

# EtherCAT®

Inverter Drives 8400 motec-----



E84DGFCTxxx

Communication Manual

EN



13564907

# Contents

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## 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 Communication Unit.

**The hardware manual contains safety instructions which must be observed!**

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

Examples illustrate typical applications.

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

Depending on the software version of the inverter and the version of the installed engineering tool («Engineer», «PLC Designer»), the screenshots in this documentation may vary from the depiction in the engineering tool.

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 Controller (PLC, master) documents.

All brand 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](http://www.EtherCAT.org)

# About this documentation

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## Target group

This documentation addresses to persons who configure, install, commission, and maintain the networking and remote maintenance of a machine.



### Tip!

Information and software updates for Lenze products are provided in the download area at:

[www.Lenze.com](http://www.Lenze.com)

## Information regarding the validity

The information given in this documentation is valid for the following devices:

| Product series                                            | Type designation | Version           |
|-----------------------------------------------------------|------------------|-------------------|
| Inverter Drives 8400 motec<br>EtherCAT communication unit | E84DGFCTxNx      | EtherCAT          |
|                                                           | E84DGFCTxJx      | EtherCAT + Safety |

► [Features and variants](#) (14)

# About this documentation

## Document history

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### 1.1 Document history

| Version |         |      | Description                                                                                                                                                                                                                                            |
|---------|---------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4.0     | 01/2019 | TD23 | General revision                                                                                                                                                                                                                                       |
| 3.0     | 05/2017 | TD17 | <ul style="list-style-type: none"><li>• From Communication Unit SW version V01.02:<ul style="list-style-type: none"><li>▶ <a href="#">State change after "Operational" in the stay-alive operation</a> (□ 27)</li></ul></li><li>• New layout</li></ul> |
| 2.1     | 11/2012 | TD17 | EtherCAT® is a registered trademark of the Beckhoff Automation GmbH, Germany.                                                                                                                                                                          |
| 2.0     | 11/2011 | TD17 | Information about the EtherCAT register " <a href="#">AL Status Code</a> " (□ 37) supplemented.                                                                                                                                                        |
| 1.0     | 04/2011 | TD17 | First edition                                                                                                                                                                                                                                          |

# About this documentation

## Conventions used

### 1.2 Conventions used

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

| Type of information       | Highlighting                                                                          | Examples/notes                                                                                                                                                  |
|---------------------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Spelling of numbers       |                                                                                       |                                                                                                                                                                 |
| Decimal                   | Normal spelling                                                                       | Example: 1234                                                                                                                                                   |
| Hexadecimal               | 0x[0 ... 9, A ... F]                                                                  | Example: 0x60F4                                                                                                                                                 |
| Binary<br>• Nibble        | In inverted commas<br>Point                                                           | Example: '100'<br>Example: '0110.0100'                                                                                                                          |
| Decimal separator         | Point                                                                                 | The decimal point is always used.<br>For example: 1234.56                                                                                                       |
| Text                      |                                                                                       |                                                                                                                                                                 |
| Program name              | » «                                                                                   | PC software<br>Example: Lenze »Engineer«                                                                                                                        |
| Window                    | <i>italics</i>                                                                        | The <i>message window</i> ... / The <i>Options</i> dialog box...                                                                                                |
| Control element           | <b>Bold</b>                                                                           | The <b>OK</b> button... / The <b>Copy</b> command... / The Properties tab... / The <b>Name</b> input field...                                                   |
| Sequence of menu commands |                                                                                       | If several commands must be used in sequence to carry out a function, the individual commands are separated by an arrow: Select <b>File</b> → <b>Open</b> to... |
| Hyperlink                 | <u>underlined</u>                                                                     | Optically highlighted reference to another topic. Can be activated with a mouse-click in this documentation.                                                    |
| Icons                     |                                                                                       |                                                                                                                                                                 |
| Page reference            |  8 | Optically highlighted reference to another page. Can be activated with a mouse-click in this documentation.                                                     |
| Step-by-step instructions |    | Step-by-step instructions are indicated by a pictograph.                                                                                                        |

# About this documentation

## Terminology used

### 1.3 Terminology used

| Term                                                                                       | Meaning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  EtherCAT | EtherCAT® ( <b>E</b> ther <b>n</b> et for <b>C</b> ontroller and <b>A</b> utomation <b>T</b> echnology) is an Ethernet-based fieldbus system which fulfils the application profile for industrial real-time systems.<br>EtherCAT® is a registered trademark and patented technology, licenced by Beckhoff Automation GmbH, Germany.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Inverter                                                                                   | Lenze inverters of the "Inverter Drives 8400 motec" product series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Standard device                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Drive Unit<br>Communication unit<br>Wiring Unit                                            | The 8400 motec inverter has a modular structure that includes the following modules: "Drive Unit", "Communication Unit", and "Wiring Unit". <ul style="list-style-type: none"><li>• The drive unit is available in different power settings.</li><li>• In case of the communication unit you can select between:<ul style="list-style-type: none"><li>• Without fieldbus (basic I/O, standard I/O, extended I/O)</li><li>• AS interface (without safety/with safety STO)</li><li>• CANopen (without safety/with safety STO)</li><li>• EtherCAT (without safety/with safety STO)</li><li>• EtherNET/IP (without safety/with safety STO)</li><li>• PROFIBUS (without safety/with safety STO)</li><li>• PROFINET (without safety/with safety STO)</li><li>• POWERLINK (without safety/with safety STO)</li></ul></li><li>• The wiring unit provides flexible connection possibilities for a simple integration into the power supply of the machine.</li></ul> |
| »Engineer«                                                                                 | Lenze PC software which supports you during the "Engineering" process (parameterisation, diagnostics, and configuration) throughout the whole life cycle, i. e. from planning to maintenance of the machine commissioned.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| »PLC Designer«                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| »TwinCAT«                                                                                  | Beckhoff PC software for EtherCAT configuration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Code                                                                                       | Parameter which serves to parameterise and monitor the inverter. In normal usage, the term is usually referred to as "Index".                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Subcode                                                                                    | If a code contains several parameters, they are stored in "subcodes". This manual uses a slash "/" as a separator between code and subcode (e.g. "C00118/3").<br>This term is also referred to as "subindex" in common parlance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Lenze setting                                                                              | This setting is the default factory setting of the device.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Basic setting                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| HW                                                                                         | Hardware                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| SW                                                                                         | Software                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| ESI                                                                                        | "EtherCAT Slave Information"<br>(device description file in XML format)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| CoE                                                                                        | CANopen over EtherCAT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| I-1600.8                                                                                   | CoE index (hexadecimal representation) <ul style="list-style-type: none"><li>• In the example: index 0x1600, subindex 8</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| TA                                                                                         | Technology application                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| PDO                                                                                        | Process data object                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| SDO                                                                                        | Service data object                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| "Hot connect"                                                                              | This feature provides for removing and connecting slave nodes during operation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

# About this documentation

## Notes used

### 1.4 Notes used

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

#### Safety instructions

Layout 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!     | <b>Danger of personal injury through dangerous electrical voltage</b><br>Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken. |
|            | Danger!     | <b>Danger of personal injury through a general source of danger</b><br>Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken.   |
|            | Stop!       | <b>Danger of property damage</b><br>Reference to a possible danger that may result in property damage 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 easy handling                    |
|            |             | Reference to another document                   |

## 2 Safety instructions



### Note!

It is absolutely vital that the stated safety measures are implemented in order to prevent serious injury to persons and damage to material assets.

Always keep this documentation to hand in the vicinity of the product during operation.

### 2.1 General safety and application notes



### Danger!

If the following basic safety measures are disregarded, severe injuries to persons and damage to material assets may result.

