L-force *Communication*

Communication Manual

8400 motec

E84DGFCTxxx

EtherCAT® Communication Unit

Lenze

Lenze

Contents

1 About this documentation

Contents

This documentation exclusively contains descriptions of the EtherCAT bus system for the Inverter Drive 8400 motec.

> 🛈 **Note!**
>
> This documentation supplements the **mounting instructions** and the **"Inverter Drives 8400 motec" hardware manual** supplied with the controller.

The properties and functions of the EtherCAT for Inverter Drives 8400 motec are described in detail.

Examples illustrate typical applications.

This documentation also contains ...

▶ the most important technical data for EtherCAT communication;

▶ Information on the installation and commissioning of the EtherCAT network;

▶ Information on the EtherCAT data transfer;

▶ information on monitoring functions and troubleshooting as well as fault elimination.

The theoretical concepts are only explained to the level of detail required to understand the function of the EtherCAT communication with Inverter Drives 8400 motec.

Depending on the software version of the controller and of the installed »Engineer« software, the screenshots in this documentation may vary from the »Engineer« depiction.

This documentation does not describe any software provided by other manufacturers. No liability can be accepted for corresponding data provided in this documentation. For information on how to use the software, please refer to the host (master) documents.

All product names mentioned in this documentation are trademarks of their corresponding owners.

> 💡 **Tip!**
>
> Detailed information on EtherCAT can be found on the website of the EtherCAT Technology Group:
>
> www.EtherCAT.org

Target group

This documentation is aimed at people involved in configuring, installing, commissioning, and maintaining the networking and remote maintenance of a machine.

Tip!

Information and software updates for Lenze products can be found in the download area at:

www.Lenze.com

Validity information

The information in this documentation applies to the following devices:

Product series	Type designation	Variant
Inverter Drives 8400 motec **EtherCAT Communication Unit**	E84DGFCTxNx	EtherCAT
	E84DGFCTxJx	EtherCAT + Safety

▶ Features and variants (📖 14)

1.1 Document history

version			Description
1.0	04/2011	TD17	First edition
2.0	11/2011	TD17	Information on the EtherCAT register "AL Status Code" (📖 36) has been added.
2.1	11/2012	TD17	EtherCAT® is a registered trademark by Beckhoff Automation GmbH, Germany.

Your opinion is important to us!

These instructions were created to the best of our knowledge and belief to give you the best possible support for handling our product.

Perhaps we have not succeeded in achieving this objective in every respect. If you have suggestions for improvement, please e-mail us to:

feedback-docu@Lenze.de

Thank you for your support.

Your Lenze documentation team

Lenze

1.2 Conventions used

This documentation uses the following conventions to distinguish different types of information:

Type of information	Writing	Examples/notes
Numbers		
Decimal	Standard notation	Example: 1234
Hexadecimal	0x[0 ... 9, A ... F]	Example: 0x60F4
Binary • Nibble	In inverted commas Point	Example: '100' Example: '0110.0100'
Decimal separator	Point	The decimal point is generally used. Example: 1234.56
Text		
Program name	» «	PC software Example: Lenze »Engineer«
Window	*Italics*	The *Message window*... / The *Options* dialog box...
Control element	**Bold**	The **OK** button... / The **Copy** command... / The **Properties** tab... / The **Name** input field...
Sequence of menu commands		If the execution of a command requires several commands in succession, the individual commands are separated by an arrow: Select the **File→Open** command to...
Hyperlink	<u>Underlined</u>	Optically highlighted reference to another subject which is activated with a mouse-click.
Symbols		
Page reference	(□ 8)	Optically highlighted reference to another page which is activated with a mouse-click.
Step-by-step instructions		Step-by-step instructions are indicated by a pictograph.

Lenze

1.3 Terminology used

Term	Meaning
EtherCAT.	EtherCAT® is a real-time capable Ethernet system with top performance. EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.
Controller	Lenze controller of the "Inverter Drives 8400 motec" product series
Standard device	
Drive Unit Communication Unit Wiring Unit	The controller 8400 motec consists of the following modules: "Drive Unit", "Communication Unit" and "Wiring Unit". • The Drive Unit is available in various power classes. • The Communication Unit is available in the following versions: −No fieldbus −AS-i option −CANopen option −PROFIBUS option −PROFINET option −EtherCAT option • The Wiring Unit provides flexible connection options for an easy integration into the power supply of the machine.
»Engineer«	PC software from Lenze which supports you in "engineering" (parameter setting, diagnosing, and configuring) during the entire life cycle, i.e. from planning to maintenance of the commissioned machine.
»PLC Designer«	
»TwinCAT«	Beckhoff PC software for EtherCAT configuration
Code	Parameter which serves to parameterise and monitor the controller. In normal usage, the term is usually referred to as "Index".
Subcode	If a code contains several parameters they are stored in so-called "subcodes". In the documentation the forward slash "/" is used as a separator between the designation of the code and the subcode (e.g. "C00118/3"). In normal usage, the term is also referred to as "Subindex".
Lenze setting	These are settings with which the device is preconfigured ex works.
Basic setting	
HW	Hardware
SW	Software
ESI	"EtherCAT Slave Information" (device description file in XML format)
CoE	CANopen over EtherCAT
I-1600.8	CoE index (hexadecimal representation) • In the example: index 0x1600, subindex 8
TA	Technology application
PDO	Process data object
SDO	Service data object
"Hot connect"	This feature provides for removing and connecting slave nodes during operation.

1.4	Notes used

The following signal words and symbols are used in this documentation to indicate dangers and important information:

Safety instructions

Structure of the safety instructions:

> ⚠ **Pictograph and signal word!**
>
> (characterise the type and severity of danger)
>
> **Note**
>
> (describes the danger and gives information about how to prevent dangerous situations)

Pictograph	Signal word	Meaning
⚡	**Danger!**	**Danger of personal injury through dangerous electrical voltage** Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
⚠	**Danger!**	**Danger of personal injury through a general source of danger** Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.
🛑	**Stop!**	**Danger of damage to material assets** Reference to a possible danger that may result in damage to material assets if the corresponding measures are not taken.

Application notes

Pictograph	Signal word	Meaning
🛈	**Note!**	Important note to ensure trouble-free operation
💡	**Tip!**	Useful tip for simple handling
♺		Reference to another documentation

Lenze

Communication manual 8400 motec EtherCAT®
Safety instructions
General safety and application notes

2 Safety instructions

> **ⓘ Note!**
>
> Always observe the specified safety measures to avoid severe injury to persons and damage to property!
>
> Always keep this documentation to hand in the vicinity of the product during operation.

2.1 General safety and application notes

> **⚠ Danger!**
>
> Disregarding the following basic safety measures may lead to severe personal injury and damage to material assets.

▶ Lenze drive and automation components ...
- may only be used as directed.
  - ▶ Application as directed (🕮 13)
- must never be commissioned if they display any signs of damage.
- must never be technically modified.
- must never be commissioned if they are not fully mounted.
- must never be operated without the required covers.
- can - depending on their degree of protection - have live, movable or rotating parts during operation and after operation. Surfaces can be hot.

▶ For Lenze drive components ...
- use only the accessories approved.
- use only original spare parts from the manufacturer.

▶ Observe all specifications given in the attached and associated documentation.
- This is the precondition for safe and trouble-free operation and for achieving the specified product features.
  - ▶ Features and variants (🕮 14)
- The procedural notes and circuit details described in this document are only proposals. It is up to the user to check whether they can be adapted to the particular applications. Lenze does not take any responsibility for the suitability of the procedures and circuit proposals described.

▶ Only qualified personnel may work with and on Lenze drive and automation components. In accordance with IEC 60364 and CENELEC HD 384, these are persons ...

– who are familiar with installing, mounting, commissioning, and operating the product.

– who have the qualifications necessary for their occupation.

– who know all regulations for the prevention of accidents, directives and laws applicable on site and are able to apply them.

2.2 Device and application-specific safety instructions

▶ During operation, the Communication Unit must be connected to the Wiring Unit and the Drive Unit.

▶ In case of external voltage supply, always use a separate power supply unit, safely separated in accordance with EN 61800-5-1 in every control cabinet ("SELV" / "PELV").

Documentation for "Inverter Drives 8400 motec", control system, system/ machine

All the other measures prescribed in this documentation must also be implemented. Observe the safety instructions and application notes stated in this manual.

2.3 Residual hazards

Device protection

▶ The Communication Unit contains electronic components that can be damaged or destroyed by electrostatic discharge.

▶ Installation (📖 19)

Communication manual 8400 motec EtherCAT®
Product description
Application as directed

3 Product description

3.1 Application as directed

The EtherCAT Communication Unit ...

▶ is a unit that can only be used in conjunction with the following modules:

Product series	Type designation
Inverter Drives 8400 motec **Drive Unit**	E84DGDVxxxxxxxx
Inverter Drives 8400 motec **Wiring Unit**	E84DGVNxx

▶ is an item of equipment intended for use in industrial power systems.

▶ may only be operated under the operating conditions specified in this documentation.

▶ may only be used in EtherCAT networks.

▶ can also be used without being connected to the EtherCAT network.

Any other use shall be deemed inappropriate!

Communication manual 8400 motec EtherCAT®
Product description
Features and variants

3.2 Features and variants

The EtherCAT Communication Unit is available in the following versions:

Product series	Type designation	Features					
		Enclosure IP 65	EtherCAT M12	I/O: Terminal	I/O: M12	Safety
Inverter Drives 8400 motec **EtherCAT Communication Unit**	E84DGFCTANP	●	●	●		
	E84DGFCT9NP	●	●		●	
	E84DGFCTAJP	●	●	●		●
	E84DGFCT9JP	●	●		●	●

▶ The EtherCAT Communication Unit is ...
   – mounted to the Wiring Unit (E84DGVNxx);
   – supplied internally via the Drive Unit (E84DGDVxxxxxxxx) or externally via a separate voltage source.

▶ The I/O connections can be brought into the device via M12 connectors or cable glands.

▶ Devices without an integrated safety system (safety option) have no analog input and no relay output.

▶ The integrated safety system of the E84DGFCTxJx Communication Units can be used on machines for the protection of persons.

▶ SDO transfer with CoE (CANopen over EtherCAT)

▶ A maximum of 10 process data words (max. 20 bytes) can be sent to the master.

▶ A maximum of 8 process data words (max. 16 bytes) can be sent by the master.

▶ Communication with the Lenze »Engineer« (access to all Lenze parameters) is executed via the diagnostic interface of the Drive Unit.

▶ Access to all Lenze parameters with CoE (CAN over EtherCAT)

▶ Cycle times: 1 ms or an integer multiple of 1 ms

> **"Inverter Drives 8400 motec" hardware manual**
>
> Here you will find detailed information on the integrated safety system (safety option).
>
> **Software manual / »Engineer« online help "Inverter Drives 8400 motec"**
>
> Here you will find detailed information on how to configure the safety system (safety option).

3.3 Connections and interfaces
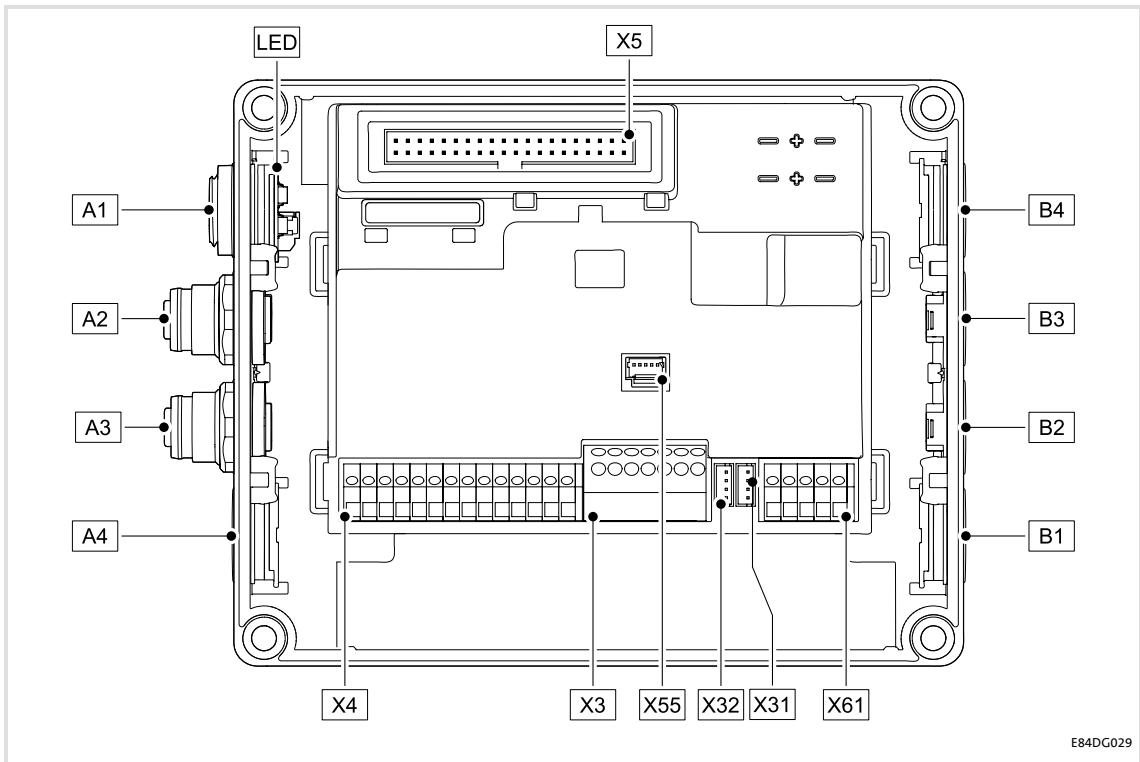
[3-1] EtherCAT Communication Unit

Pos.	Description
A1 / LED	Position of LEDs for EtherCAT status display ▸ LED status displays (□ 58)
A2	IN: EtherCAT input (M12 socket, 5-pole, D-coded) ▸ EtherCAT connection (□ 23)
A3	OUT: EtherCAT output (M12 socket, 5-pole, D-coded) ▸ EtherCAT connection (□ 23)
A4 B1 ... B4	Positions for further freely designable inputs and outputs: • Digital inputs • Digital output • Analog input (only for E84DGFCTxJx) • Relay output (only for E84DGFCTxJx) • Connection of safety system "Safety Option" (only for E84DGFCTxJx)
X3 / X4 / X61	Terminal strips for wiring the connections at A4 and B1 ... B4
X5	Plug connector for connection to the Drive Unit
X31	Plug connector for wiring the EtherCAT input (IN) at A2
X32	Plug connector for wiring the EtherCAT output (OUT) at A3
X55	Plug connector for wiring the LEDs at A1

