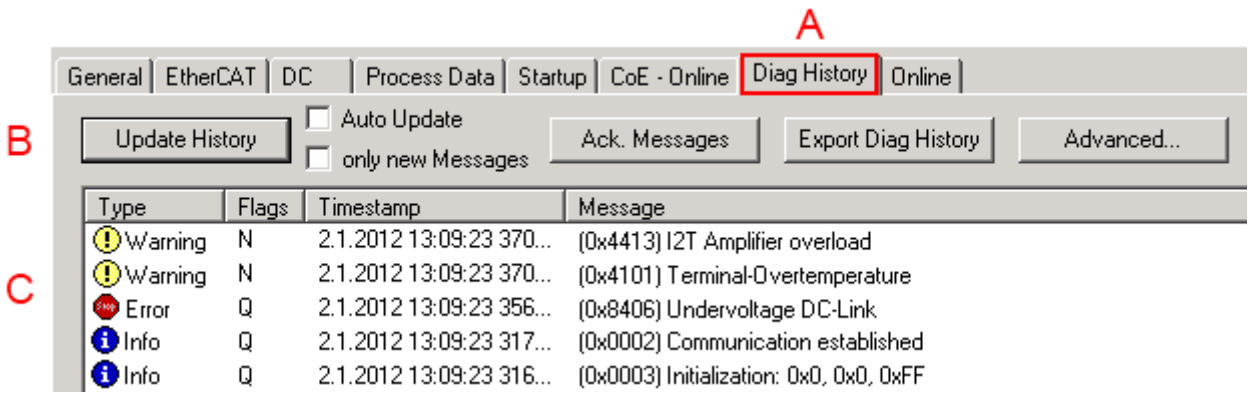


Fig. 29: Implementation of the DiagMessage system in the TwinCAT System Manager

The operating buttons (B) and the history read out (C) can be seen on the Diag History tab (A). The components of the message:

- Info/Warning/Error
- Acknowledge flag (N = unconfirmed, Q = confirmed)
- Time stamp
- Text ID
- Plain text message according to ESI/XML data

The meanings of the buttons are self-explanatory.

DiagMessages within the ADS Logger/Eventlogger

From TwinCAT 3.1 build 4022 onwards, DiagMessages sent by the terminal are shown by the TwinCAT ADS Logger. Given that DiagMessages are represented IO- comprehensive at one place, commissioning will be simplified. In addition, the logger output could be stored into a data file – hence DiagMessages are available long-term for analysis.

DiagMessages are actually only available locally in CoE 0x10F3 in the terminal and can be read out manually if required, e.g. via the DiagHistory mentioned above.

In the latest developments, the EtherCAT Terminals are set by default to report the presence of a DiagMessage as emergency via EtherCAT; the event logger can then retrieve the DiagMessage. The function is activated in the terminal via 0x10F3:05, so such terminals have the following entry in the StartUp list by default:

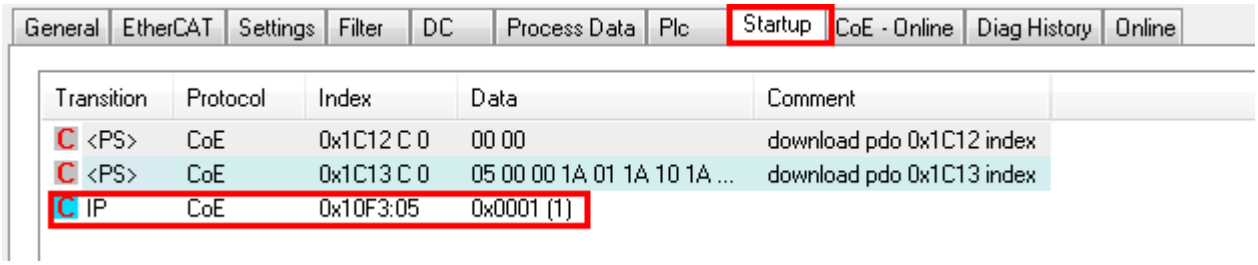


Fig. 30: Startup List

If the function is to be deactivated because, for example, many messages come in or the EventLogger is not used, the StartUp entry can be deleted or set to 0. The value can then be set back to 1 later from the PLC via CoE access if required.