- Lenze drive and automation components ...
  - must only be used as directed.
    - ▶ [Application as directed](#) (📖 13)
  - must never be commissioned if they display signs of damage.
  - must never be technically modified.
  - must never be commissioned if they are not fully mounted.
  - must never be operated without required covers.
  - during and after operation can have live, moving and rotating parts, depending on their degree of protection. Surfaces can be hot.
- The following applies to Lenze drive components ...
  - only use the accessories approved.
  - Only use original manufacturer spare parts.
- Observe all specifications contained in the enclosed documentation and related documentation.
  - This is the precondition for safe and trouble-free operation and for obtaining the product features specified.
    - ▶ [Features and variants](#) (📖 14)
  - The specifications, processes, and circuitry described in this document are for guidance only and must be adapted to your own specific application. Lenze does not take responsibility for the suitability of the process and circuit proposals.
- Only qualified personnel may work with and on Lenze drive and automation components. According to IEC 60364 and CENELEC, these are persons ...
  - are familiar with installing, mounting, commissioning, and operating the product.
  - who have the corresponding qualifications for their work.
  - who know and can apply all regulations for the prevention of accidents, directives, and laws applicable at the place of use.

# Safety instructions

Device and application-specific safety instructions

---

## 2.2 Device and application-specific safety instructions

- During operation, the Communication Unit must be connected to the Wiring Unit and the Drive Unit.
- With external voltage supply, always use a separate power supply unit, safely separated to EN 61800-5-1 in every control cabinet (SELV/PELV).



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

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

## 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<br><b>Drive Unit</b>  | E84DGDVxxxxxxxxx |
| Inverter Drives 8400 motec<br><b>Wiring Unit</b> | E84DGVNxx        |

- is a device intended for use in industrial power systems.
- should only be used under the operating conditions prescribed 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!**

# Product description

## Features and variants

### 3.2 Features and variants

The EtherCAT communication unit is available in the following versions:

| Product series                                                   | Type designation | Product features |                     |                              |                         |        |
|------------------------------------------------------------------|------------------|------------------|---------------------|------------------------------|-------------------------|--------|
|                                                                  |                  | Enclosure        | Connection EtherCAT | I/O: Connection via terminal | I/O: Connection via M12 | Safety |
| Inverter Drives 8400 motec<br><b>EtherCAT communication unit</b> | E84DGFCTFNP      | IP 65            | M12                 | 3× DI<br>1× DO               | 2× DI                   |        |
|                                                                  | E84DGFCTENP      | IP 65            | M12                 | 2× DI                        | 3× DI<br>1× DO          |        |
|                                                                  | E84DGFCTFJP      | IP 65            | M12                 | 3× DI<br>1× DO<br>1× AI      | 2× DI                   | ●      |
|                                                                  | E84DGFCTEJP      | IP 65            | M12                 | 3× DI                        | 2× DI<br>1× DO<br>1× AI | ●      |

- The EtherCAT communication unit is ...
  - mounted on top of the Wiring Unit (E84DGVNxx);
  - supplied internally via the Drive Unit (E84DGDVxxxxxxx) 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 can be used on machines for the protection of persons.
- SDO transfer with CoE (CANopen over EtherCAT)
- Up to 10 process data words (max 20 bytes) can be sent to the master.
- Up to 8 process data words (max. 16 bytes) can be sent from 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 (CANopen 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).

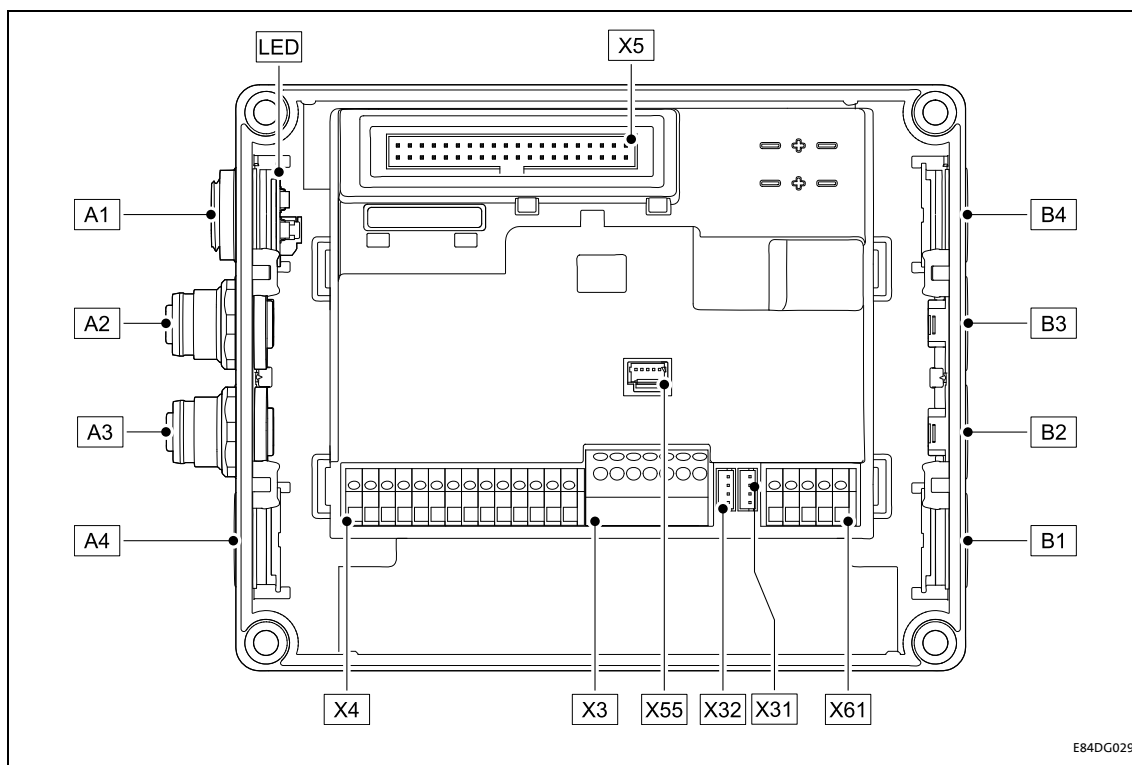
#### Reference manual / »Engineer« online help "Inverter Drives 8400 motec"

Here you will find detailed information on how to configure the safety system (safety option).

# Product description

## Connections and interfaces

### 3.3 Connections and interfaces



[3-1] EtherCAT communication unit

| Pos.          | Description                                                                                                                                                                                                                                                              |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A1 / LED      | Position for LEDs for EtherCAT status display<br>▶ <a href="#">LED status displays</a> (□ 59)                                                                                                                                                                            |
| A2            | IN: EtherCAT input (M12 socket, 5-pole, D-coded)<br>▶ <a href="#">EtherCAT connection</a> (□ 23)                                                                                                                                                                         |
| A3            | OUT: EtherCAT output (M12 socket, 5-pole, D-coded)<br>▶ <a href="#">EtherCAT connection</a> (□ 23)                                                                                                                                                                       |
| A4            | Positions for further freely designable inputs and outputs:                                                                                                                                                                                                              |
| B1 ... B4     |                                                                                                                                                                                                                                                                          |
|               | <ul style="list-style-type: none"> <li>• Digital inputs</li> <li>• Digital output</li> <li>• Analog input (only for E84DGFCTxJx)</li> <li>• Relay output (only for E84DGFCTxJx)</li> <li>• Connection of "Safety Option" safety system (only for E84DGFCTxJx)</li> </ul> |
| 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) to A2                                                                                                                                                                                                                  |
| X32           | Plug connector for wiring the EtherCAT output (OUT) to A3                                                                                                                                                                                                                |
| X55           | Plug connector for the wiring of the LEDs to A1                                                                                                                                                                                                                          |

# Product description

## Connections and interfaces

---

- By default, 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 on plug connector X55
- At positions A1 ... A4 and B1 ... B4 it is also possible to connect the EtherCAT terminals and other connections (e.g. digital inputs) freely.
- For the connections, 5-pin M12 connectors or - alternatively - cable glands (cable cross-section max. 1.0 mm<sup>2</sup>, 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 contained in this documentation.