Communication manual 8400 motec EtherCAT®
Product description
Connections and interfaces

▶ On delivery, the EtherCAT connections and the LEDs for the EtherCAT status displays are already mounted and wired:
  – EtherCAT input to plug connector X31
  – EtherCAT output to plug connector X32
  – LEDs to plug connector X55

▶ It is also possible to connect the EtherCAT and other inputs and outputs (e.g. digital inputs) via the positions A1 ... A4 and B1 ... B4.

▶ For the connections, 5-pin M12 connectors or - alternatively - cable glands (cable cross-section max. 1.0 mm^2, AWG 18) can be used.

▶ The M12 connectors, cable glands and prefabricated system cables can be obtained from various manufacturers.

▶ Wire the M12 connectors or cable glands used to the corresponding contacts of the terminal strips/plug connectors X3, X4 and X61.

"Inverter Drives 8400 motec" hardware manual

Observe the notes and wiring instructions included.

Communication manual 8400 motec EtherCAT®
Technical data
General data and operating conditions

4   Technical data

> **"Inverter Drives 8400 motec" hardware manual**
>
> Here you will find the **ambient conditions** and information on the **electromagnetic compatibility (EMC)** that also apply to the Communication Unit.

4.1   General data and operating conditions

Area	Values
Order designation	• E84DGFCTxNx (EtherCAT) • E84DGFCTxJx (EtherCAT + Safety)
Communication profile	EtherCAT
Supported device profile and mailbox protocol	CANopen over EtherCAT (CoE)
Communication medium	S/FTP (Screened Foiled Twisted Pair, ISO/IEC 11801 or EN 50173), CAT 5e
Interface for communication	• EtherCAT input (IN): M12 socket, 5-pole, D-coded • EtherCAT output (OUT): M12 socket, 5-pole, D-coded
Network topology	Line, switch
Type of node	EtherCAT slave
Number of nodes	Max. 65535 (in the entire network)
Max. cable length between two EtherCAT nodes	100 m (typically)
Vendor ID [hex]	0x3B
Product ID	841020
Revision ID	Dependent on the software version of the Communication Unit
Baud rate	100 Mbps, full duplex
Cycle times	1 ms or an integer multiple of 1 ms
External voltage supply	• U = 24 V DC (20 V - 0 % ... 29 V + 0 %) • I_{max} = 400 mA
Conformities, approvals	• CE • UR / cUR

4.2 Protocol data

Area	Values
Process data words	1 ... 10 process data words to master (max. 20 bytes, 16 bits / word) 1 ... 8 process data words from master (max. 16 bytes, 16 bits / word)
Parameter data (mailbox size for CoE transfer)	Max. 128 bytes

4.3 Communication time

Parameter data (SDO)

The communication time for parameter data is the time between the transmission of an SDO request and the arrival of a corresponding response.

▶ The processing time in the controller is approx. 10 ms + a tolerance of +20 ms (typically)

▶ Some codes may require a longer processing time (see software manual / »Engineer« online help "Inverter Drive 8400 motec").

Process data (PDO)

The communication time for process data is the time between the reception of a PDO with setpoints and the return of a PDO with current actual values.

The communication times for process data depend on the ...

▶ processing time in the controller (interval time of the application task, process data mode)

▶ runtime on the bus (telegram length, number of nodes, PDO update time, instant of transmission of the EtherCAT frame)

The processing time starts when the setpoints are taken over by the controller at a point in time which is not synchronised with the EtherCAT master, and ends when the current actual values are provided at the EtherCAT interface.

Hence, the following holds true for the processing time:

1.3 ms + 1.0 ms (tolerance) + interval time of the application task

Lenze

5 Installation

> **STOP** **Stop!**
>
> **Electrostatic discharge**
>
> Electronic components within the Communication Unit can be damaged or destroyed by electrostatic discharge.
>
> **Possible consequences:**
>
> - The Communication Unit is defective.
> - Fieldbus communication is troubled or not possible.
> - I/O signals are faulty.
> - The safety function is faulty.
>
> **Protective measures**
>
> - Discharge electrostatic charges before touching the Communication Unit.

5.1 Mechanical installation

> **Mounting instructions for "Inverter Drives 8400 motec"**
>
> Here you will find detailed information on the installation.

0.37 ... 3.0 kW	4.0 ... 7.5 kW

EDK84DGDVBxxx4

EDK84DGFCxxxx

EDK84DGVNxE

E84DG023a

EDK84DGFCxxxx

EDK84DGDVBxxx4

EDK84DGVN4E

E84DG023b
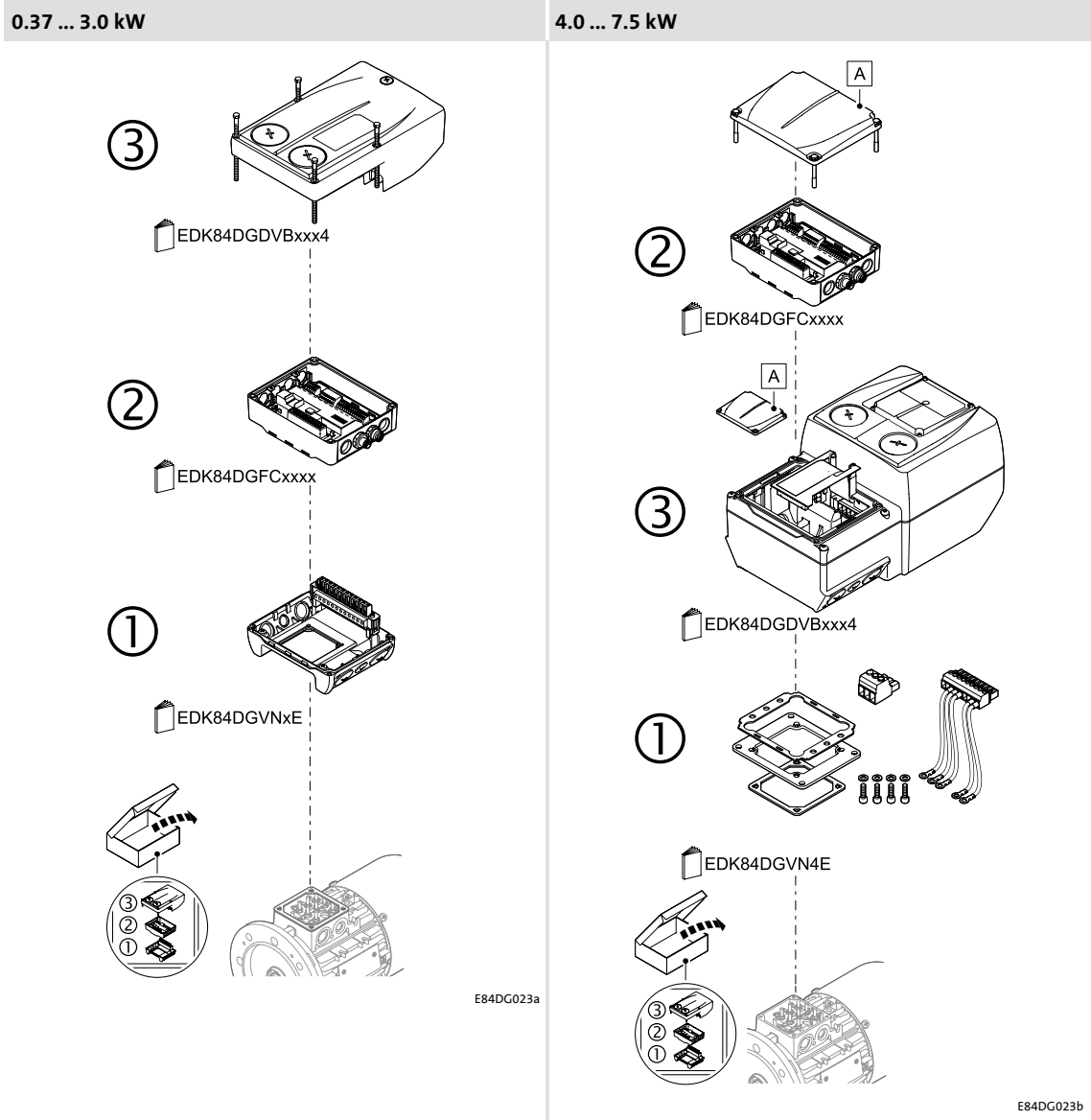
[5-1]   Mechanical installation of the 8400 motec components

Legend for Fig. [5-1]	
1	Drive Unit
2	Communication Unit
3	Wiring Unit
A	Cover of the Drive Unit
EDK84DG...	Mounting instructions for the Drive Unit, Communication Unit, Wiring Unit

5.2 Electrical installation

> **"Inverter Drives 8400 motec" hardware manual**
>
> Here you will find detailed information about ...
> - the digital and analog inputs/outputs;
> - the relay output;
> - the integrated safety system (safety option);
> - the wiring of the connections.
>
> Observe the notes and wiring instructions included.

5.2.1 Network topology

An EtherCAT telegram is sent through a pair of wires from the master to the slaves. The telegram is forwarded from slave to slave until it has passed through all the devices. Finally, the last slave returns the telegram to the master through a second pair of wires. In this way, EtherCAT always forms a logic ring topology, independent of the topology selected.

Line topology
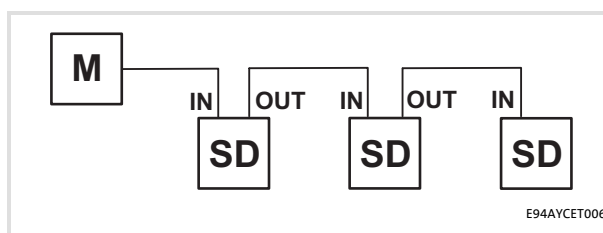
M = master

SD = slave device

[5-2]   Line topology

▶ The devices are interconnected successively.

▶ Correct assignment and wiring of the EtherCAT inputs (IN) and EtherCAT outputs (OUT) is required for proper operation.

▶ The direction of data transmission is from the master to the slaves.

> **Tip!**
>
> The termination of the last node is effected automatically by the slave.

Switch topology
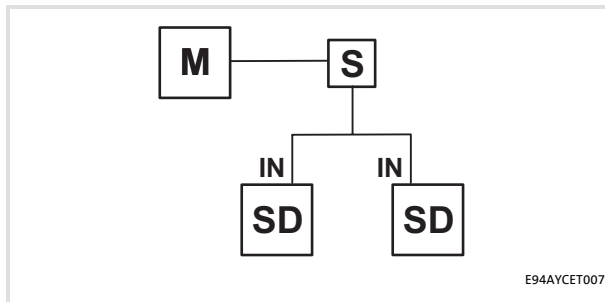
M = master

S = switch

SD = slave device

[5-3]   Switch topology

The wiring can also be carried out in a star structure via an appropriate switch. For this, observe the additional runtimes.

5.2.2 EtherCAT connection

EtherCAT input (IN)

▶ M12 socket, 5-pole, D-coded

▶ Wiring at terminal strip X31

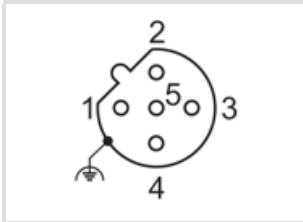| Pin	Signal	Description
1	Tx +	Data line (transmitted data, plus)
2	Rx +	Data line (received data, plus)
3	Tx -	Data line (transmitted data, minus)
4	Rx -	Data line (received data, minus)
5	-	Not assigned

EtherCAT output (OUT)
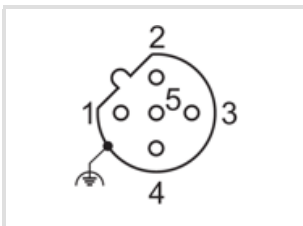
▶ M12 socket, 5-pole, D-coded

▶ Wiring at terminal strip X32

Pin	Signal	Description
1	Tx +	Data line (transmitted data, plus)
2	Rx +	Data line (received data, plus)
3	Tx -	Data line (transmitted data, minus)
4	Rx -	Data line (received data, minus)
5	-	Not assigned

Lenze

5.2.3 **External voltage supply**

▶ The external voltage supply can be used to establish EtherCAT communication for commissioning purposes and to query the data of the digital and analog inputs.