Reading messages into the PLC

- In preparation -

Interpretation

Time stamp

The time stamp is obtained from the local clock of the terminal at the time of the event. The time is usually the distributed clock time (DC) from register x910.

Please note: When EtherCAT is started, the DC time in the reference clock is set to the same time as the local IPC/TwinCAT time. From this moment the DC time may differ from the IPC time, since the IPC time is not adjusted. Significant time differences may develop after several weeks of operation without a EtherCAT restart. As a remedy, external synchronization of the DC time can be used, or a manual correction calculation can be applied, as required: The current DC time can be determined via the EtherCAT master or from register x901 of the DC slave.

Structure of the Text ID

The structure of the MessageID is not subject to any standardization and can be supplier-specifically defined. In the case of Beckhoff EtherCAT devices (EL, EP) it usually reads according to **xyzz**:

x	y	zz
0: Systeminfo 2: reserved 1: Info 4: Warning 8: Error	0: System 1: General 2: Communication 3: Encoder 4: Drive 5: Inputs 6: I/O general 7: reserved	Error number

Example: Message 0x4413 --> Drive Warning Number 0x13

Overview of text IDs

Specific text IDs are listed in the device documentation.

Text ID	Type	Place	Text Message	Additional comment
0x0001	Information	System	No error	No error
0x0002	Information	System	Communication established	Connection established
0x0003	Information	System	Initialization: 0x%X, 0x%X, 0x%X	General information; parameters depend on event. See device documentation for interpretation.
0x1000	Information	System	Information: 0x%X, 0x%X, 0x%X	General information; parameters depend on event. See device documentation for interpretation.
0x1012	Information	System	EtherCAT state change Init - PreOp	
0x1021	Information	System	EtherCAT state change PreOp - Init	
0x1024	Information	System	EtherCAT state change PreOp - Safe-Op	
0x1042	Information	System	EtherCAT state change SafeOp - PreOp	
0x1048	Information	System	EtherCAT state change SafeOp - Op	
0x1084	Information	System	EtherCAT state change Op - SafeOp	
0x1100	Information	General	Detection of operation mode completed: 0x%X, %d	Detection of the mode of operation ended
0x1135	Information	General	Cycle time o.k.: %d	Cycle time OK
0x1157	Information	General	Data manually saved (Idx: 0x%X, SubIdx: 0x%X)	Data saved manually
0x1158	Information	General	Data automatically saved (Idx: 0x%X, SubIdx: 0x%X)	Data saved automatically
0x1159	Information	General	Data deleted (Idx: 0x%X, SubIdx: 0x%X)	Data deleted
0x117F	Information	General	Information: 0x%X, 0x%X, 0x%X	Information
0x1201	Information	Communication	Communication re-established	Communication to the field side restored This message appears, for example, if the voltage was removed from the power contacts and re-applied during operation.
0x1300	Information	Encoder	Position set: %d, %d	Position set - StartInputhandler
0x1303	Information	Encoder	Encoder Supply ok	Encoder power supply unit OK
0x1304	Information	Encoder	Encoder initialization successfully, channel: %X	Encoder initialization successfully completed
0x1305	Information	Encoder	Sent command encoder reset, channel: %X	Send encoder reset command
0x1400	Information	Drive	Drive is calibrated: %d, %d	Drive is calibrated
0x1401	Information	Drive	Actual drive state: 0x%X, %d	Current drive status
0x1705	Information		CPU usage returns in normal range (< 85%%)	Processor load is back in the normal range
0x1706	Information		Channel is not in saturation anymore	Channel is no longer in saturation
0x1707	Information		Channel is not in overload anymore	Channel is no longer overloaded
0x170A	Information		No channel range error anymore	A measuring range error is no longer active
0x170C	Information		Calibration data saved	Calibration data were saved
0x170D	Information		Calibration data will be applied and saved after sending the command “0x5AFE”	Calibration data are not applied and saved until the command "0x5AFE" is sent.