### 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

| Range                                         | Values                                                                                                                                                         |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Order designation                             | <ul style="list-style-type: none"> <li>E84DGFCTxNx (EtherCAT)</li> <li>E84DGFCTxJx (EtherCAT + Safety)</li> </ul>                                              |
| 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                   | <ul style="list-style-type: none"> <li>EtherCAT input (IN): M12 socket, 5-pole, D-coded</li> <li>EtherCAT output (OUT): M12 socket, 5-pole, D-coded</li> </ul> |
| 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 (typical)                                                                                                                                                |
| 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                       | <ul style="list-style-type: none"> <li>U = 24 V DC (20 V - 0 % ... 29 V + 0 %)</li> <li>I<sub>max</sub> = 120 mA</li> </ul>                                    |
| Conformities, approvals                       | <ul style="list-style-type: none"> <li>CE</li> <li>UR / cUR</li> </ul> (see also hardware manual)                                                              |

### 4.2 Protocol data

| Range                                          | Values                                                                                                                                          |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Process data words                             | 1 ... 10 process data words to master (max. 20 bytes, 16 bits / word)<br>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 the corresponding response.

- The processing time in the inverter is approx. 10 ms + a tolerance of 20 ms (typically)
- Some codes may require a longer processing time (see reference 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 the current actual values.

The communication times for process data depend on ...

- processing time in the inverter (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 inverter 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.

The following processing time arises:

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

## 5 Installation



### **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 not possible or faulty.
- I/O signals are faulty.
- The safety function is faulty.

#### **Protective measures**

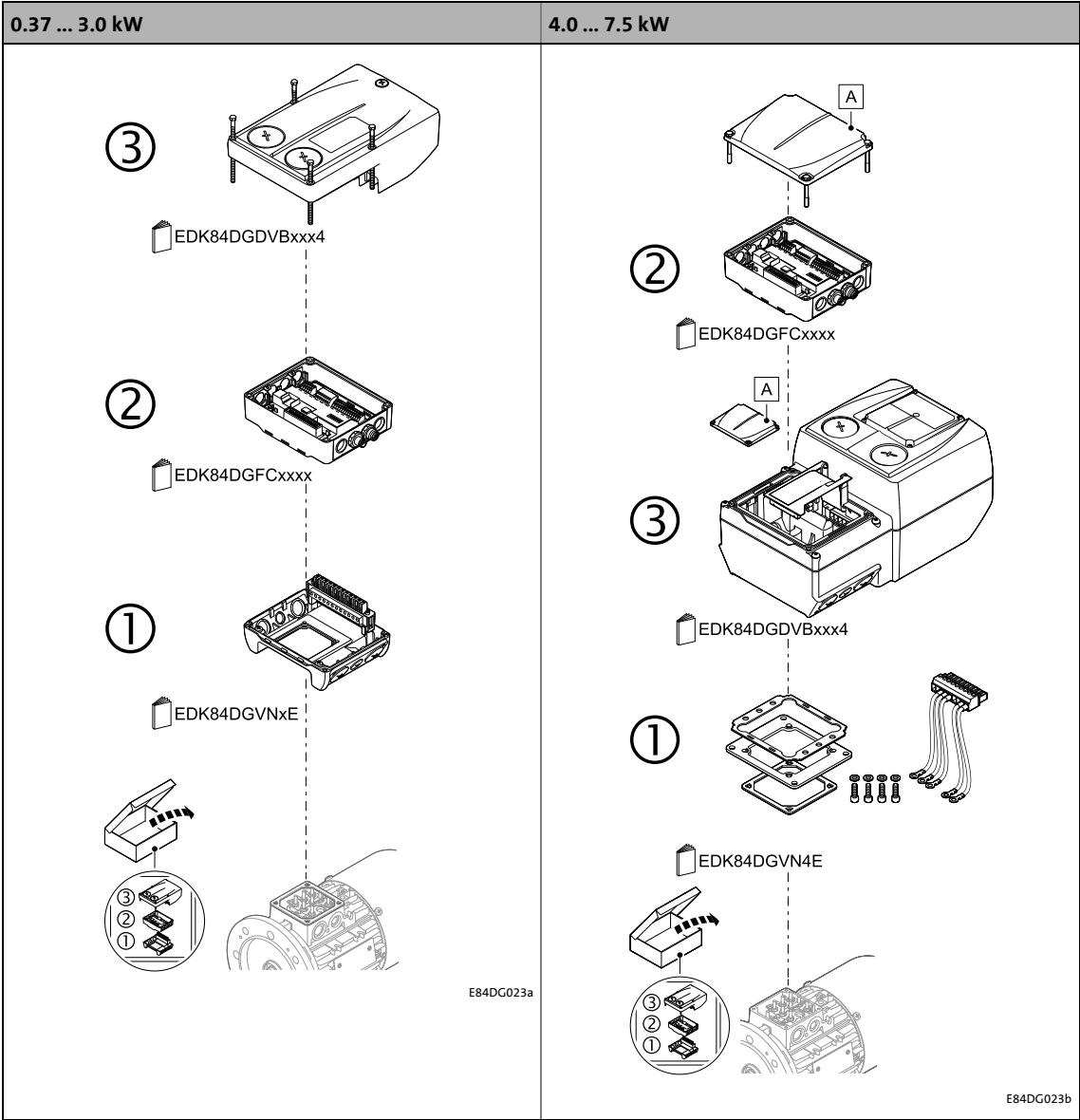
Discharge electrostatic charges before touching the Communication Unit.

5.1 Mechanical installation



**Mounting instructions "Inverter Drives 8400 motec"**

Here you will find detailed information on the installation.



[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 of the Drive Unit, Communication Unit, Wiring Unit |

### 5.2 Electrical installation



#### "Inverter Drives 8400 motec" hardware manual

Here you can find detailed information on ...

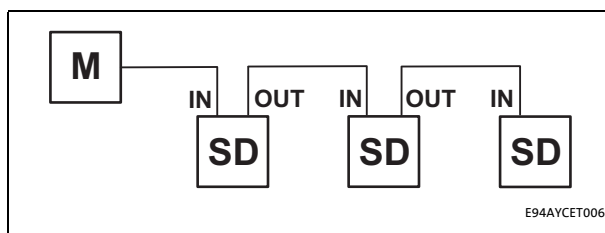
- the digital and analog inputs/outputs;
- the relay output;
- the integrated safety system (safety option);
- the wiring of the terminals.

Observe the notes and wiring instructions contained in this documentation.

#### 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 used.

##### Line topology



M = master

SD = slave device

[5-2] Line topology

- The devices are interconnected successively.
- In order to ensure trouble-free operation, it is required to assign and wire the EtherCAT inputs (IN) and EtherCAT outputs (OUT) correctly.  
The receiving line is plugged into the X31 socket (IN), the forwarding line into the X32 socket (OUT).
- The direction of data transmission is from the master to the slaves.



#### Tip!

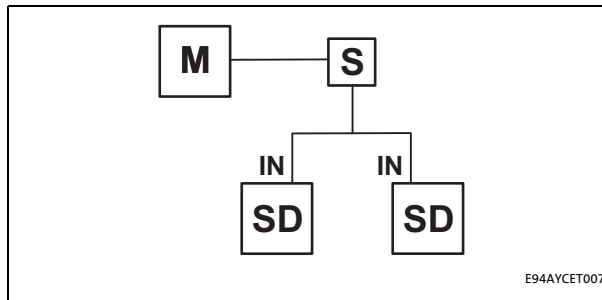
The termination of the last EtherCAT node is effected automatically by the slave.