▶ Moreover, the external voltage supply serves to keep up EtherCAT communication in the event of a main supply failure.

▶ The digital inputs RFR, DI1 ... DI5 and the analog inputs can be evaluated as before.

▶ The external voltage supply is done via the terminals 24E and GND of the terminal strip X3.

▶ Permissible voltage (DC) / max. current:
  − U = 24 V DC (20 V - 0 % ... 29 V + 0 %)
  − I_{max} = 400 mA

▶ Access to parameters of a device that is disconnected from the mains is not possible.

> **"Inverter Drives 8400 motec" hardware manual**
>
> Here you can find detailed information on how to wire the Communication Unit.

6 Commissioning

During commissioning, system-related data such as motor parameters, operating parameters, responses, and parameters for fieldbus communication are defined for the controller. For Lenze devices, this is done via the codes.

The codes of the controller and communication are saved non-volatilely as a data set in the memory module.

In addition to codes for the configuration, there are codes for diagnosing and monitoring the nodes.

▶ Parameter reference (🕮 66)

The data from the controller or memory module can only be read in conjunction with the main voltage supply (400/500 V AC).

During commissioning with 24 V DC, only the information provided by the last two data words in the digital and analog inputs is valid and readable (see Configuring process data (🕮 28)).

6.1 Before initial switch-on

> 🛑 **Stop!**
>
> Before the controller is switched on for the first time, the entire wiring must be checked for completeness, short circuit and earth fault.

Communication manual 8400 motec EtherCAT®
Commissioning
Configuring the host (master)

6.2 Configuring the host (master)

To be able to communicate with the Communication Unit the host (master) must be configured first.

In order to configure EtherCAT networks, you always need a configuration software for the host (master), e.g.:

▶ Lenze »PLC Designer«

▶ Beckhoff »TwinCAT«

These are software systems for the programming of control programs, EtherCAT configuration, real-time execution and diagnostics.

▶ The basic parameters of the Communication Unit are saved to the internal configuration memory and can be used by the master for the node identification.

▶ For the node search (fieldbus scan), the corresponding device descriptions of the Lenze device family are used.

6.2.1 Installing device description files

The current XML device description files required for the configuration of the EtherCAT node can be found in the download area at:

www.Lenze.com

The **Lenze_E84DGFCT_Vxzz_ddmmyy.xml** device description file must be installed by means of the EtherCAT configuration software.

Wildcards in the file name	
x	Main version of the XML device description file used
zz	Additional version of the XML device description file used
dd	Day
mm	Month
yy	Year

Communication manual 8400 motec EtherCAT®
Commissioning
Configuring the host (master)

6.2.2 Automatic device identification

- ▶ For troublefree integration of the EtherCAT slaves in a master configuration it is necessary to select the correct Lenze device from the EtherCAT configuration software.

- ▶ The configuration software unambiguously identifies an EtherCAT node by the product code (identical to CoE object I-1018.2), the manufacturer code (0x3B), and the main software version of the Communication Unit.

  ▸ Implemented CoE objects (🕮 53)

- ▶ The product code is automatically set in the Identity object for the configuration software to select the configuration specific to the EtherCAT node from the device description file.

- ▶ During initialisation, the product code is transferred to the master. Based on this identification, the master can accept the corresponding settings from the device description.

- ▶ Product code of the Inverter Drives 8400 motec: 841020

6.2.3 Configuring process data

▶ The process data configuration is determined during the initialisation phase of the master (PDO mapping).

▶ A maximum of 10 process data words (max. 20 bytes) can be sent to the master.

▶ A maximum of 8 process data words (max. 16 bytes) can be sent by the master.

▶ Independent of the configured length of the process data from the Inverter Drive 8400 motec to the master, the I/O data are always entered into the last two words:

Data word	Bits	Function	Value / description	
Word 1	0 ... 9	Analog input value (0 ... 10 V)	10 V = 1000	
	10	Digital input 3	0 (FALSE)	open
			1 (TRUE)	closed
	11	Digital input 4	0 (FALSE)	open
			1 (TRUE)	closed
	12	Digital input 5	0 (FALSE)	open
			1 (TRUE)	closed
	13	Reserved		
	14	I/O status	0 (FALSE)	Data in word 1/2 are not valid.
			1 (TRUE)	Data in word 1/2 are valid.
	15	Connection status of the controller	0 (FALSE)	Controller is offline ("Stay alive" operation)
			1 (TRUE)	Controller is online
Word 2	0	RFR	0 (FALSE)	open
			1 (TRUE)	closed
	1	Digital input 1	0 (FALSE)	open
			1 (TRUE)	closed
	2	Digital input 2	0 (FALSE)	open
			1 (TRUE)	closed
	3	Digital input 3	0 (FALSE)	open
			1 (TRUE)	closed
	4	Digital input 4	0 (FALSE)	open
			1 (TRUE)	closed
	5	Digital input 5	0 (FALSE)	open
			1 (TRUE)	closed
	6 ... 13	Reserved		
	14	I/O status	0 (FALSE)	Data in word 1/2 are not valid.
			1 (TRUE)	Data in word 1/2 are valid.
	15	Connection status of the controller	0 (FALSE)	Controller is offline ("Stay alive" operation)
			1 (TRUE)	Controller is online

Lenze

Communication manual 8400 motec EtherCAT®
Commissioning
Configuring the host (master)

▶ The process data configuration is predefined in the device description file for each application and can be adjusted by the user if required.

    ▸ Configuring the port interconnection of the process data objects (PDO) (📖 39)

▶ The last internal information of the configured data must be deleted to shorten the configured length of the process data. Process data words to the master must keep their last two I/O data words.

6.2.4 Determining the cycle time

The process data objects (PDO) are transmitted cyclically between the master and the slaves.

The cycle time can be set via the EtherCAT configuration software.

6.3 Address allocation

The EtherCAT nodes are normally addressed via a fixed 16-bit address defined by the EtherCAT master. During start-up, the master assigns this address to each node, depending on the physical order in the EtherCAT network. The address is not saved and is lost when the device is switched off.

Via the **Station alias address** input field you can assign a fixed address to the EtherCAT slave.
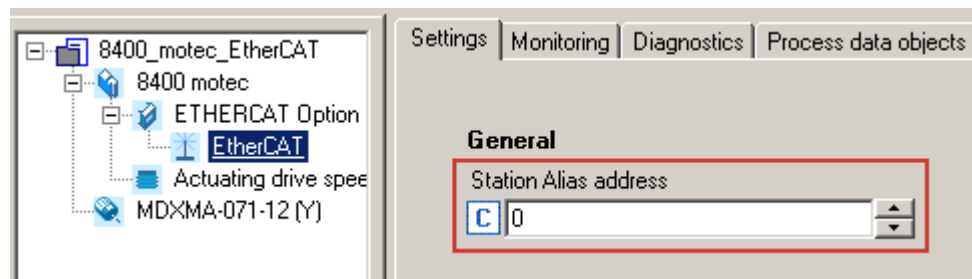
> **ℹ Note!**
>
> - The station alias address must only be set if the node is part of a "hot connect" group.
> - The station alias address must be unambiguous and may only be assigned once within the EtherCAT network.
> - Use the same station alias address in the EtherCAT master and in the slave.

▶ Valid address range: 0 ... 32767

– Address 0 means that no station alias address is assigned.

– Impermissible addresses are marked in red in the input field.

– The address is written to code C13899.

▶ In addition, specify the use of the fixed addressing on the master.

▶ The address assigned by the master is displayed under code C13864.

▶ Via standard device code **C00002**, execute the **"11: Save all parameter sets"** device command to activate the changed station alias address and to save it to the memory module.

6.4 Initial switch-on

Establishing communication

▶ To establish communication, the controller must be supplied with mains voltage.

▶ The external voltage supply serves to keep up EtherCAT communication in the event of a main supply failure.

    ▸ External voltage supply (▭ 24)

▶ During mains connection, all parameters (codes) are read.

▶ If an error occurs, the error message "CE04: MCI communication error" (error no. 01.0127.00002) is output.

▶ Addressing can be carried out automatically via the EtherCAT master or manually via codes in the »Engineer«.

    ▸ Address allocation (▭ 30)

7 Data transfer

EtherCAT transmits data in so-called "EtherCAT frames". The EtherCAT nodes only extract the data intended for them while the EtherCAT frame passes through the device. At the same time output data are inserted into the frame while it passes through the device. Read and write accesses are only executed on a small section of the entire EtherCAT frames – the datagrams. Therefore it is not necessary to receive the complete frame before it can be processed. The processing starts as soon as possible.

EtherCAT transmits process data, parameter data, configuration data, and diagnostic data between the host (master) and the controllers (slaves) that are part of the fieldbus. The data are transmitted via corresponding communication channels depending on their time-critical behaviour (see Process data transfer (🕮 37) / Parameter data transfer (🕮 43)).

7.1 EtherCAT frame structure

EtherCAT frames have the following structure:

Ethernet header			Ethernet data				FCS
48 bits	48 bits	16 bits	11 bits	1 bit	4 bits	48 ... 1498 bytes	32 bits
Destination	Source	EtherType	Frame header			Datagrams	
			Length	Reserved	Type		

Ethernet header

The Ethernet header contains the following information:

▶ Target address of the EtherCAT frame (destination)

▶ Source address of the EtherCAT frame (source)

▶ Type of the EtherCAT frame (EtherType = 0x88A4)

Ethernet data

The Ethernet data contain the following information:

▶ Length of the datagrams within the EtherCAT frame (Length)

▶ One reserved bit (Reserved)

▶ Type of the datagrams within the EtherCAT frame (Type)

▶ EtherCAT datagrams (Datagrams)

FCS

Checksum of the EtherCAT frame

7.2 EtherCAT datagrams

EtherCAT datagrams have the following structure:

EtherCAT Command header	Data	WKC
10 bytes	Max. 1486 bytes	2 bytes

EtherCAT command header

The EtherCAT command header contains the following information:

▶ Command to be executed

▶ Addressing information

▶ Length of the data area (Data)

▶ Interrupt field

Data

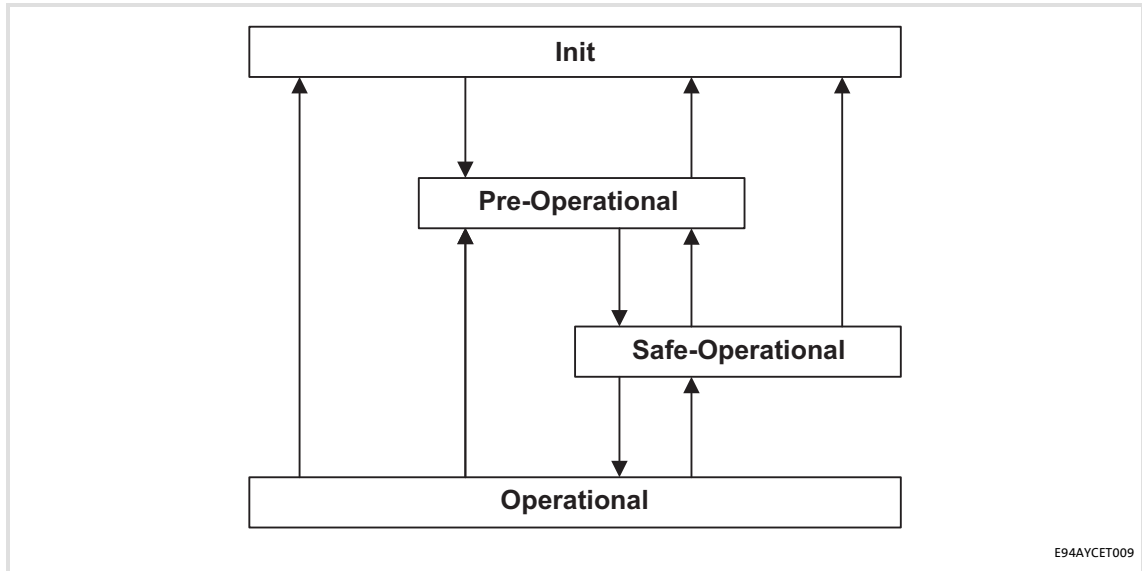The data area contains the data of the command to be executed.

WKC

The working counter is evaluated by the master for monitoring the execution of the command.