Text ID	Type	Place	Text Message	Additional comment
0x2000	Information	System	%s: %s	
0x2001	Information	System	%s: Network link lost	Network connection lost
0x2002	Information	System	%s: Network link detected	Network connection found
0x2003	Information	System	%s: no valid IP Configuration - Dhcp client started	Invalid IP configuration
0x2004	Information	System	%s: valid IP Configuration (IP: %d.%d.%d.%d) assigned by Dhcp server %d.%d.%d.%d	Valid IP configuration, assigned by the DHCP server
0x2005	Information	System	%s: Dhcp client timed out	DHCP client timeout
0x2006	Information	System	%s: Duplicate IP Address detected (%d.%d.%d.%d)	Duplicate IP address found
0x2007	Information	System	%s: UDP handler initialized	UDP handler initialized
0x2008	Information	System	%s: TCP handler initialized	TCP handler initialized
0x2009	Information	System	%s: No more free TCP sockets available	No free TCP sockets available.

Text ID	Type	Place	Text Message	Additional comment
0x4000	Warning		Warning: 0x%X, 0x%X, 0x%X	General warning; parameters depend on event. See device documentation for interpretation.
0x4001	Warning	System	Warning: 0x%X, 0x%X, 0x%X	
0x4002	Warning	System	%s: %s Connection Open (IN:%d OUT:%d API:%dms) from %d.%d.%d.%d successful	
0x4003	Warning	System	%s: %s Connection Close (IN:%d OUT:%d) from %d.%d.%d.%d successful	
0x4004	Warning	System	%s: %s Connection (IN:%d OUT:%d) with %d.%d.%d.%d timed out	
0x4005	Warning	System	%s: %s Connection Open (IN:%d OUT:%d) from %d.%d.%d.%d denied (Error: %u)	
0x4006	Warning	System	%s: %s Connection Open (IN:%d OUT:%d) from %d.%d.%d.%d denied (Input Data Size expected: %d Byte(s) received: %d Byte(s))	
0x4007	Warning	System	%s: %s Connection Open (IN:%d OUT:%d) from %d.%d.%d.%d denied (Output Data Size expected: %d Byte(s) received: %d Byte(s))	
0x4008	Warning	System	%s: %s Connection Open (IN:%d OUT:%d) from %d.%d.%d.%d denied (RPI:%dms not supported -> API:%dms)	
0x4101	Warning	General	Terminal-Overtemperature	Overtemperature. The internal temperature of the terminal exceeds the parameterized warning threshold.
0x4102	Warning	General	Discrepancy in the PDO-Configuration	The selected PDOs do not match the set operating mode. Sample: Drive operates in velocity mode, but the velocity PDO is but not mapped in the PDOs.
0x417F	Warning	General	Warning: 0x%X, 0x%X, 0x%X	
0x428D	Warning	General	Challenge is not Random	
0x4300	Warning	Encoder	Subincrements deactivated: %d, %d	Sub-increments deactivated (despite activated configuration)
0x4301	Warning	Encoder	Encoder-Warning	General encoder error
0x4302	Warning	Encoder	Maximum frequency of the input signal is nearly reached (channel %d)	
0x4303	Warning	Encoder	Limit counter value was reduced because of the PDO configuration (channel %d)	
0x4304	Warning	Encoder	Reset counter value was reduced because of the PDO configuration (channel %d)	
0x4400	Warning	Drive	Drive is not calibrated: %d, %d	Drive is not calibrated
0x4401	Warning	Drive	Starttype not supported: 0x%X, %d	Start type is not supported
0x4402	Warning	Drive	Command rejected: %d, %d	Command rejected
0x4405	Warning	Drive	Invalid modulo subtype: %d, %d	Modulo sub-type invalid
0x4410	Warning	Drive	Target overrun: %d, %d	Target position exceeded
0x4411	Warning	Drive	DC-Link undervoltage (Warning)	The DC link voltage of the terminal is lower than the parameterized minimum voltage. Activation of the output stage is prevented.
0x4412	Warning	Drive	DC-Link overvoltage (Warning)	The DC link voltage of the terminal is higher than the parameterized maximum voltage. Activation of the output stage is prevented.
0x4413	Warning	Drive	I2T-Model Amplifier overload (Warning)	• The amplifier is being operated outside the specification. • The I2T-model of the amplifier is incorrectly parameterized.
0x4414	Warning	Drive	I2T-Model Motor overload (Warning)	• The motor is being operated outside the parameterized rated values.