# Installation

## Electrical installation

---

### Switch topology



M = master

S = switch

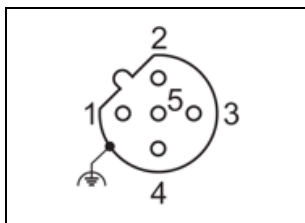
SD = slave device

[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

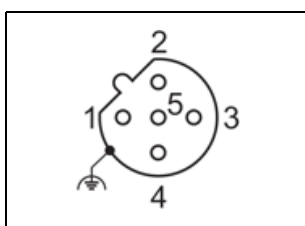
### EtherCAT input (IN)



- 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                        |

### 5.2.3 External voltage supply

- The external voltage supply can be used to establish EtherCAT communication for commissioning and to query the data of the digital and analog inputs.
- Furthermore the external voltage supply serves to maintain EtherCAT communication if the main supply fails.
- The digital inputs RFR, DI1 ... DI5 and the analog input can continue to be evaluated.
- The external voltage supply is done via the terminals 24E and GND of the terminal strip X3.
- Permissible voltage (DC) / max. current:
  - $U = 24 \text{ V DC (} 20 \text{ V} - 0 \% \dots 29 \text{ V} + 0 \% \text{)}$
  - $I_{\text{max}} = 120 \text{ mA}$
- 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 inverter. For Lenze devices, this is done via the codes.

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

In addition, there are codes for diagnosing and monitoring the stations.

▶ [Parameter reference](#) (📖 67)

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

For commissioning with 24 V DC, only the data of the digital and analog inputs in the last two data words are valid and readable (see [Configuring process data](#) (📖 29)).

### 6.1 Before initial switch-on



#### Stop!

Before switching on the inverter for the first time, check the entire wiring with regard to completeness, short circuit, and earth fault.

### 6.2 Configuring the Controller (master)

For communication with the Communication Unit, the Controller (master) must be configured first. In order to configure EtherCAT networks, you always need a configuration software for the Controller, 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 stored in the internal configuration memory and can be used by the master for the node identification.
- For node detection (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 the configuration of the EtherCAT node can be found in the download area on:

[www.Lenze.com](http://www.Lenze.com)

The device description file **Lenze\_Inverter\_8400\_IO\_yyyymmdd.xml** must be installed via the EtherCAT configuration software.

| Wildcards in the file name |       |
|----------------------------|-------|
| yyyy                       | Year  |
| mm                         | Month |
| dd                         | Day   |

The description file summarises all EtherCAT-capable devices of the Inverter Drives 8400 series (Inverter Drives 8400 with EtherCAT from V01.xx, 8400 motec with EtherCAT from V01.xx).

### 6.2.2 Automatic device identification

- For a faultless integration of the EtherCAT slaves into a master configuration it is necessary to select the correct Lenze device in the EtherCAT configuration software.
- Each EtherCAT node is unambiguously identified by the configuration software by means of the product code (equal to the CoE object I-1018.2), the manufacturer's identification mark (0x3B) and the main software version of the Communication Unit.
  - ▶ [Implemented CoE objects](#) (66 54)
- In order that the configuration software selects the configuration specific for the EtherCAT node from the device description file, the product code is automatically set in the identity object.
- During initialisation, the product code is transferred to the master. Based on identification, the master can accept the corresponding settings from the device description.
- Product code of the Inverter Drives 8400 motec: 841020

### 6.2.3 State change after "Operational" in the stay-alive operation

[To be used from Communication Unit SW version V01.02!](#)

If the inverter connected via EtherCAT is not supplied with power when switching on the Lenze Controller, but the EtherCAT Communication Unit is externally supplied with 24 V (stay-alive operation), the inverter does not change to the "Operational" EtherCAT state.

The inverter remains in "Safe-Operational". The Controller resets the EtherCAT state and thus the entire interconnection from "Operational" to "Pre-Operational".

In order to enable the controller to switch the whole EtherCAT bus to "Operational", the "0x2995: Reach Operational" parameter ([C13930](#)) must be set to '1' (66 28). The parameter is a volatile parameter that is not saved and must therefore be reset to '1' each time the controller is restarted.

#### Error messages

- Logbook message: "Inverter\_8400\_Motec: CoE - Emergency request. id=0x0, len=8, errCode=0x1000, ErrReg=0x1, data: 0x0 0x0 0x31 0xbc 0x1."
- Message of the communication unit: [Quit "Operational" status \[0x01bc8131\] \(nt04: COM fault 4\)](#) (66 66)

# Commissioning

## Configuring the Controller (master)



### How to configure the state change in the »PLC Designer«:

#### Preconditions:

- No further start parameters assigned to the standard device must be transmitted to the inverter. Only mapping data via the corresponding indices are permissible.
- All device parameters must be written from the application via function blocks and only if IOData1.Bit15 = TRUE (the control electronics of the inverter is active; the device parameters can be accessed).
- IOData1.Bit15 must be polled cyclically from the application. If the value is FALSE, no power supply is available and the control electronics of the inverter is switched off. However, the inverter continues to stay in the "Operational" state.

1. Add the **1 0x2995** parameter ([C13930](#)) to the list of the start parameters of the inverter.
2. Set the **2** parameter value to '1'.
3. Complete the entry with **OK**.

**Inverter\_8400\_Motec**

General | Process Data | **Startup Parameters** | EtherCAT I/O Mapping | Status | Information

Line | Index/Subindex | Name | Value | Bitlength | Comment

Select Item from Object Directory

| Index/Subindex         | Name                                      | Flags     | Type         | Default |
|------------------------|-------------------------------------------|-----------|--------------|---------|
| 16#1600:16#00          | RxPDO 1                                   | RW        | USINT        |         |
| 16#1A00:16#00          | TxPDO 1                                   | RW        | USINT        |         |
| 16#1C32:16#00          | Sync Man 2 Synchronization                | RO        | USINT        |         |
| 16#1C33:16#00          | Sync Man 3 Synchronization                | RO        | USINT        |         |
| <b>1 16#2995:16#00</b> | <b>(C13930) Reach Operational</b>         | <b>RW</b> | <b>USINT</b> |         |
| 16#29B4:16#00          | (C13899) Station Alias address            | RW        | UINT         | 16#0000 |
| 16#29C2:16#00          | (C13885) Delete process data              | RW        | USINT        | 16#01   |
| 16#29C6:16#00          | (C13881) Process data monitoring time     | RW        | UINT         | 16#0000 |
| 16#29C7:16#00          | (C13880) Process data monitoring reaction | RW        | USINT        | 16#00   |
| 16#5F96:16#00          | (C0105) Deceleration time quick stop>     | RW        | UDINT        |         |
| 16#5FA4:16#00          | (C0091) Motor coine phi>                  | RW        | USINT        |         |
| 16#5FA5:16#00          | (C0090) Rated motor voltage>              | RW        | UINT         |         |
| 16#5FA6:16#00          | (C0089) Rated motor frequency>            | RW        | UINT         |         |
| 16#5FA7:16#00          | (C0088) Rated motor current>              | RW        | UINT         |         |
| 16#5FA8:16#00          | (C0087) Rated motor speed>                | RW        | UINT         |         |
| 16#5FAE:16#00          | (C0081) Rated motor power>                | RW        | INT          |         |

Name: (13930) Reach Operational

Index: 2995 Bitlength: 8

SubIndex: 16# 0 **2 Value: 1**

☐ Byte Array

OK Cancel

### 6.2.4 Configuring process data

- The process data configuration is determined during the initialisation phase of the master (PDO mapping).
- Up to 10 process data words (max 20 bytes) can be sent to the master.
- Up to 8 process data words (max. 16 bytes) can be sent from 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<br>...<br>9  | Analog input value<br>(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 inverter  | 0 (FALSE)           | Inverter is offline ("stay-alive" operation) |
|           |                |                                    | 1 (TRUE)            | Inverter 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<br>...<br>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 inverter  | 0 (FALSE)           | Inverter is offline ("stay-alive" operation) |
|           |                |                                    | 1 (TRUE)            | Inverter is online                           |

- The process data configuration is predefined in the device description file for each application.
  - ▶ [Configuring the port interconnection of the process data objects \(PDO\)](#) (📖 40)
- If required, the process data length can be adapted by the user.
- The last internal information of the configured data must be deleted to shorten the configured the process data length. Process data words to the master must keep their last two I/O data words.