Lenze

Communication manual 8400 motec EtherCAT®
Data transfer
EtherCAT state machine

7.3 EtherCAT state machine

Before communication is possible via EtherCAT, the fieldbus passes through the EtherCAT state machine during start-up. The following illustration depicts the possible state changes from the point of view of an EtherCAT slave:

[7-1] EtherCAT state machine

Status	Description
Init	• Initialisation phase • No SDO/PDO communication with the slave • Device detection possible by means of a fieldbus scan
Pre-operational	• The fieldbus is active. • SDO communication (mailbox communication) is possible. • No PDO communication

Safe-operational	• SDO communication (mailbox communication) is possible.
	• PDO communication:
	  −The input data are transferred to the master and evaluated.
	  −The output data are in the "Safe" state. They are not transferred to the standard device.

Operational	• Normal operation
	  −SDO communication
	  −PDO communication
	  −Fieldbus synchronisation successful (if used)

The current state of the EtherCAT state machine is displayed under C13861 and indicated via the "RUN" LED.

Possible errors during state transitions are displayed in C13879. In addition, an error message is entered into the "AL Status Code" EtherCAT register (📖 36).

▶ Diagnostics with the »Engineer« (📖 60)

▶ LED status displays (📖 58)

Lenze

Communication manual 8400 motec EtherCAT®
Data transfer
EtherCAT state machine

AL Status Code

Information on how to access the "AL Status Code" EtherCAT register (address 0x0134:0x0135) can be found in the documentation for the EtherCAT master.

These error messages can be entered into the "AL Status Code" register:

Code [hex]	Description
0x0000	No error
0x0011	Invalid status change requested
0x0012	Unknown status requested
0x0013	"Bootstrap" status is not supported
0x0016	Invalid mailbox configuration "Pre-operational"
0x001A	Synchronisation error
0x001B	Sync manager watchdog
0x001D	Invalid output data configuration
0x001E	Invalid input data configuration
0x002B	Invalid input and output data
0x0030	Invalid configuration of DC synchronisation
0x9001	Firmware watchdog error
0x9002	Mapping error

8 Process data transfer

▶ Process data are transmitted by means of so-called EtherCAT datagrams (⊞ 34) via the process data channel.

▶ The Inverter Drive 8400 motec is controlled by means of the process data.

▶ Transferring process data is time-critical.

▶ Process data are cyclically transferred between the host (master) and the controllers (slaves) (continuous exchange of current input and output data).

▶ The master can directly access the process data. In the PLC for instance, the data are directly stored in the I/O area.

▶ A maximum of 10 process data words (max. 20 bytes) can be sent to the master.

▶ A maximum of 8 process data words (max. 16 bytes) can be sent by the master.

▶ Process data are not saved to the Inverter Drive 8400 motec.

▶ Process data are for instance setpoints, actual values, control words, and status words.

Lenze

8.1 **Accessing process data / PDO mapping**

Process data are transferred via the MCI/CAN interface.

▶ Max. 8 words (16 bits/word) per direction can be exchanged.

▶ The process data are accessed via the port blocks **LP_Network_In** and **LP_Network_Out**. These port blocks are also called process data channels.

▶ The **LP_Network_In** port block maps the received MCI-PDOs.

▶ The **LP_Network_Out** port block maps the MCI-PDOs to be sent.

▶ The port/function block interconnection of the process data objects (PDOs) is made via the Lenze »Engineer«.
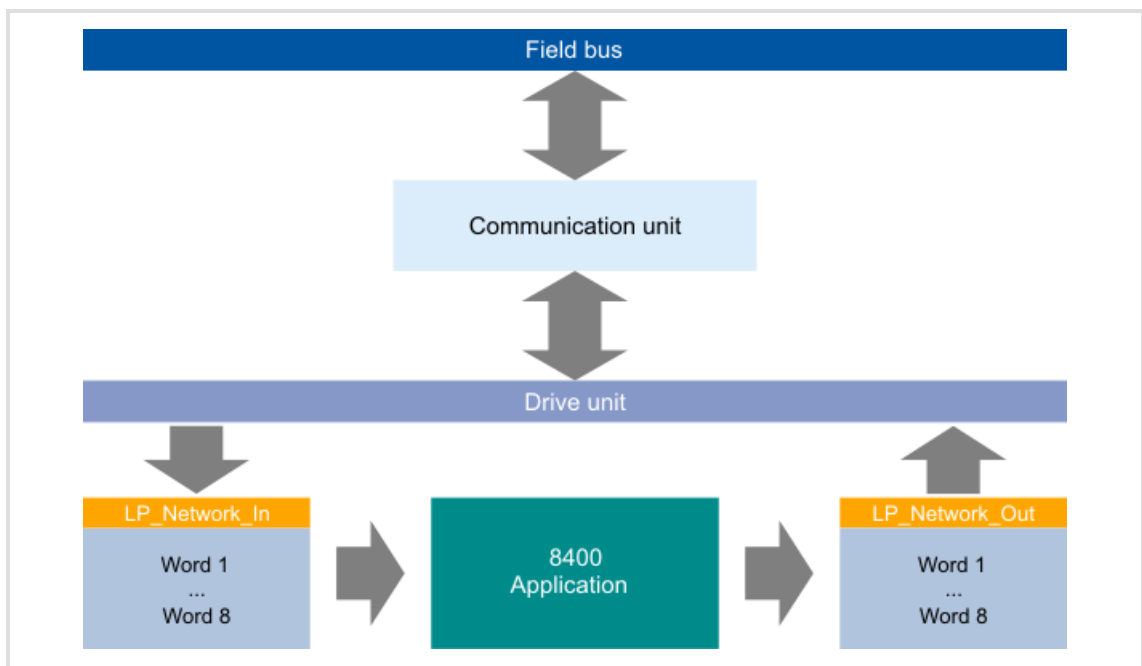
[8-1]   Outer and inner data transfer between bus system, controller, and application

🛈 **Software manual / »Engineer« online help "Inverter Drives 8400 motec"**

Here you can find detailed information on the port/function block interconnection in the »Engineer« and on port blocks.

Lenze

8.2 **Configuring the port interconnection of the process data objects (PDO)**

> **ℹ Note!**
>
> The following »Engineer« screenshots are only <u>examples</u> of the setting sequence and the resulting displays.
>
> Depending on the software version of the controller and of the installed »Engineer« software, the screenshots may vary from your »Engineer« depiction.

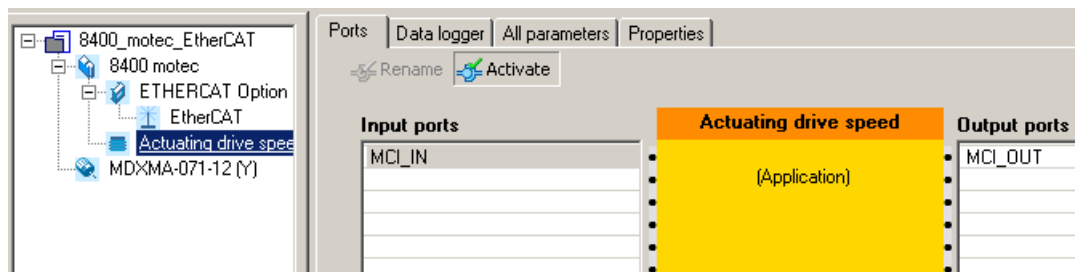The preconfigured port interconnection of the process data objects is activated by setting code **C00007 = 40: Network (MCI/CAN)**.

⌨ **How to configure the port interconnection in the »Engineer«:**

1. Go to the **Process data objects** tab and click **Go to application**.
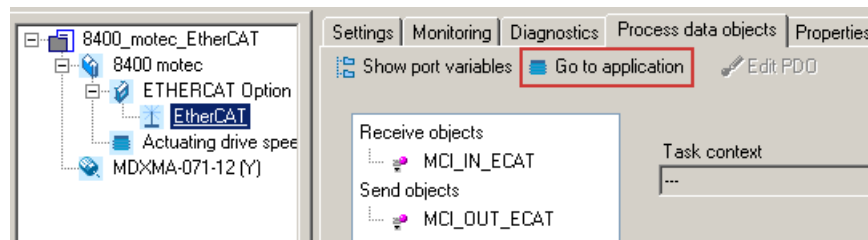
2. The **Ports** tab displays the port blocks MCI_IN and MCI_OUT.

3. Click the port to be configured and press the **Change Variable...** button.

4. The [...] button serves to assign signals to the process data words in the *Assignment Signal --> Function Block* dialog box.
   → Select signals and then click the **OK** button.

Communication manual 8400 motec EtherCAT®
Process data transfer
Configuring the port interconnection of the process data objects (PDO)
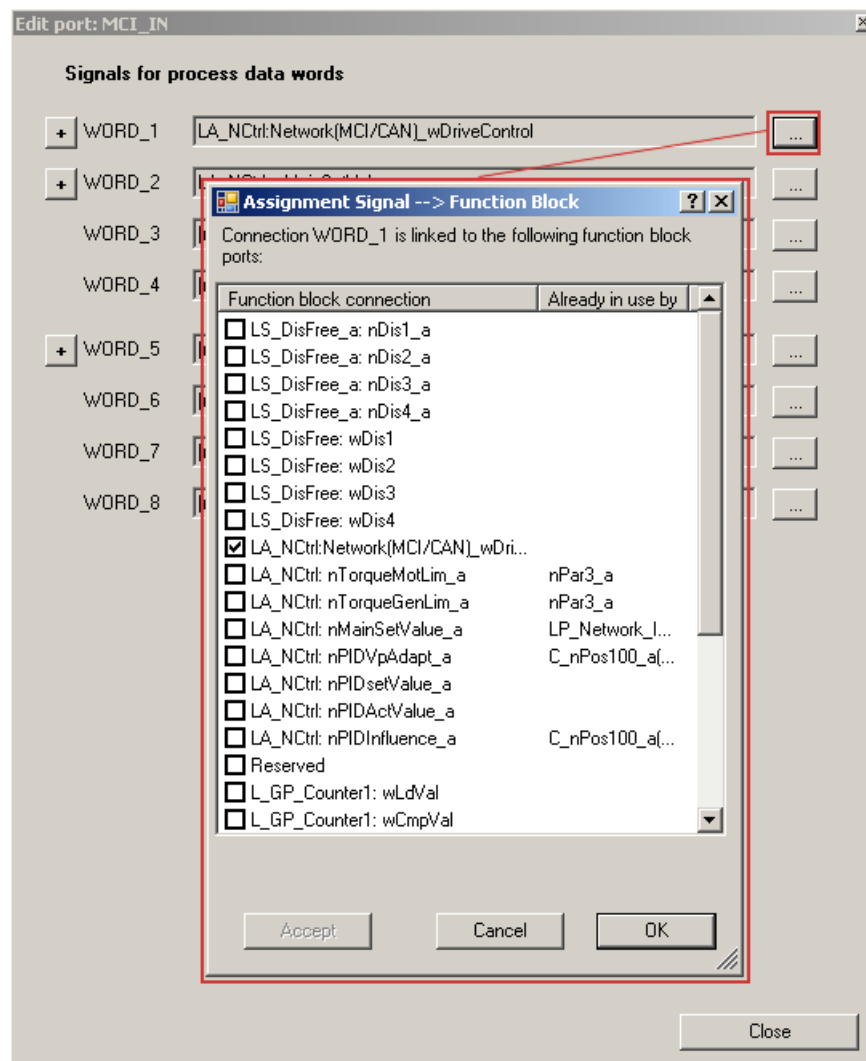
For some process data words, you can also assign signals to the individual bits via the ⊞ and … buttons.

➜ Select the signals and then confirm the selection with **OK**.
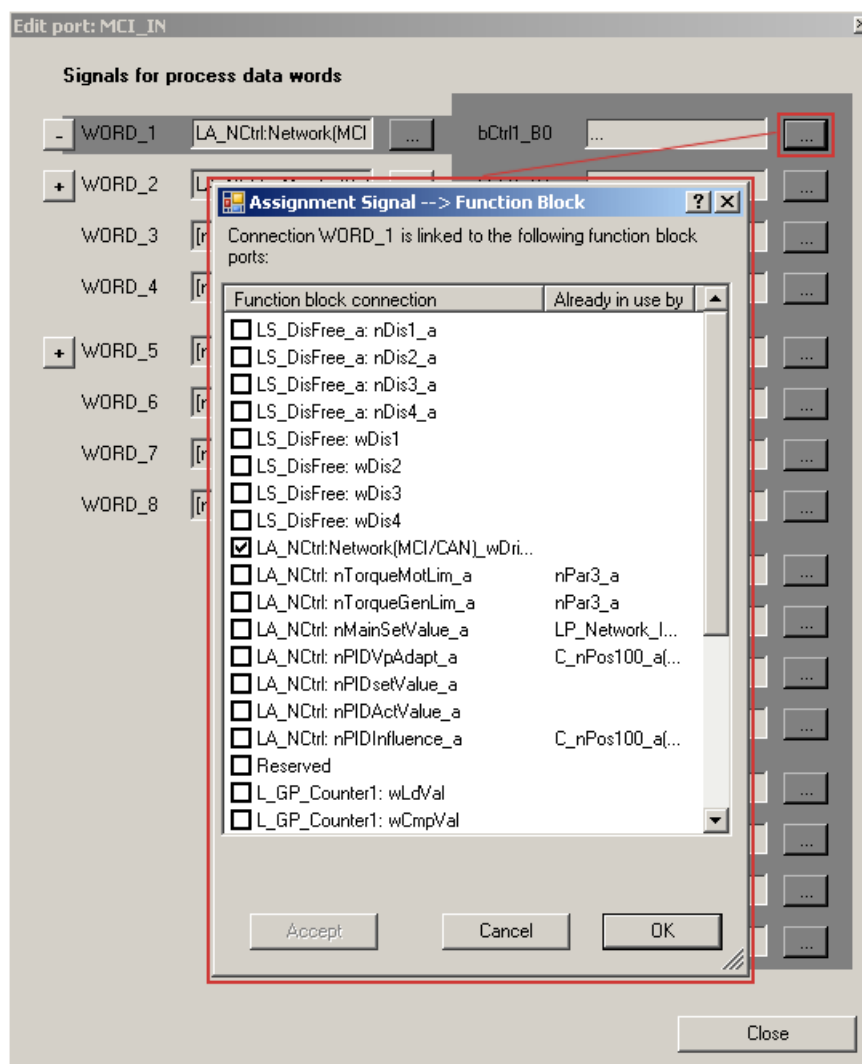
The current interconnection is only displayed if the following has been set for the control mode in code **C00007 = 40: Network (MCI/CAN)**.