Text ID	Type	Place	Text Message	Additional comment
				• The I2T-model of the motor is incorrectly parameterized.
0x4415	Warning	Drive	Speed limitation active	The maximum speed is limited by the parameterized objects (e.g. velocity limitation, motor speed limitation). This warning is output if the set velocity is higher than one of the parameterized limits.
0x4416	Warning	Drive	Step lost detected at position: 0x%X%X	Step loss detected
0x4417	Warning	Drive	Motor overtemperature	The internal temperature of the motor exceeds the parameterized warning threshold
0x4418	Warning	Drive	Limit: Current	Limit: current is limited
0x4419	Warning	Drive	Limit: Amplifier I2T-model exceeds 100%%	The threshold values for the maximum current were exceeded.
0x441A	Warning	Drive	Limit: Motor I2T-model exceeds 100%%	Limit: Motor I2T-model exceeds 100%
0x441B	Warning	Drive	Limit: Velocity limitation	The threshold values for the maximum speed were exceeded.
0x441C	Warning	Drive	STO while the axis was enabled	An attempt was made to activate the axis, despite the fact that no voltage is present at the STO input.
0x4600	Warning	General IO	Wrong supply voltage range	Supply voltage not in the correct range
0x4610	Warning	General IO	Wrong output voltage range	Output voltage not in the correct range
0x4705	Warning		Processor usage at %d %%	Processor load at %d %%
0x470A	Warning		EtherCAT Frame missed (change Settings or DC Operation Mode or Sync0 Shift Time)	EtherCAT frame missed (change DC Operation Mode or Sync0 Shift Time under Settings)

Text ID	Type	Place	Text Message	Additional comment
0x8000	Error	System	%s: %s	
0x8001	Error	System	Error: 0x%X, 0x%X, 0x%X	General error; parameters depend on event. See device documentation for interpretation.
0x8002	Error	System	Communication aborted	Communication aborted
0x8003	Error	System	Configuration error: 0x%X, 0x%X, 0x%X	General; parameters depend on event. See device documentation for interpretation.
0x8004	Error	System	%s: Unsuccessful FwdOpen-Response received from %d.%d.%d.%d (%s) (Error: %u)	
0x8005	Error	System	%s: FwdClose-Request sent to %d.%d.%d.%d (%s)	
0x8006	Error	System	%s: Unsuccessful FwdClose-Response received from %d.%d.%d.%d (%s) (Error: %u)	
0x8007	Error	System	%s: Connection with %d.%d.%d.%d (%s) closed	
0x8100	Error	General	Status word set: 0x%X, %d	Error bit set in the status word
0x8101	Error	General	Operation mode incompatible to PDO interface: 0x%X, %d	Mode of operation incompatible with the PDO interface
0x8102	Error	General	Invalid combination of Inputs and Outputs PDOs	Invalid combination of input and output PDOs
0x8103	Error	General	No variable linkage	No variables linked
0x8104	Error	General	Terminal-Overtemperature	The internal temperature of the terminal exceeds the parameterized error threshold. Activation of the terminal is prevented
0x8105	Error	General	PD-Watchdog	Communication between the fieldbus and the output stage is secured by a Watchdog. The axis is stopped automatically if the fieldbus communication is interrupted. • The EtherCAT connection was interrupted during operation. • The Master was switched to Config mode during operation.
0x8135	Error	General	Cycle time has to be a multiple of 125 µs	The IO or NC cycle time divided by 125 µs does not produce a whole number.
0x8136	Error	General	Configuration error: invalid sampling rate	Configuration error: Invalid sampling rate
0x8137	Error	General	Electronic type plate: CRC error	Content of the external name plate memory invalid.
0x8140	Error	General	Sync Error	Real-time violation
0x8141	Error	General	Sync%X Interrupt lost	Sync%X Interrupt lost
0x8142	Error	General	Sync Interrupt asynchronous	Sync Interrupt asynchronous
0x8143	Error	General	Jitter too big	Jitter limit violation
0x817F	Error	General	Error: 0x%X, 0x%X, 0x%X	
0x8200	Error	Communication	Write access error: %d, %d	Error while writing
0x8201	Error	Communication	No communication to field-side (Auxiliary voltage missing)	• There is no voltage applied to the power contacts. • A firmware update has failed.
0x8281	Error	Communication	Ownership failed: %X	
0x8282	Error	Communication	To many Keys founded	
0x8283	Error	Communication	Key Creation failed: %X	
0x8284	Error	Communication	Key loading failed	
0x8285	Error	Communication	Reading Public Key failed: %X	
0x8286	Error	Communication	Reading Public EK failed: %X	
0x8287	Error	Communication	Reading PCR Value failed: %X	
0x8288	Error	Communication	Reading Certificate EK failed: %X	
0x8289	Error	Communication	Challenge could not be hashed: %X	
0x828A	Error	Communication	Tickstamp Process failed	
0x828B	Error	Communication	PCR Process failed: %X	
0x828C	Error	Communication	Quote Process failed: %X	
0x82FF	Error	Communication	Bootmode not activated	Boot mode not activated
0x8300	Error	Encoder	Set position error: 0x%X, %d	Error while setting the position