### 6.2.5 Determining the cycle time

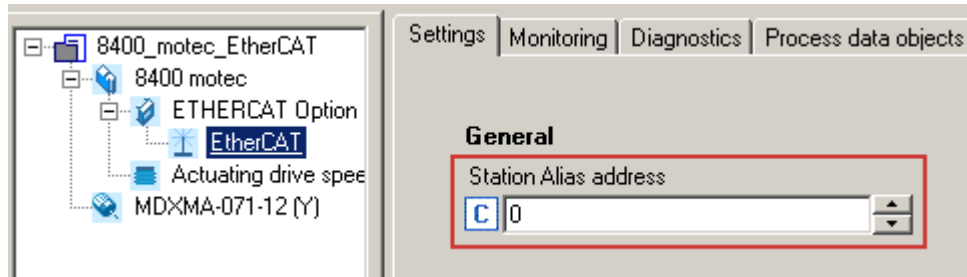
The process data objects (PDO) are transmitted cyclically between the master and the slaves.

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.



#### 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 inverter must be supplied with mains voltage.
- EtherCAT communication requires voltage supply of the communication unit.  
If this requirement is not met, the "CE04: MCI communication error" error message (error No. 01.0127.00002) is output. The error must be reset in the inverter so that EtherCAT communication can be established.
- 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.
- Addressing can be carried out automatically via the EtherCAT master or manually via codes in the »Engineer«.
  - ▶ [Address allocation](#) (📖 31)

## 7 Data transfer

Compared with conventional Ethernet, the collision-free transfer of telegrams on the fieldbus makes EtherCAT a real-time capable bus system.

Communication is always initiated by the EtherCAT master which is the Controller. A telegram sent by the master passes through all EtherCAT slaves. The last slave of the communication chain sends the telegram back to the EtherCAT master. On the way back, the telegram is directly sent to the EtherCAT master, without being processed in the slaves.

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. Each datagram is transmitted with a minimum delay.

EtherCAT transmits process data, parameter data, configuration data, and diagnostic data between the controller (master) and the inverters (slaves) that are part of the fieldbus. The data are transmitted via corresponding communication channels as a function of their time-critical response (see [Process data transfer](#) (□ 38) / [Parameter data transfer](#) (□ 44)).

# Data transfer

## EtherCAT frames

### 7.1 EtherCAT frames

EtherCAT frames have the following structure:

| EtherCAT 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<br>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

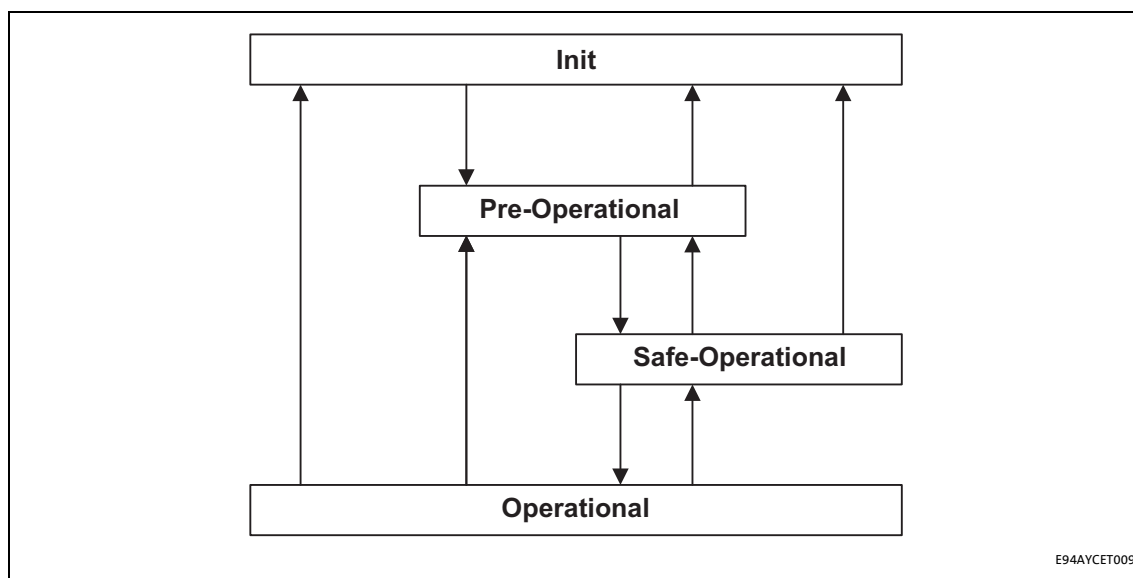
The data area contains the data of the command to be executed.

#### WKC

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

### 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             | <ul style="list-style-type: none"> <li>Initialisation phase</li> <li>No SDO/PDO communication with the slaves</li> <li>Device can be detected by fieldbus scan</li> </ul>                                                                                                                                                   |
| Pre-Operational  | <ul style="list-style-type: none"> <li>The fieldbus is active.</li> <li>SDO communication (mailbox communication) is possible.</li> <li>No PDO communication</li> </ul>                                                                                                                                                     |
| Safe-operational | <ul style="list-style-type: none"> <li>SDO communication (mailbox communication) is possible.</li> <li>PDO communication: <ul style="list-style-type: none"> <li>The input data in the process image are updated.</li> <li>The output data from the process image are not transferred to the slaves.</li> </ul> </li> </ul> |
| Operational      | <ul style="list-style-type: none"> <li>Normal operation <ul style="list-style-type: none"> <li>SDO communication</li> <li>PDO communication</li> <li>Fieldbus synchronisation has been successful (if used)</li> </ul> </li> </ul>                                                                                          |



#### Note!

- An EtherCAT fieldbus scan is possible in every state.
- The SDO communication via the EtherCAT bus is only possible if at least the "Pre-Operational" state has been reached.
- Only in the transitional phases between states can bus nodes be in different states.

The current EtherCAT state is displayed in [C13861](#) and signalled via the "RUN" LED.

Possible errors in the state transitions are displayed in [C13879](#). Additionally, an error message is entered in the EtherCAT register "AL Status Code".

▶ [Diagnosing with the »Engineer«](#) (📖 61)

▶ [LED status displays](#) (📖 59)

## 7.4 AL Status Code

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

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

| AL Status Code<br>[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 [EtherCAT datagrams](#) (35) via the process data channel.
- Process data serve to control the Inverter Drive 8400 motec.
- The transmission of process data is time-critical.
- Process data are cyclically transferred between the Controller (master) and the inverters (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.
- Up to 10 process data words (max 20 bytes) can be sent to the master.
- Up to 8 process data words (max. 16 bytes) can be sent from the master.
- Process data are not saved in the Inverter Drive 8400 motec.
- Process data are e.g. setpoints, actual values, control words, and status words.