5. Via standard device code **C00002**, execute the **"11: Save all parameter sets"** device command to activate the changed port interconnection and to save it to the memory module.

Communication manual 8400 motec EtherCAT®
Parameter data transfer
Establishing a connection between master and slave

9 Parameter data transfer

Parameter data are transmitted via the fieldbus as so-called SDOs (Service Data Objects). The SDO services provide for the write and read access to the object directory.

▶ The SDO channel provides for the access to Implemented CoE objects (📖 53) and Lenze codes by means of the CoE protocol.

▶ In general, the parameter data transfer is not time-critical.

▶ Parameter data are, for instance, operating parameters, motor data, diagnostic information.

9.1 Establishing a connection between master and slave

Basically a master can always request parameter jobs from a slave if the slave is at least in the "Pre-operational" state.
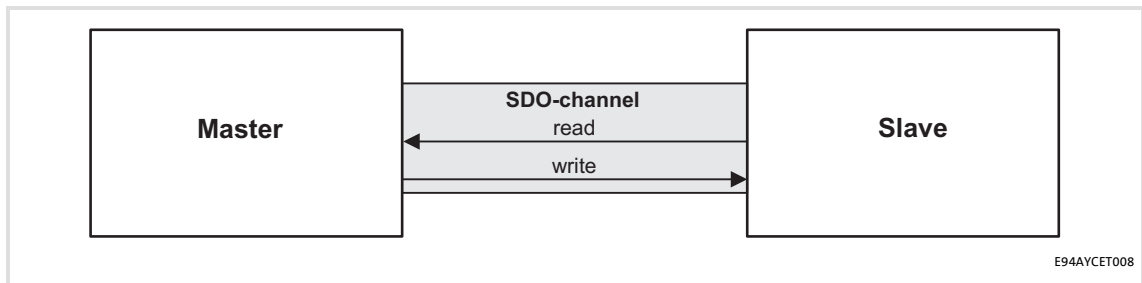
[9-1]   Data communication via the SDO channel

Lenze

Communication manual 8400 motec EtherCAT®
Parameter data transfer
Reading and writing parameters

9.2 **Reading and writing parameters**

Parameters ...

▶ are set e.g. for one-time system settings or if materials are changed within a machine.

▶ are transmitted with a low priority.

In the case of Lenze controllers, the parameters to be changed are contained in codes.

Indexing of the Lenze codes

The codes of the Inverter Drive 8400 motec are addressed by the index when accessed via the Communication Unit.

The index of Lenze code numbers within the manufacturer-specific area of the object directory is between 8192 (0x2000) and 24575 (0x5FFF).

Conversion formula	
Index [dec]	**Index [hex]**
24575 - Lenze code	0x5FFF - Lenze code$_{hex}$

Example of C00002 (device commands)	
Index [dec]	**Index [hex]**
24575 - 2 = 24573	0x5FFF - 2 = 0x5FFD

Structure of a mailbox datagram

Mailbox data are transmitted in a datagramm within an EtherCAT frame. The data area of the mailbox datagram has the following structure:

Mailbox Header	CoE Header	SDO control byte	Index	Subindex	Data	Data
6 bytes	2 bytes	1 byte	2 bytes	1 byte	4 bytes	1 ... n bytes

Communication manual 8400 motec EtherCAT®
Parameter data transfer
Reading and writing parameters

9.2.1 Reading parameters (SDO Upload)

1. The master sends "Initiate Domain Upload Request".

2. The slave acknowledges the request with a positive response ("Initiate Domain Upload Response").

   In the event of an error the slave responds with "Abort Domain Transfer".

> **Note!**
>
> In the case of jobs for the controller, please make sure that you convert the code into an index.
>
> ▶ Indexing of the Lenze codes (📖 44)

SDO Upload Request

Detailed breakdown of the data for an "SDO Upload Request":

SDO frame area	Data field	Data type / length		Value / description
Mailbox header	Length	WORD	2 bytes	0x0A: Length of the mailbox service data
	Address	WORD	2 bytes	Station address of the source if an EtherCAT master is the instructing party. Station address of the target if an EtherCAT slave is the instructing party.
	Channel	WORD	6 bits (0 ... 5)	0x00: Reserved
	Priority		2 bits (6, 7)	0x00: Lowest priority ... 0x03: Highest priority
	Type		4 bits (8 ... 11)	0x03: CANopen over EtherCAT (CoE)
	Reserved		4 bits (12 ... 15)	0x00
CANopen header	Number	WORD	9 bits (0 ... 8)	0x00
	Reserved		3 bits (9 ... 11)	0x00
	Service		4 bits (12 ... 15)	0x02: SDO Request
SDO	Reserved	BYTE	4 bits (0 ... 3)	0x00
	Complete access		1 bit (4)	0x00: The entry addressed by index and subindex is read. 0x01: The entire object is read. (Is not supported at present.)
	Command specifier		3 bits (5 ... 7)	0x02: Upload Request
	Index	WORD	2 bytes	Index of the object
	Subindex	BYTE	1 byte	Subindex of the object 0x00 or 0x01 if "Complete access" = 0x01.
	Reserved	DWORD	4 bytes	0x00

Communication manual 8400 motec EtherCAT®
Parameter data transfer
Reading and writing parameters

SDO Upload Expedited Response

An "SDO Upload Expedited Response" is carried out if the data length of the parameter data to be read amounts to a maximum of 4 bytes.

Detailed breakdown of the data for an "SDO Upload Expedited Response":

SDO frame area	Data field	Data type / length		Value / description
Mailbox header	Length	WORD	2 bytes	0x0A: Length of the mailbox service data
	Address	WORD	2 bytes	Station address of the source if an EtherCAT master is the instructing party. Station address of the target if an EtherCAT slave is the instructing party.
	Channel	WORD	6 bits (0 … 5)	0x00: Reserved
	Priority		2 bits (6, 7)	0x00: Lowest priority … 0x03: Highest priority
	Type		4 bits (8 … 11)	0x03: CANopen over EtherCAT (CoE)
	Reserved		4 bits (12 … 15)	0x00
CANopen header	Number	WORD	9 bits (0 … 8)	0x00
	Reserved		3 bits (9 … 11)	0x00
	Service		4 bits (12 … 15)	0x03: SDO Response
SDO	Size indicator	BYTE	1 bit (0)	0x01: Data size in "Data set size"
	Transfer type		1 bit (1)	0x01: Expedited transfer
	Data set size		2 bits (2, 3)	0x00: 4 bytes data 0x01: 3 bytes data 0x02: 2 bytes data 0x03: 1 byte data
	Complete access		1 bit (4)	0x00: The entry addressed by index and subindex is read. 0x01: The entire object is read. (Is not supported at present.)
	Command specifier		3 bits (5 … 7)	0x02: Upload Response
	Index	WORD	2 bytes	Index of the object
	Subindex	BYTE	1 byte	Subindex of the object 0x00 or 0x01 if "Complete access" = 0x01.
	Data	DWORD	4 bytes	Data of the object

Lenze

Communication manual 8400 motec EtherCAT®
Parameter data transfer
Reading and writing parameters

SDO Upload Normal Response

An "SDO Upload Normal Response" is carried out if the data length of the parameter data to be read amounts to ≥ 4 bytes.

Detailed breakdown of the data for an "SDO Upload Normal Response":

SDO frame area	Data field	Data type / length		Value / description
Mailbox header	Length	WORD	2 bytes	n ≥ 0x0A: Length of the mailbox service data
	Address	WORD	2 bytes	Station address of the source if an EtherCAT master is the instructing party. Station address of the target if an EtherCAT slave is the instructing party.
	Channel	WORD	6 bits (0 ... 5)	0x00: Reserved
	Priority		2 bits (6, 7)	0x00: Lowest priority ... 0x03: Highest priority
	Type		4 bits (8 ... 11)	0x03: CANopen over EtherCAT (CoE)
	Reserved		4 bits (12 ... 15)	0x00
CANopen header	Number	WORD	9 bits (0 ... 8)	0x00
	Reserved		3 bits (9 ... 11)	0x00
	Service		4 bits (12 ... 15)	0x03: SDO Response
SDO	Size indicator	BYTE	1 bit (0)	0x01
	Transfer type		1 bit (1)	0x00: Normal transfer
	Data set size		2 bits (2, 3)	0x00
	Complete access		1 bit (4)	0x00: The entry addressed by index and subindex is read. 0x01: The entire object is read. (Is not supported at present.)
	Command specifier		3 bits (5 ... 7)	0x02: Upload Response
	Index	WORD	2 bytes	Index of the object
	Subindex	BYTE	1 byte	Subindex of the object 0x00 or 0x01 if "Complete access" = 0x01.
	Complete size	DWORD	4 bytes	Total data length of the object
	Data	BYTE	n - 10 bytes	Data of the object

Communication manual 8400 motec EtherCAT®
Parameter data transfer
Reading and writing parameters

Example

The transmitted response structure during an **Upload** to index 0x5FD8 (standard value of C00039/1, Fixed_Setpoint_1 = 0x0FA0) includes the following data:

SDO frame area	Data field	Data type / length		Value / description
Mailbox header	Length	WORD	2 bytes	0x0A: Length of the mailbox service data
	Address	WORD	2 bytes	0x00
	Channel	WORD	6 bits (0 ... 5)	0x00: Reserved
	Priority		2 bits (6, 7)	0x00: Lowest priority
	Type		4 bits (8 ... 11)	0x03: CANopen over EtherCAT (CoE)
	Reserved		4 bits (12 ... 15)	0x00
CANopen header	Number	WORD	9 bits (0 ... 8)	0x00
	Reserved		3 bits (9 ... 11)	0x00
	Service		4 bits (12 ... 15)	0x03: SDO Response
SDO	Size indicator	BYTE	1 bit (0)	0x01: Data length in "Data set size"
	Transfer type		1 bit (1)	0x01: Expedited transfer
	Data set size		2 bits (2, 3)	0x02: 2 bytes data
	Complete access		1 bit (4)	0x00: The entry addressed by index and subindex is read.
	Command specifier		3 bits (5 ... 7)	0x02: Upload Response
	Index	WORD	2 bytes	0xD8: Index low byte of the object 0x5F: Index high byte of the object
	Subindex	BYTE	1 byte	0x01
	Data	DWORD	2 bytes	0x0FA0

Communication manual 8400 motec EtherCAT®
Parameter data transfer
Reading and writing parameters

9.2.2 **Writing parameters (SDO Download)**

1. The master sends "Initiate Domain Download Request".

2. The slave acknowledges the request with a positive response ("Initiate Domain Download Response").

   In the event of an error the slave responds with "Abort Domain Transfer".

> **Note!**
>
> In the case of jobs for the controller, please make sure that you convert the code into an index.
>
> ▸ Indexing of the Lenze codes (🕮 44)

SDO Download Expedited Request

An "SDO Download Expedited Request" is carried out if the data length of the parameter data to be written amounts to a maximum of 4 bytes.

Detailed breakdown of the data for an "SDO Download Expedited Request":

SDO frame area	Data field	Data type / length		Value / description
Mailbox header	Length	WORD	2 bytes	0x0A: Length of the mailbox service data
	Address	WORD	2 bytes	Station address of the source if an EtherCAT master is the instructing party. Station address of the target if an EtherCAT slave is the instructing party.
	Channel	WORD	6 bits (0 ... 5)	0x00: Reserved
	Priority		2 bits (6, 7)	0x00: Lowest priority ... 0x03: Highest priority
	Type		4 bits (8 ... 11)	0x03: CANopen over EtherCAT (CoE)
	Reserved		4 bits (12 ... 15)	0x00
CANopen header	Number	WORD	9 bits (0 ... 8)	0x00
	Reserved		3 bits (9 ... 11)	0x00
	Service		4 bits (12 ... 15)	0x02: SDO Request
SDO	Size indicator	BYTE	1 bit (0)	0x01: Data size in "Data set size"
	Transfer type		1 bit (1)	0x01: Expedited transfer
	Data set size		2 bits (2, 3)	0x00: 4 bytes data 0x01: 3 bytes data 0x02: 2 bytes data 0x03: 1 byte data
	Complete access		1 bit (4)	0x00: The entry addressed by index and subindex is written. 0x01: The entire object is written. (Is not supported at present.)
	Command specifier		3 bits (5 ... 7)	0x01: Download Request
	Index	WORD	2 bytes	Index of the object
	Subindex	BYTE	1 byte	Subindex of the object 0x00 or 0x01 if "Complete access" = 0x01.
	Data	DWORD	4 bytes	Data of the object

Communication manual 8400 motec EtherCAT®
Parameter data transfer
Reading and writing parameters

SDO Download Normal Request

An "SDO Download Normal Request" is carried out if the data length of the parameter data to be written amounts to ≥ 4 bytes.