Text ID	Type	Place	Text Message	Additional comment
0x8301	Error	Encoder	Encoder increments not configured: 0x%X, %d	Encoder increments not configured
0x8302	Error	Encoder	Encoder error	The amplitude of the resolver is too small
0x8303	Error	Encoder	Encoder power missing (channel %d)	
0x8304	Error	Encoder	Encoder communication error, channel: %X	Encoder communication error
0x8305	Error	Encoder	EnDat2.2 is not supported, channel: %X	EnDat2.2 is not supported
0x8306	Error	Encoder	Delay time, tolerance limit exceeded, 0x%X, channel: %X	Runtime measurement, tolerance exceeded
0x8307	Error	Encoder	Delay time, maximum value exceeded, 0x%X, channel: %X	Runtime measurement, maximum value exceeded
0x8308	Error	Encoder	Unsupported ordering designation, 0x%X, channel: %X (only 02 and 22 is supported)	Wrong EnDat order ID
0x8309	Error	Encoder	Encoder CRC error, channel: %X	Encoder CRC error
0x830A	Error	Encoder	Temperature %X could not be read, channel: %X	Temperature cannot be read
0x830C	Error	Encoder	Encoder Single-Cycle-Data Error, channel. %X	CRC error detected. Check the transmission path and the CRC polynomial
0x830D	Error	Encoder	Encoder Watchdog Error, channel. %X	The sensor has not responded within a predefined time period
0x8310	Error	Encoder	Initialisation error	
0x8311	Error	Encoder	Maximum frequency of the input signal is exceeded (channel %d)	
0x8312	Error	Encoder	Encoder plausibility error (channel %d)	
0x8313	Error	Encoder	Configuration error (channel %d)	
0x8314	Error	Encoder	Synchronisation error	
0x8315	Error	Encoder	Error status input (channel %d)	
0x8400	Error	Drive	Incorrect drive configuration: 0x%X, %d	Drive incorrectly configured
0x8401	Error	Drive	Limiting of calibration velocity: %d, %d	Limitation of the calibration velocity
0x8402	Error	Drive	Emergency stop activated: 0x%X, %d	Emergency stop activated
0x8403	Error	Drive	ADC Error	Error during current measurement in the ADC
0x8404	Error	Drive	Overcurrent	Overcurrent in phase U, V or W
0x8405	Error	Drive	Invalid modulo position: %d	Modulo position invalid
0x8406	Error	Drive	DC-Link undervoltage (Error)	The DC link voltage of the terminal is lower than the parameterized minimum voltage. Activation of the output stage is prevented.
0x8407	Error	Drive	DC-Link overvoltage (Error)	The DC link voltage of the terminal is higher than the parameterized maximum voltage. Activation of the output stage is prevented.
0x8408	Error	Drive	I2T-Model Amplifier overload (Error)	• The amplifier is being operated outside the specification. • The I2T-model of the amplifier is incorrectly parameterized.
0x8409	Error	Drive	I2T-Model motor overload (Error)	• The motor is being operated outside the parameterized rated values. • The I2T-model of the motor is incorrectly parameterized.
0x840A	Error	Drive	Overall current threshold exceeded	Total current exceeded
0x8415	Error	Drive	Invalid modulo factor: %d	Modulo factor invalid
0x8416	Error	Drive	Motor overtemperature	The internal temperature of the motor exceeds the parameterized error threshold. The motor stops immediately. Activation of the output stage is prevented.
0x8417	Error	Drive	Maximum rotating field velocity exceeded	Rotary field speed exceeds the value specified for dual use (EU 1382/2014).
0x841C	Error	Drive	STO while the axis was enabled	An attempt was made to activate the axis, despite the fact that no voltage is present at the STO input.