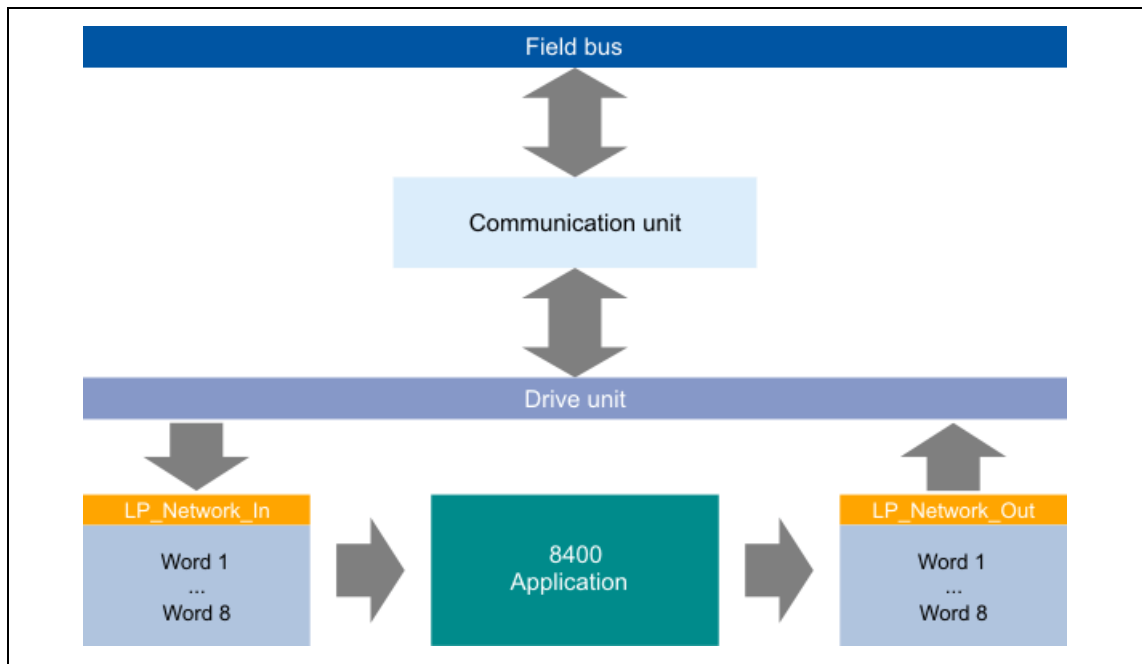
# Process data transfer

Accessing process data / PDO mapping

## 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 **LP\_Network\_In** and **LP\_Network\_Out** port blocks. These port blocks are also called process data channels.
- Port block **LP\_Network\_In** maps the MCI PDOs received.
- Port block **LP\_Network\_Out** maps the MCI PDOs to be transmitted.
- The port/function blocks of the process data objects (PDO) are interconnected via the Lenze »Engineer«.



[8-1] External and internal data transfer between the bus system, inverter, and application



### Reference manual / »Engineer« online help for "Inverter Drive 8400 motec"

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

# Process data transfer

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

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



### Note!

The »Engineer« screenshots shown on the following pages are only examples of the setting sequence and the resulting screens.

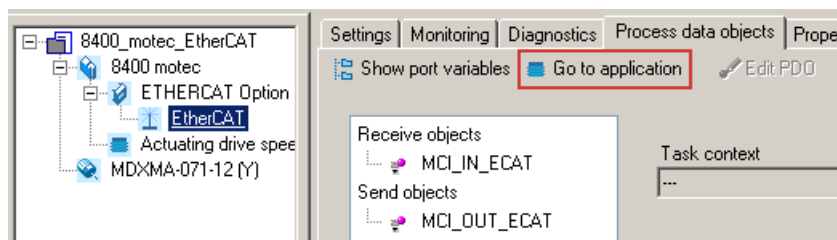
Depending on the software version of the inverter and the version of the »Engineer« software installed, the screenshots in this documentation may differ from the actual »Engineer« screens.

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

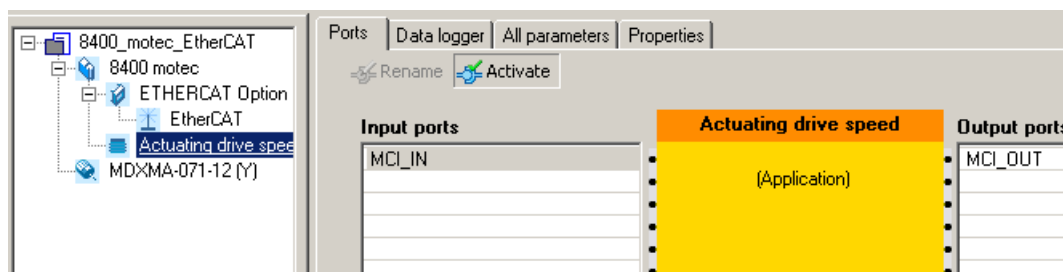


### How to configure the port interconnection in the »Engineer«:

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**.



# Process data transfer

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

3. Select the port to be configured and click the **Change Variable ...** button.

Ports | Data logger | All parameters | Properties

Rename Activate

**Input ports**

MCI\_IN

**Actuating drive speed**

(Application)

**Output ports**

MCI\_OUT

**Mapping**

EtherCAT/MCI\_IN\_ECATT : 0

**Network default interconnection**

<not defined>

Network default change...

**Application variables**

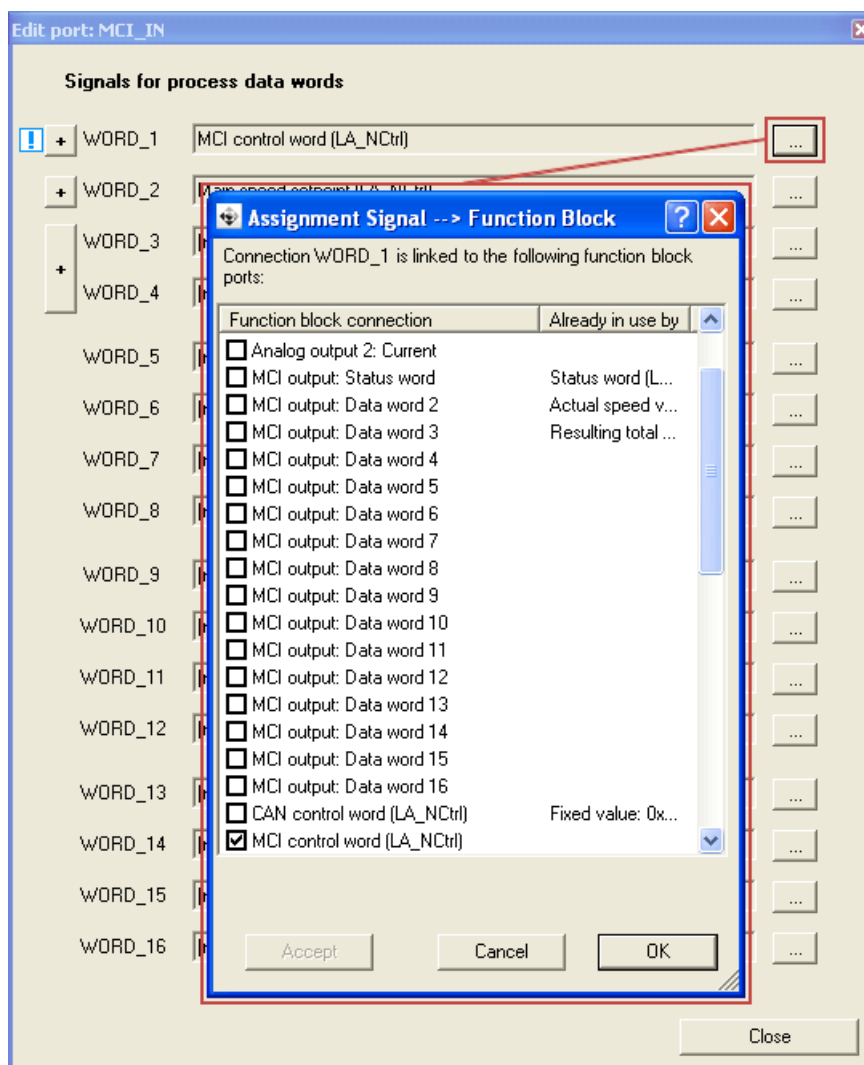
| Name     | Signal                       | Type | Length | Index  | Online  |
|----------|------------------------------|------|--------|--------|---------|
| WORD_1   | LA_NCtrl:Network(MCI/CAN)... | WORD | 16     | C876/1 | offline |
| WORD_2   | LA_NCtrl: nMainSetValue_a    | WORD | 16     | C876/2 | offline |
| WORD_3   | [not connected]              | WORD | 16     | C876/3 | offline |
| WORD_4   | [not connected]              | WORD | 16     | C876/4 | offline |
| WORD_5   | [not connected]              | WORD | 16     | C876/5 | offline |
| WORD_6   | [not connected]              | WORD | 16     | C876/6 | offline |
| WORD_7   | [not connected]              | WORD | 16     | C876/7 | offline |
| WORD_8   | [not connected]              | WORD | 16     | C876/8 | offline |
| hCtrl_RR | hRFG_0                       | BOOL | 1      | ...    | offline |

Change Variable...