Detailed breakdown of the data for an "SDO Download Normal Request":

SDO frame area	Data field	Data type / length		Value / description
Mailbox header	Length	WORD	2 bytes	n ≥ 0x0A: Length of the mailbox service data
	Address	WORD	2 bytes	Station address of the source if an EtherCAT master is the instructing party. Station address of the target if an EtherCAT slave is the instructing party.
	Channel	WORD	6 bits (0 ... 5)	0x00: Reserved
	Priority		2 bits (6, 7)	0x00: Lowest priority ... 0x03: Highest priority
	Type		4 bits (8 ... 11)	0x03: CANopen over EtherCAT (CoE)
	Reserved		4 bits (12 ... 15)	0x00
CANopen header	Number	WORD	9 bits (0 ... 8)	0x00
	Reserved		3 bits (9 ... 11)	0x00
	Service		4 bits (12 ... 15)	0x02: SDO Request
SDO	Size indicator	BYTE	1 bit (0)	0x01
	Transfer type		1 bit (1)	0x00: Normal transfer
	Data set size		2 bits (2, 3)	0x00
	Complete access		1 bit (4)	0x00: The entry addressed by index and subindex is written. 0x01: The entire object is written. (Is not supported at present.)
	Command specifier		3 bits (5 ... 7)	0x01: Download Request
	Index	WORD	2 bytes	Index of the object
	Subindex	BYTE	1 byte	Subindex of the object 0x00 or 0x01 if "Complete access" = 0x01.
	Complete size	DWORD	4 bytes	Total data length of the object
	Data	BYTE	n - 10 bytes	Data of the object

Communication manual 8400 motec EtherCAT®
Parameter data transfer
Reading and writing parameters

SDO Download Response

Detailed breakdown of the data for an "SDO Download Response":

SDO frame area	Data field	Data type / length		Value / description
Mailbox header	Length	WORD	2 bytes	0x0A: Length of the mailbox service data
	Address	WORD	2 bytes	Station address of the source if an EtherCAT master is the instructing party. Station address of the target if an EtherCAT slave is the instructing party.
	Channel	WORD	6 bits (0 … 5)	0x00: Reserved
	Priority		2 bits (6, 7)	0x00: Lowest priority … 0x03: Highest priority
	Type		4 bits (8 … 11)	0x03: CANopen over EtherCAT (CoE)
	Reserved		4 bits (12 … 15)	0x00
CANopen header	Number	WORD	9 bits (0 … 8)	0x00
	Reserved		3 bits (9 … 11)	0x00
	Service		4 bits (12 … 15)	0x03: SDO Response
SDO	Size indicator	BYTE	1 bit (0)	0x0
	Transfer type		1 bit (1)	0x0
	Data set size		2 bits (2, 3)	0x0
	Complete access		1 bit (4)	0x00: The entry addressed by index and subindex is written. 0x01: The entire object is written. (Is not supported at present.)
	Command specifier		3 bits (5 … 7)	0x3: Download Response
	Index	WORD	2 bytes	Index of the object
	Subindex	BYTE	1 byte	Subindex of the object 0x00 or 0x01 if "Complete access" = 0x01.
	Reserved	DWORD	4 bytes	0x00

Example

The transmitted request structure during a **Download** to index 0x1600 includes the following data:

SDO frame area	Data field	Data type / length		Value / description
Mailbox header	Length	WORD	2 bytes	0x0A: Length of the mailbox service data
	Address	WORD	2 bytes	0x00
	Channel	WORD	6 bits (0 ... 5)	0x00: Reserved
	Priority		2 bits (6, 7)	0x00: Lowest priority
	Type		4 bits (8 ... 11)	0x03: CANopen over EtherCAT (CoE)
	Reserved		4 bits (12 ... 15)	0x00
CANopen header	Number	WORD	9 bits (0 ... 8)	0x00
	Reserved		3 bits (9 ... 11)	0x00
	Service		4 bits (12 ... 15)	0x02: SDO Request
SDO	Size indicator	BYTE	1 bit (0)	0x01: Data size in "Data set size"
	Transfer type		1 bit (1)	0x01: Expedited transfer
	Data set size		2 bits (2, 3)	0x00: 4 bytes data
	Complete access		1 bit (4)	0x00: The entry addressed by index and subindex is written.
	Command specifier		3 bits (5 ... 7)	0x01: Download Request
	Index	WORD	2 bytes	0x00: Index low byte of the object 0x16: Index high byte of the object
	Subindex	BYTE	1 byte	0x01: Subindex of the object
	Data	DWORD	4 bytes	0x5C930110

Lenze

Communication manual 8400 motec EtherCAT®
Parameter data transfer
Implemented CoE objects

9.3 Implemented CoE objects

Lenze devices can be parameterised with both Lenze codes and the manufacturer-independent "CoE objects". In order to comply fully with EtherCAT communication, you may only use the CoE objects for parameterisation. The CoE objects described in this manual are defined in the "EtherCAT Specification, Part 6 – Application Layer Protocol Specification".

Index	Designation	Subindex	Subindex name	Type	Bits	Access
0x1000	Device type	-	-	UDINT	32	R
0x1001	Error register	-	-	USINT	8	R
0x1008	Device name	-	-	STRING(8)	64	R
0x1009	Hardware version	-	-	STRING(8)	64	R
0x100A	Software version	-	-	STRING(7)	56	R
0x1018	Identity	0	Number of elements	USINT	8	R
		1	Vendor ID	UDINT	32	R
		2	Product code	UDINT	32	R
		3	Revision number	UDINT	32	R
		4	Serial number	UDINT	32	R
0x1600	RxPDO 1	0	Number of elements	USINT	8	RW
		1 ... 8	Output object 1 ... 8	UDINT	32	RW
0x1A00	TxPDO 1	0	Number of elements	USINT	8	RW
		1 ... 10	Input object 1 ... 10	UDINT	32	RW
0x1C00	Sync Man Communication type	0	Number of elements	USINT	8	R
		1	Elements	UDINT	32	R
0x1C10	Sync Man 0 Assignment	0	-	UINT	16	R
0x1C11	Sync Man 1 Assignment	0	-	UINT	16	R
0x1C12	Sync Man 2 Assignment	0	Number of assigned RxPDOs	USINT	8	R
		1	PDO Mapping object index of assigned RxPDO	UDINT	32	R
0x1C13	Sync Man 3 Assignment	0	Number of assigned TxPDOs	USINT	8	R
		1	PDO Mapping object index of assigned TxPDO	UDINT	32	R
0x1C32	Sync Man 2 Synchronization	0	Number of elements	USINT	8	R
		1	Synchronization type	UINT	16	R
		2	Cycle time / ns	UDINT	32	R
		3	Shift time / ns	UDINT	32	R
		4	Sync types supported	UINT	16	R
		5	Minimum cycle time / ns	UDINT	32	R
		6	Minimum shift time / ns	UDINT	32	R
0x1C33	Sync Man 3 Synchronization	0	Number of elements	USINT	8	R
		1	Synchronization type	UINT	16	R
		2	Cycle time / ns	UDINT	32	R
		3	Shift time / ns	UDINT	32	R
		4	Sync types supported	UINT	16	R
		5	Minimum cycle time / ns	UDINT	32	R
		6	Minimum shift time / ns	UDINT	32	R

R: Read access only
RW: Read and write access

Communication manual 8400 motec EtherCAT®
Parameter data transfer
EtherCAT objects of the Communication Unit

9.4 **EtherCAT objects of the Communication Unit**

The object directory displays the <u>Parameters relevant for EtherCAT communication</u> (67) as objects:

Index	Code	Index name	Subindex	Subindex name	Type	Bits	Access
0x29E5	C13850	All words from drive to master	0 ... 10	All words from drive to master	UNSIGNED	16	R
0x29E4	C13851	All words from master to drive	0 ... 8	All words from master to drive	UNSIGNED	16	R
0x29DC	C13859	Number of PDO words Tx	-	-	UNSIGNED	16	R
0x29DB	C13860	Number of PDO words Rx	-	-	UNSIGNED	16	R
0x29DA	C13861	Bus state	-	-	UNSIGNED	16	R
0x29D7	C13864	Active station address	-	-	UNSIGNED	16	R
0x29D4	C13867	Display last emergency data	-	-	STRING(8)	64	R
0x29C8	C13879	Bus error	-	-	UNSIGNED	16	R
0x29C7	C13880	Reaction on communication failure	1	-	UNSIGNED	8	RW
0x29C6	C13881	Monitoring time com. failure	-	-	UNSIGNED	16	RW
0x29C2	C13885	Clear process data	-	-	UNSIGNED	8	RW
0x29B4	C13899	Station Alias address	-	-	UNSIGNED	16	RW
0x29B3	C13900	Firmware product type	-	-	STRING(8)	64	R
0x29B2	C13901	Firmware compilation date	-	-	STRING(20)	160	R
0x29B1	C13902	Firmware version	-	-	STRING(11)	88	R

R: Read access only
RW: Read and write access

Lenze

9.5 SDO abort codes (Abort codes)

If an SDO request is evaluated negatively, a corresponding error code is output.

Index [hex]	Description
0x00000000	No error
0x05030000	The status of the toggle bit has not changed
0x05040000	SDO time-out protocol
0x05040001	Invalid or unknown specification symbol for the client/server command
0x05040005	Not enough space in the main memory
0x06010000	Non-supported access to an object
0x06010001	Read access to a write-protected object
0x06010002	Write access to a write-protected object
0x06020000	An object does not exist in the object directory
0x06040041	An object cannot be mapped into the PDO
0x06040042	The number and/or length of the objects mapped would exceed the PDO length
0x06040043	General parameter incompatibility
0x06040047	General internal incompatibility within the device
0x06060000	Access has failed due to a fault in the hardware
0x06070010	The data type or the parameter length does not correspond
0x06070012	Incorrect data type (The parameter length is too large)
0x06070013	Incorrect data type (The parameter length is too small)
0x06090011	A subindex is not available
0x06090030	The value range for parameters is too great (only for write access)
0x06090031	The parameter value is too high
0x06090032	The parameter value is too low
0x06090036	The maximum value is lower than the minimum value
0x08000000	General error
0x08000020	Data cannot be transferred to the application or stored in the application
0x08000021	Due to local control, data cannot be transferred to the application or stored in the application
0x08000022	Due to the current device state, data cannot be transferred to the application or stored in the application
0x08000023	The dynamic object directory generation has failed, or no object directory is available

Lenze

Communication manual 8400 motec EtherCAT®
Monitoring
Interruption of EtherCAT communication

10 Monitoring

10.1 Interruption of EtherCAT communication

An interruption of the EtherCAT communication in the "Operational" state, e.g. due to cable break of failure of the EtherCAT master, is detected by the slave.

⌨️🖱 **The response to the communication interruption is controlled via the following settings:**

1. During the initialisation of the EtherCAT communication, the sync manager watchdog monitoring time determined in the master is transferred to the slave.

   If the slave does not receive any valid process data in the "Operational" state, the process data are treated according to the setting in **2** C13885. (The data sent last by the master can be used or reset to zero.)

   After the watchdog monitoring time has expired, the slave changes to the "Error Safe-Operational" state (see C13861). LEDs **RUN** (green) and **ERR** (red) are activated (see LED status displays (📖 58)).

   There is no response in the slave.

2. In order to trigger a response in the slave, you can set an additional **1** **response of the Inverter Drive 8400 motec** (C13880) in the »Engineer« on the **Monitoring** tab.
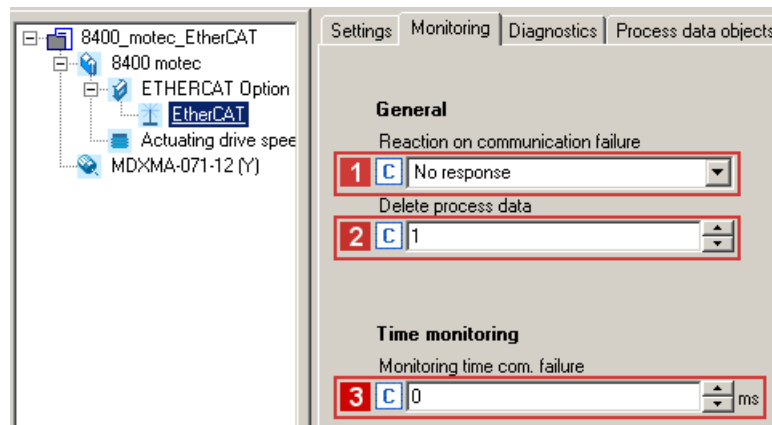
Set a **response delay** **3** (C13881) to delay execution of the response.