Text ID	Type	Place	Text Message	Additional comment
0x8550	Error	Inputs	Zero crossing phase %X missing	Zero crossing phase %X missing
0x8551	Error	Inputs	Phase sequence Error	Wrong direction of rotation
0x8552	Error	Inputs	Overcurrent phase %X	Overcurrent phase %X
0x8553	Error	Inputs	Overcurrent neutral wire	Overcurrent neutral wire
0x8581	Error	Inputs	Wire broken Ch %D	Wire broken Ch %d
0x8600	Error	General IO	Wrong supply voltage range	Supply voltage not in the correct range
0x8601	Error	General IO	Supply voltage to low	Supply voltage too low
0x8602	Error	General IO	Supply voltage to high	Supply voltage too high
0x8603	Error	General IO	Over current of supply voltage	Overcurrent of supply voltage
0x8610	Error	General IO	Wrong output voltage range	Output voltage not in the correct range
0x8611	Error	General IO	Output voltage to low	Output voltage too low
0x8612	Error	General IO	Output voltage to high	Output voltage too high
0x8613	Error	General IO	Over current of output voltage	Overcurrent of output voltage
0x8700	Error		Channel/Interface not calibrated	Channel/interface not synchronized
0x8701	Error		Operating time was manipulated	Operating time was manipulated
0x8702	Error		Oversampling setting is not possible	Oversampling setting not possible
0x8703	Error		No slave controller found	No slave controller found
0x8704	Error		Slave controller is not in Bootstrap	Slave controller is not in bootstrap
0x8705	Error		Processor usage to high (>= 100%%)	Processor load too high (>= 100%%)
0x8706	Error		Channel in saturation	Channel in saturation
0x8707	Error		Channel overload	Channel overload
0x8708	Error		Overloadtime was manipulated	Overload time was manipulated
0x8709	Error		Saturationtime was manipulated	Saturation time was manipulated
0x870A	Error		Channel range error	Measuring range error for the channel
0x870B	Error		no ADC clock	No ADC clock available
0xFFFF	Information		Debug: 0x%X, 0x%X, 0x%X	Debug: 0x%X, 0x%X, 0x%X

8 Appendix

8.1 Support and Service

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

Beckhoff's branch offices and representatives

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

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

You will also find further documentation for Beckhoff components there.

Support

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

- support
- design, programming and commissioning of complex automation systems
- and extensive training program for Beckhoff system components

Hotline:	+49 5246 963 157
e-mail:	support@beckhoff.com
web:	www.beckhoff.com/support

Service

The Beckhoff Service Center supports you in all matters of after-sales service:

- on-site service
- repair service
- spare parts service
- hotline service

Hotline:	+49 5246 963 460
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