# Process data transfer

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

4. Via the  button, you can assign signals to the process data words in the *Assignment Signal --> Function Block* dialog window.  
→ Select the signals and then confirm the selection with **OK**.

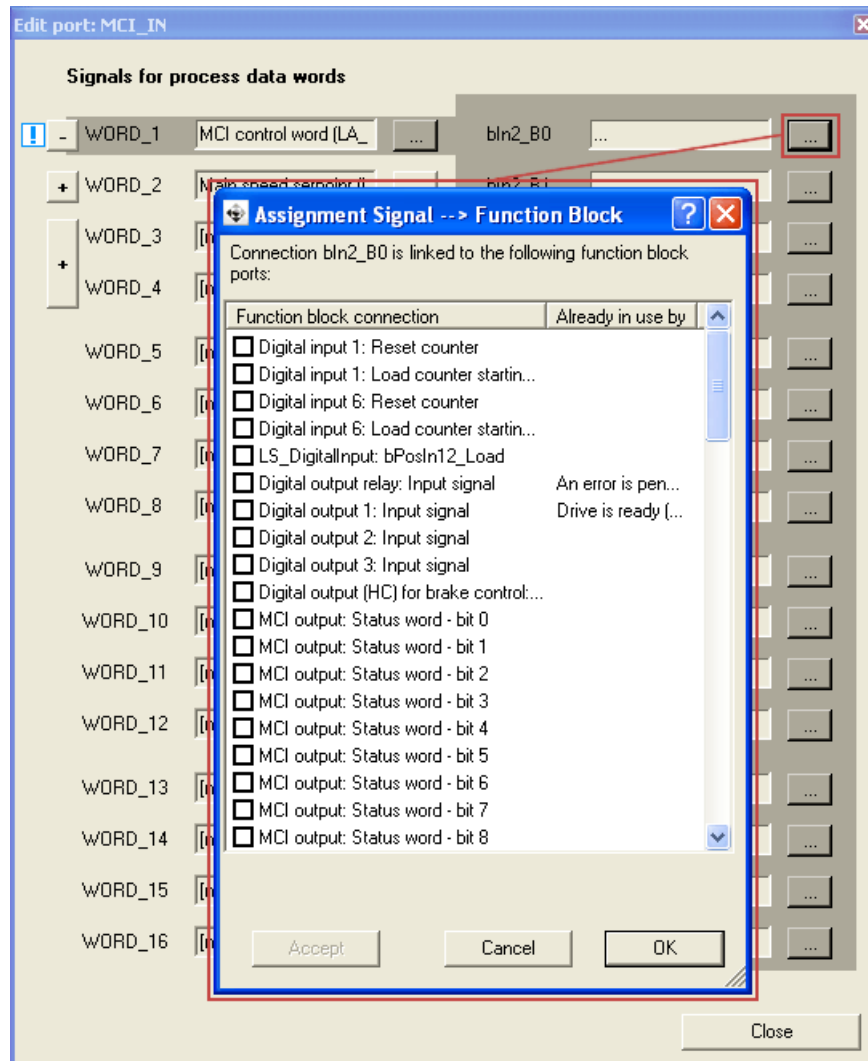


# Process data transfer

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

# Parameter data transfer

Establishing a connection between master and slave

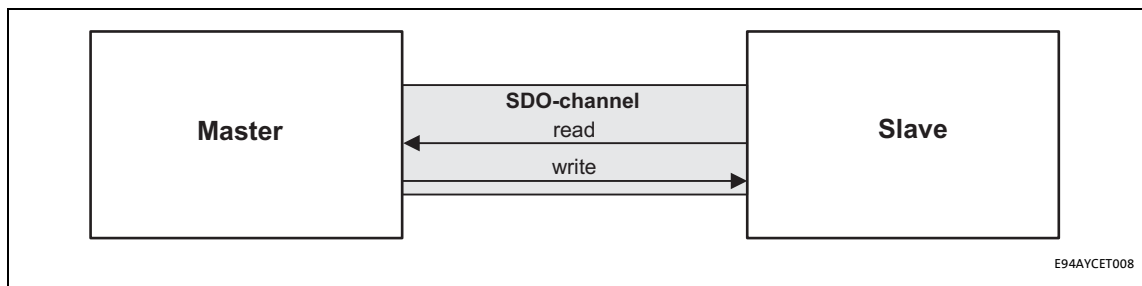
## 9 Parameter data transfer

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 access to [Implemented CoE objects](#) (📖 54) and Lenze codes by means of the CoE protocol.
- The transmission of parameter data is usually 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

# Parameter data transfer

## Reading and writing parameters

### 9.2 Reading and writing parameters

Parameters ...

- for instance are set for one-time system settings or if materials are changed within a machine;
- are transmitted with a low priority.

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

#### Indexing of the Lenze codes

If they are accessed via the Communication Unit, the codes of the Inverter Drive 8400 motec are addressed by the index.

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

| Conversion formula |                                    |
|--------------------|------------------------------------|
| Index [dec]        | Index [hex]                        |
| 24575 - Lenze code | 0x5FFF - Lenze code <sub>hex</sub> |

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

#### Structure of a mailbox datagram

In a datagram, mailbox data are transferred 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 |

# 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 inverter, please make sure that you convert the code into an index.

► [Indexing of the Lenze codes](#) (45)

#### 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.<br>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<br>...<br>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 with index and subindex is read.<br>0x01: The complete object is read. (Currently not supported.)                                   |
|                | 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<br>0x00 or 0x01 if "Complete access" = 0x01.                                                                                           |
|                | Reserved          | DWORD              | 4 bytes            | 0x00                                                                                                                                                          |

# Parameter data transfer

## Reading and writing parameters

### SDO Upload Expedited Response

An "SDO Upload Expedited Response" is effected if the data length of the parameter data to be read is up to 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.<br>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)<br>...<br>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: Size of the data in "Data set size"                                                                                                                     |
|                | Transfer type     |                    | 1 bit (1)                                      | 0x01: Expedited transfer                                                                                                                                      |
|                | Data set size     |                    | 2 bits (2, 3)                                  | 0x00: 4 bytes of data<br>0x01: 3 bytes of data<br>0x02: 2 bytes of data<br>0x03: 1 byte of data                                                               |
|                | Complete access   |                    | 1 bit (4)                                      | 0x00: The entry addressed with index and subindex is read.<br>0x01: The complete object is read. (Currently not supported.)                                   |
|                | 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<br>0x00 or 0x01 if "Complete access" = 0x01.                                                                                           |
|                | Data              | DWORD              | 4 bytes                                        | Data of the object                                                                                                                                            |

# Parameter data transfer

## Reading and writing parameters

### SDO Upload Expedited Response

An "SDO Upload Normal Response" is effected if the data length of the parameter data to be read is  $\geq 4$  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            | $n \geq 0x0A$ : Length of the mailbox service data                                                                                                            |
|                | Address           | WORD               | 2 bytes            | Station address of the source if an EtherCAT master is the instructing party.<br>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<br>...<br>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 with index and subindex is read.<br>0x01: The complete object is read. (Currently not supported.)                                   |
|                | 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<br>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                                                                                                                                            |

# Parameter data transfer

## Reading and writing parameters

### Example

In the case of an **upload** to the index 0x5FD8 (standard value of C00039/1, preset setpoint\_1 = 0x0FA0), the transmitted response structure contains 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: Length of the data in "Data set size"                               |
|                | Transfer type     |                    | 1 bit (1)          | 0x01: Expedited transfer                                                  |
|                | Data set size     |                    | 2 bits (2, 3)      | 0x02: 2 bytes of data                                                     |
|                | Complete access   |                    | 1 bit (4)          | 0x00: The entry addressed with 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<br>0x5F: Index high byte of the object |
|                | Subindex          | BYTE               | 1 byte             | 0x01                                                                      |
|                | Data              | DWORD              | 2 bytes            | 0x0FA0                                                                    |

# 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 inverter, please make sure that you convert the code into an index.