- A Lenze setting of "No response" deactivates this monitoring.
- Setting a response will activate the monitoring as long as a response time < 65356 ms is set.
- A change in monitoring is effective immediately.
- The monitoring time expires as soon as communication in the "Operational" state is interrupted.

After the monitoring time has elapsed, the set response is executed with the error message "Operational status quit [0x01bc8131]" (📖 65).

Communication manual 8400 motec EtherCAT®
Monitoring
Fault of the internal communication

3. Via standard device code **C00002**, execute the **"11: Save all parameter sets"** device command to activate the changed parameter settings and to save it to the memory module.

10.2 Fault of the internal communication

▶ The response to a communication error between the Communication Unit and the Drive Unit can be set in code C01501.

▶ The Communication Unit reports interrupted communication via an emergency telegram to the master and changes to the "Safe-Operational" state.

▶ Error message "Lost connection to 8400 base device [0x01bc3100]" (📖 63) is issued.

Communication manual 8400 motec EtherCAT®
Diagnostics
LED status displays
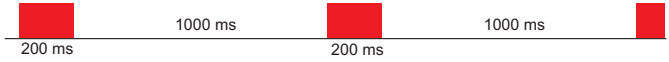
11 Diagnostics

EtherCAT communication faults can be diagnosed via the LEDs of the Communication Unit. Moreover, the »Engineer« providesEtherCAT diagnostic information.

11.1 LED status displays

E84DG056
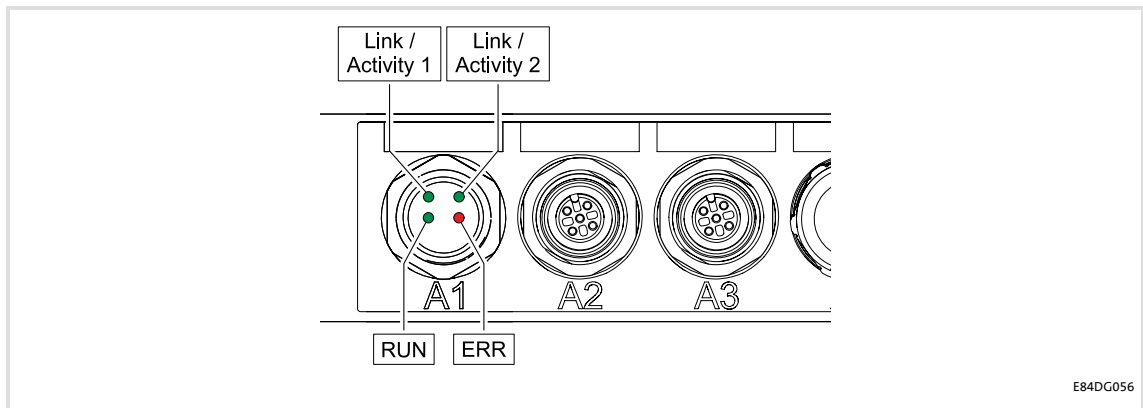
LED	Colour	Status	Description
Link / Activity 1 (A2)	green	off	• There is no cable connected to the EtherCAT input (IN). • No communication
		on	 A cable is connected to the EtherCAT input (IN).
		flickering	 50 ms Communication at the EtherCAT input (IN) is active.
Link / Activity 2 (A3)	green	off	• There is no cable connected to the EtherCAT output (OUT). • No communication
		on	 A cable is connected to the EtherCAT output (OUT).
		flickering	 50 ms Communication at the EtherCAT output (OUT) is active.

Lenze

LED	Colour	Status	Description
RUN	green	off	The Communication Unit is not active on the fieldbus or is in the "Init" state.
		on	The Communication Unit is in the "Operational" state.
		blinking	"Pre-operational" status is active: • Access to parameters and objects is possible. • No process data exchange.
		blinking once (single flash)	"Safe-operational" status is active: • The data are transferred from the controller to the master. The data to the controller are not active yet.
ERR	red	off	No error
		blinking	The configuration is invalid/faulty.
		blinking once (single flash)	• A not requested state change has occurred. (The slave application has autonomously changed the EtherCAT status.) • Synchronisation error (The EtherCAT node automatically changes to the "Safe-operational" state.)
		blinking twice (double flash)	An "Application Watchdog Timeout" or a "Sync Manager Watchdog Timeout" has occurred.

11.2 Diagnostics with the »Engineer«

In the »Engineer« under the **Diagnostics** tab, various EtherCAT diagnostics information is displayed.
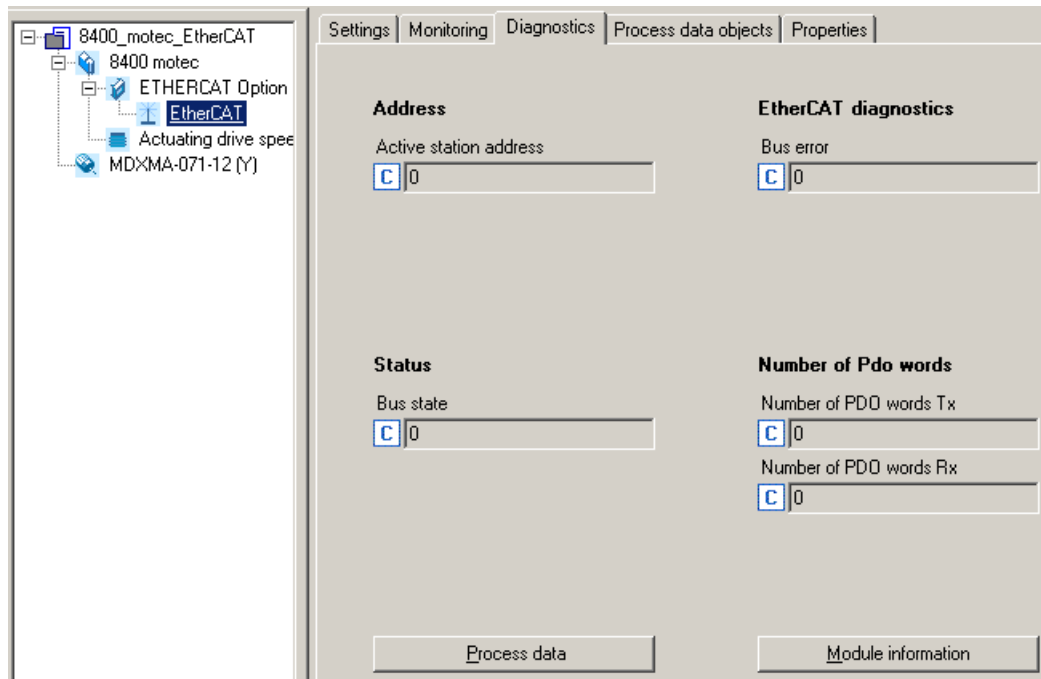
11.3 Emergency requests / Emergency messages

Emergency messages are sent to the EtherCAT master once when the error status changes, i.e …

▶ if an error of the Inverter Drive 8400 motec or the Communication Unit occurs;

▶ if an internal error of the Communication Unit is no longer pending.

An "Emergency Request" on the fieldbus consists of the components "Mailbox Header", "CANopen Header" and the actual "Emergency Message":

Mailbox header	CANopen header	Emergency Message
6 bytes	2 bytes	8 bytes

Structure of the Emergency message

Example: Emergency message of the error "Operational status quit [0x01bc8131]":

Byte 1	Byte2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Emergency Error code		Error Register (I-1001)	Reserved	Error code Inverter Drive 8400 motec / E84DGFCTxxx			
Low byte	High byte	Low byte	High byte	Low word		High word	
				Low byte	High byte	Low byte	High byte
0x00	0x10	0x01	0x00	0x31	0x81	0xbc	0x01

▶ Bytes 1 and 2 indicate that an error is pending.

▶ Byte 3 display the contents of the error register (I-1001).

▶ The error code is displayed in bytes 5 … 8:
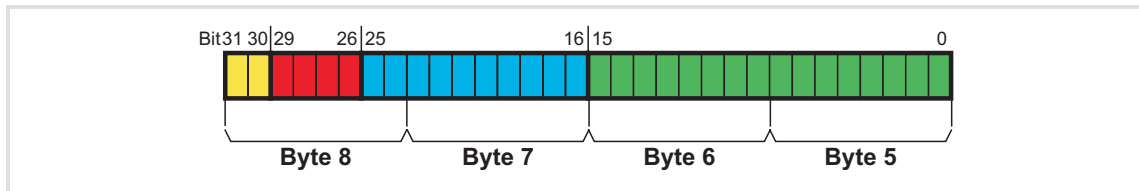
Byte 8		Byte 7		Byte 6		Byte 5	
0x01		0xbc		0x81		0x31	
0 0	0 0 0 0	0 1	1 0 1 1 1 1 0 0	1 0 0 0 0 0 0 1		0 0 1 1 0 0 0 1	
Reaction	Instance ID		Module ID		Error ID		

🛈 **Software manual/»Engineer« online help for Inverter Drives 8400 motec**

Detailed information on the error codes is provided here.

Communication manual 8400 motec EtherCAT®
Error messages
Short overview of EtherCAT error messages

12 Error messages

This chapter complements the error list in the software manual and the »Engineer« online help for the Inverter Drive 8400 motec by EtherCAT error messages.

> **Software manual/»Engineer« online help for Inverter Drives 8400 motec**
>
> Here you can find general information on diagnostics & fault analysis and on error messages.

12.1 Short overview of EtherCAT error messages

The table below contains all EtherCAT error messages in the numerical order of the error number. In addition, the preset error response and – if applicable – the parameter for setting the error response are provided.

> **Tip!**
>
> When you click the cross-reference in the first column, you will get to the detailed description (causes and remedies) of the corresponding error message.

Error no. [hex]	Subject area no. [dec]	Error no. [dec]	Error text	Error type (Error response)	Can be set in
0x01bc3100	444	12544	Lost connection to 8400 base device	1: Error	C01501/2
0x01bc5531	444	21809	Memory: No access	1: Error	C01501/2
0x01bc5532	444	21810	Memory: Read error	1: Error	C01501/2
0x01bc5533	444	21811	Memory: Write error	1: Error	C01501/2
0x01bc6010	444	24592	Restart by Watchdog Reset	1: Error	C01501/2
0x01bc6011	444	24593	Internal error	1: Error	C01501/2
0x01bc6100	444	24832	Internal error	1: Error	C01501/2
0x01bc6101	444	24833	Internal error	1: Error	C01501/2
0x01bc641f	444	25631	Invalid parameter record	1: Error	-
0x01bc6420	444	25632	Error: Lenze setting loaded	1: Error	-
0x01bc6430	444	25648	Invalid module configuration	4: Warning locked	-
0x01bc8131	444	33073	"Operational" status quit	0: No response	C13880

Lenze

12.2 **Possible causes and remedies**

This chapter contains all EtherCAT error messages in numerical order of the error number. Possible causes and remedies as well as responses to the error messages are described in detail.

Lost connection to 8400 base device [0x01bc3100]

Response (Lenze setting printed in bold)	Setting: C01501/2 (☑ adjustable response)
☑ No response ☒ **Error** ☐ Fault ☑ Warning locked	

Cause	Remedy
Internal communication to the Control Unit has been interrupted. • Inverter Drive 8400 motec has been switched off. • Incorrect wiring of Communication Unit.	• Switch on Inverter Drive 8400 motec. • Check Communication Unit for correct wiring. • Send the device and a description of the fault to Lenze.

Memory: No access [0x01bc5531]

Response (Lenze setting printed in bold)	Setting: C01501/2 (☑ adjustable response)
☑ No response ☒ **Error** ☐ Fault ☑ Warning locked	

Cause	Remedy
Access to memory was not possible.	Send the device and a description of the fault to Lenze.

Memory: Read error [0x01bc5532]

Response (Lenze setting printed in bold)	Setting: C01501/2 (☑ adjustable response)
☑ No response ☒ **Error** ☐ Fault ☑ Warning locked	

Cause	Remedy
Parameter could not be read.	• Repeat download of the application (including module). • Send the device and a description of the fault to Lenze.

Memory: Write error [0x01bc5533]

Response (Lenze setting printed in bold)	Setting: C01501/2 (☑ adjustable response)
☑ No response ☒ **Error** ☐ Fault ☑ Warning locked	

Cause	Remedy
Parameter could not be written.	• Repeat download of the application (including module). • Send the device and a description of the fault to Lenze.

Restart by Watchdog Reset [0x01bc6010]

Response (Lenze setting printed in bold)	Setting: C01501/2 (☑ adjustable response)
☑ No response ☒ **Error** ☐ Fault ☑ Warning locked	

Cause	Remedy
Device is damaged.	Send the device and a description of the fault to Lenze.

Internal error [0x01bc6011]

Response (Lenze setting printed in bold)	Setting: C01501/2 (☑ adjustable response)
☑ No response ☒ **Error** ☐ Fault ☑ Warning locked	

Cause	Remedy
Device is damaged.	Send the device and a description of the fault to Lenze.

Internal error [0x01bc6100]

Response (Lenze setting printed in bold)	Setting: C01501/2 (☑ adjustable response)
☑ No response ☒ **Error** ☐ Fault ☑ Warning locked	

Cause	Remedy
Device is damaged.	Send the device and a description of the fault to Lenze.

Internal error [0x01bc6101]

Response (Lenze setting printed in bold)	Setting: C01501/2 (☑ adjustable response)
☑ No response ☒ **Error** ☐ Fault ☑ Warning locked	

Cause	Remedy
Device is damaged.	Send the device and a description of the fault to Lenze.

Invalid parameter record [0x01bc641f]

Response (Lenze setting printed in bold)	Setting: not possible
☐ No response ☒ **Error** ☐ Fault ☐ Warning locked	

Cause	Remedy
No active parameter set could be loaded	• Repeat download of the application (including module). • Send the device and a description of the fault to Lenze.

Error: Lenze setting loaded [0x01bc6420]

Response (Lenze setting printed in bold)	Setting: not possible
☐ No response ☒ **Error** ☐ Fault ☐ Warning locked	

Cause	Remedy
Access to parameter set was not possible.	• Repeat download of the application (including module). • Send the device and a description of the fault to Lenze.

Invalid module configuration [0x01bc6430]

Response (Lenze setting printed in bold)	Setting: not possible
☐ No response ☐ Error ☐ Fault ☒ **Warning locked**	

Cause	Remedy
The number of configured process data words via EtherCAT does not correspond to the length saved to the memory module.	Save parameter set via **C00002/11 = 1**.

Operational status quit [0x01bc8131]

Response (Lenze setting printed in bold)	Setting: C13880/1 (☑ Adjustable response)
☒ **No response** ☑ Error ☐ Fault ☑ Warning locked	

Cause	Remedy
The EtherCAT data exchange was stopped in the "Operational" state. • See also chapter "Interruption of EtherCAT communication" (🕮 56).	• Check cables and terminals. • Connect network cable to EtherCAT terminals. • The master has to reset the node to the "Operational" status. (If required, check a pending emergency message first).

Communication manual 8400 motec EtherCAT®
Parameter reference
Communication-relevant parameters of the operating system

13 Parameter reference

This chapter complements the parameter list and table of attributes in the software manual and the »Engineer« online help for the Inverter Drive 8400 motec by the parameters for the EtherCAT communication.

> **Software manual/»Engineer« online help "Inverter Drives 8400 motec"**
>
> Here you will find general information about parameters.

13.1 Communication-relevant parameters of the operating system

This chapter lists the communication-relevant parameters of the 8400 motec operating system in numerically ascending order.

C01501

Parameter	Name:		Data type: UNSIGNED_8
C01501 | Resp. to communication error with MCI			Index: $23074_d = 5A22_h$

Configuration of monitoring functions for the Communication Unit

Selection list		
0	No response	
1	Error	
4	Warning locked	

Subcodes	Lenze setting	Info
C01501/1	1: Error	Resp. to MCI error 1 • Response to a communication error.
C01501/2	1: Error	Resp. to MCI error 2 • Response to troubled Communication Unit.

☑ Read access   ☑ Write access   ☐ CINH   ☐ PLC STOP   ☐ No transfer   ☐ COM   ☐ MOT   Scaling factor: 1

C01503

Parameter	Name:		Data type: UNSIGNED_16
C01503 | MCI timeout			Index: $23072_d = 5A20_h$

Setting range (min. value | unit | max. value)		
0	ms	1000

Subcodes	Lenze setting	Info
C01503/1	200 ms	MCI timeout

☑ Read access   ☑ Write access   ☐ CINH   ☐ PLC STOP   ☐ No transfer   ☐ COM   ☐ MOT   Scaling factor: 1

Communication manual 8400 motec EtherCAT®
Parameter reference
Parameters relevant for EtherCAT communication

13.2 Parameters relevant for EtherCAT communication

This chapter lists the EtherCAT parameters of the Communication Unit in numerically ascending order.

C13850

Parameter	Name:	Data type: UNSIGNED_16
**C13850	All words from drive to master**		Index: $10725_d = 29E5_h$

Display of the process data words (subcodes 1 ... 10) which are transferred from the controller to the master. Only those which are configured are valid.

Display area (min. value	unit	max. value)	
0		65535	
Subcodes		**Info**
C13850/1		1st word
...		...
C13850/8		8th word
C13850/9		I/O data 1
C13850/10		I/O data 2

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT

C13851

Parameter	Name:	Data type: UNSIGNED_16
**C13851	All words from master to drive**		Index: $10724_d = 29E4_h$

Display of the process data words (subcodes 1 ... 8) which are transferred from the master to the controller. Only those which are configured are valid.

Display area (min. value	unit	max. value)	
0		65535	
Subcodes		**Info**
C13851/1		1st word
...		...
C13851/8		8th word

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT

C13859

Parameter	Name:	Data type: UNSIGNED_16
**C13859	All words to standard device**		Index: $10716_d = 29DC_h$

Number of process data words to be sent

Display area (min. value	unit	max. value)	
0		10	

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT

Lenze

Communication manual 8400 motec EtherCAT®
Parameter reference
Parameters relevant for EtherCAT communication

C13860

Parameter	Name:	Data type: UNSIGNED_16
C13860 | All words from standard device	Index: $10715_d = 29DB_h$

Number of process data words to be received

Display area (min. value | unit | max. value)		
0		8

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT

C13861

Parameter	Name:	Data type: UNSIGNED_16
C13861 | Bus state	Index: $10714_d = 29DA_h$

Display of the current bus status
▸ EtherCAT state machine (🕮 35)

Display area (min. value | unit | max. value)		
0		65535

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT

C13864

Parameter	Name:	Data type: UNSIGNED_16
C13864 | Active station address	Index: $10711_d = 29D7_h$

Display of the station address allocated by the master

Display area (min. value | unit | max. value)		
0		32767

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT

C13867

Parameter	Name:	Data type: OCTET_STRING
C13867 | Display last emergency data	Index: $10708_d = 29D4_h$

Display of the emergency data sent by the controller (string with a length of 8 bytes).
▸ Emergency requests / Emergency messages (🕮 61)

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT

C13879

Parameter	Name:	Data type: UNSIGNED_16
C13879 | Bus error	Index: $10696_d = 29C8_h$

Bit-coded display of the bus error
In addition, an error message is entered into the EtherCAT register "AL Status Code" (🕮 36).

Value is bit-coded:	Info
Bit 0 General bus error	
Bit 1 Reserved	
... ...	
Bit 31 Reserved	

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT

.Lenze

Communication manual 8400 motec EtherCAT®
Parameter reference
Parameters relevant for EtherCAT communication

C13880

Parameter	Name:	Data type: UNSIGNED_8
		Index: 10695_d = $29C7_h$

C13880 | Reaction on communication failure

The set response will be executed if the node detects that it is no longer in the "Operational" state and the monitoring time (C13881) has elapsed.
The **notes in code C13881 must be observed!**

▶ Interruption of EtherCAT communication (🕮 56)

Selection list	
0	No response
1	Error
4	Warning locked

Subcodes	Lenze setting	Info
C13880/1	0: No response	

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT

C13881

Parameter	Name:	Data type: UNSIGNED_16
		Index: 10694_d = $29C6_h$

C13881 | Response time when exiting "Operational"

If the "Operational" state is exited, the response parameterised with C13880 occurs after the time set here has elapsed.
- A value of "0" or "65535" in this code deactivates the monitoring.

▶ Interruption of EtherCAT communication (🕮 56)

Setting range (min. value | unit | max. value)			Lenze setting
0	ms	65535	**0 ms**

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT

C13885

Parameter	Name:	Data type: UNSIGNED_8
		Index: 10690_d = $29C2_h$

C13885 | Clear process data

This code serves to set the process data which the slave must process for maintaining internal communication when the EtherCAT has exited the "Operational" state.
- 0: The data last sent by the master are used.
- 1: The process data contents is set to a value of "0".

▶ Interruption of EtherCAT communication (🕮 56)

Setting range (min. value | unit | max. value)			Lenze setting
0		1	**1**

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT

C13899

Parameter	Name:	Data type: UNSIGNED_16
		Index: 10676_d = $29B4_h$

C13899 | Station Alias address

This code serves to set a station alias address.
In order to use a station alias address, you must select a value > "0".
- The station alias address must only be set if the node is part of a "hot connect" group.
- The station alias address must be unambiguous and may only be assigned once within the EtherCAT network.
- Use the same station alias address in the EtherCAT master and in the slave.

▶ Address allocation (🕮 30)

Setting range (min. value | unit | max. value)			Lenze setting
0		32767	**0**

☑ Read access ☑ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☑ COM ☐ MOT

Communication manual 8400 motec EtherCAT®
Parameter reference
Parameters relevant for EtherCAT communication

C13900

Parameter | Name:	Data type: VISIBLE_STRING
C13900 | Firmware product type	Index: 10675_d = $29B3_h$

The code contains a string with a length of 8 bytes.
The following identification code is displayed: "E84DFFET".

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT

C13901

Parameter | Name:	Data type: VISIBLE_STRING
C13901 | Firmware compilation date	Index: 10674_d = $29B2_h$

The code contains a string with a length of 20 bytes.
Here, the compilation date ("MM DD YYYY") and time ("hh:mm:ss") of the software are provided.
Example: "Mar 21 2005 12:31:21"

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT

C13902

Parameter | Name:	Data type: VISIBLE_STRING
C13902 | Firmware version	Index: 10673_d = $29B1_h$

The code contains a string with a length of 11 bytes.
Here, the firmware version is provided.
Example: "01.00.00.00"

☑ Read access ☐ Write access ☐ CINH ☐ PLC-STOP ☐ No transfer ☐ PDO_MAP_RX ☐ PDO_MAP_TX ☐ COM ☐ MOT

13.3 Table of attributes

The table of attributes contains information required for communicating with the controller via parameters.

How to read the table of attributes:

Column		Meaning	Entry	
Code		Parameter name	Cxxxxx	
Name		Parameter short text (display text)	*Text*	
Index	dec	Index by which the parameter is addressed. The subindex for array variables corresponds to the Lenze subcode number.	24575 - Lenze code number	Only required for access via a bus system
	hex		5FFF$_h$ - Lenze code number	
Data	DS	Data structure	E	Single variable (only one parameter element)
			A	Array variable (several parameter elements)
	DA	Number of array elements (subcodes)	*Number*	
	DT	Data type	BITFIELD_8	1 byte, bit-coded
			BITFIELD_16	2 bytes, bit-coded
			BITFIELD_32	4 bytes, bit-coded
			INTEGER_8	1 byte, with sign
			INTEGER_16	2 bytes, with sign
			INTEGER_32	4 bytes, with sign
			UNSIGNED_8	1 byte, without sign
			UNSIGNED_16	2 bytes, without sign
			UNSIGNED_32	4 bytes, without sign
			VISIBLE_STRING	ASCII string
			OCTET_STRING	
	Factor	Factor for data transmission via a bus system, depending on the number of decimal positions	*Factor*	1 = no decimal positions 10 = 1 decimal position 100 = 2 decimal positions 1000 = 3 decimal positions
Access	R	Read access	☑ Reading permitted	
	W	Write access	☑ Writing permitted	
	CINH	Controller inhibit (CINH) required	☑ Writing only possible if the controller is inhibited (CINH)	

Communication manual 8400 motec EtherCAT®
Parameter reference
Table of attributes

Table of attributes

Code	Name	Index		Data				Access		
		dec	hex	DS	DA	Data type	Factor	R	W	CINH
C13850	All words from drive to master	10725	29E5	A	9	UNSIGNED_16	1	☑		
C13851	All words from master to drive	10724	29E4	A	8	UNSIGNED_16	1	☑		
C13859	All words to standard device	10716	29DC	E	1	UNSIGNED_16	1	☑		
C13860	All words from standard device	10715	29DB	E	1	UNSIGNED_16	1	☑		
C13861	Bus state	10714	29DA	E	1	UNSIGNED_16	1	☑		
C13864	Active station address	10711	29D7	E	1	UNSIGNED_16	1	☑		
C13867	Display last emergency data	10708	29D4	E	1	OCTET_STRING		☑		
C13879	Bus error	10696	29C8	E	1	UNSIGNED_16	1	☑		
C13880	Reaction on communication failure	10695	29C7	A	1	UNSIGNED_8	1	☑	☑	
C13881	Response time when exiting "Operational"	10694	29C6	E	1	UNSIGNED_16	1	☑	☑	
C13885	Clear process data	10690	29C2	E	1	UNSIGNED_8	1	☑	☑	
C13899	Station Alias address	10676	29B4	E	1	UNSIGNED_16	1	☑	☑	
C13900	Firmware product type	10675	29B3	E	1	VISIBLE_STRING		☑		
C13901	Firmware compilation date	10674	29B2	E	1	VISIBLE_STRING		☑		
C13902	Firmware version	10673	29B1	E	1	VISIBLE_STRING		☑		

Lenze

14 Index