► [Indexing of the Lenze codes](#) (45)

#### SDO Download Expedited Request

An "SDO Download Expedited Request" is effected if the data length of the parameter data to be written is up to 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.<br>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)<br>...<br>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: Size of the data in "Data set size"                                                                                                                     |
|                | Transfer type     |                    | 1 bit (1)                                      | 0x01: Expedited transfer                                                                                                                                      |
|                | Data set size     |                    | 2 bits (2, 3)                                  | 0x00: 4 bytes of data<br>0x01: 3 bytes of data<br>0x02: 2 bytes of data<br>0x03: 1 byte of data                                                               |
|                |                   |                    | Complete access                                | 1 bit (4)                                                                                                                                                     |
|                | 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<br>0x00 or 0x01 if "Complete access" = 0x01.                                                                                           |
|                | Data              | DWORD              | 4 bytes                                        | Data of the object                                                                                                                                            |

# Parameter data transfer

## Reading and writing parameters

### SDO Download Expedited Request

An "SDO Download Normal Request" is effected if the data length of the parameter data to be written is  $\geq 4$  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            | $n \geq 0x0A$ : Length of the mailbox service data                                                                                                            |
|                | Address           | WORD               | 2 bytes            | Station address of the source if an EtherCAT master is the instructing party.<br>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<br>...<br>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 with index and subindex is written.<br>0x01: The complete object is written. (Currently not supported.)                             |
|                | 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<br>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                                                                                                                                            |

# 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.<br>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<br>...<br>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 with index and subindex is written.<br>0x01: The complete object is written. (Currently not supported.)                             |
|                | 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<br>0x00 or 0x01 if "Complete access" = 0x01.                                                                                           |
|                | Reserved          | DWORD              | 4 bytes            | 0x00                                                                                                                                                          |

# Parameter data transfer

## Reading and writing parameters

### Example

In case of a **download**, the request structure transmitted to the index 0x1600 contains 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: Size of the data in "Data set size"                                 |
|                | Transfer type     |                    | 1 bit (1)          | 0x01: Expedited transfer                                                  |
|                | Data set size     |                    | 2 bits (2, 3)      | 0x00: 4 bytes of data                                                     |
|                | Complete access   |                    | 1 bit (4)          | 0x00: The entry addressed with 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<br>0x16: Index high byte of the object |
|                | Subindex          | BYTE               | 1 byte             | 0x01: Subindex of the object                                              |
|                | Data              | DWORD              | 4 bytes            | 0x5C930110                                                                |

# 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 fully comply with EtherCAT communication, you must 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  | Name                        | 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

# Parameter data transfer

EtherCAT objects of the Communication Unit

## 9.4 EtherCAT objects of the Communication Unit

The object directory displays the [Parameters of the Communication Unit](#) (□ 68) as objects:

| Index  | Name                   | Subindex                                  | Subindex name | Type                           | Bits       | Access | Index |
|--------|------------------------|-------------------------------------------|---------------|--------------------------------|------------|--------|-------|
| 0x29E5 | <a href="#">C13850</a> | All words from the inverter to the master | 1 ... 10      | All words from drive to master | UNSIGNED   | 16     | R     |
| 0x29E4 | <a href="#">C13851</a> | All words from the master to the inverter | 1 ... 8       | All words from master to drive | UNSIGNED   | 16     | R     |
| 0x29DC | <a href="#">C13859</a> | Number of PDO words Tx                    | -             | -                              | UNSIGNED   | 16     | R     |
| 0x29DB | <a href="#">C13860</a> | Number of PDO words Rx                    | -             | -                              | UNSIGNED   | 16     | R     |
| 0x29DA | <a href="#">C13861</a> | Bus status                                | -             | -                              | UNSIGNED   | 16     | R     |
| 0x29D7 | <a href="#">C13864</a> | Active station address                    | -             | -                              | UNSIGNED   | 16     | R     |
| 0x29D4 | <a href="#">C13867</a> | Display of emergency data                 | -             | -                              | STRING(8)  | 64     | R     |
| 0x29C8 | <a href="#">C13879</a> | Bus error                                 | -             | -                              | UNSIGNED   | 16     | R     |
| 0x29C7 | <a href="#">C13880</a> | Response to interruption of communication | 1             | -                              | UNSIGNED   | 8      | RW    |
| 0x29C6 | <a href="#">C13881</a> | Monitoring time of data failure           | -             | -                              | UNSIGNED   | 16     | RW    |
| 0x29C2 | <a href="#">C13885</a> | Delete process data                       | -             | -                              | UNSIGNED   | 8      | RW    |
| 0x29B4 | <a href="#">C13899</a> | Station alias address                     | -             | -                              | UNSIGNED   | 16     | RW    |
| 0x29B3 | <a href="#">C13900</a> | Firmware product type                     | -             | -                              | STRING(8)  | 64     | R     |
| 0x29B2 | <a href="#">C13901</a> | Firmware: Creation date                   | -             | -                              | STRING(20) | 160    | R     |
| 0x29B1 | <a href="#">C13902</a> | Firmware version                          | -             | -                              | STRING(11) | 88     | R     |
| 0x2995 | <a href="#">C13930</a> | Reach Operational                         | -             | -                              | UNSIGNED   | 8      | RW    |

R: Read access only

RW: Read and write access

# Parameter data transfer

## SDO abort codes (Abort codes)

### 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 protocol time-out                                                                                       |
| 0x05040001  | Invalid or unknown specification symbol for the client/server command                                       |
| 0x05040005  | The space in the main memory is not sufficient.                                                             |
| 0x06010000  | Access to object not supported                                                                              |
| 0x06010001  | Read access to a write-only object                                                                          |
| 0x06010002  | Write access to a read-only 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 device incompatibility                                                                     |
| 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 or saved to the application.                                                     |
| 0x08000021  | Data cannot be transferred or saved to the application because of local control.                            |
| 0x08000022  | Due to the current device state, data cannot be transferred to the application or stored in the application |
| 0x08000023  | The dynamic generation of an object directory has failed, or no object directory is available.              |

## 10 Monitoring

### 10.1 Interruption of EtherCAT communication

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



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

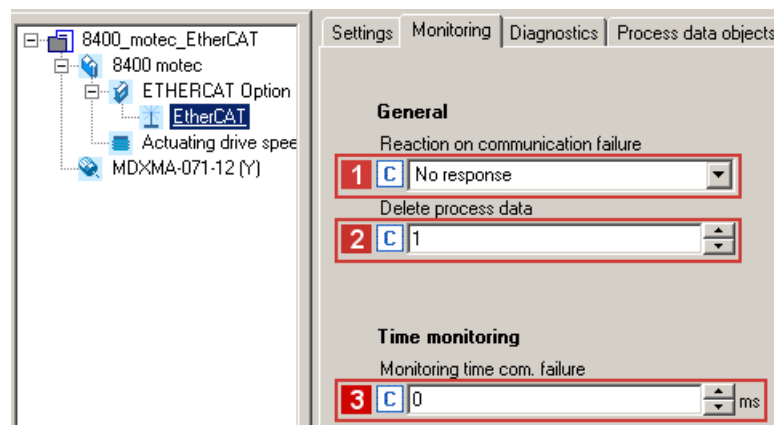
1. During the initialisation of the EtherCAT communication, the sync manager watchdog monitoring time determined in the master is transferred to the slave.

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.)

When the watchdog monitoring time has elapsed, the slave changes to the "Error safe-operational" state (see [C13861](#)). The RUN (green) and ERR (red) LEDs are activated (see [LED status displays](#) (p 59)).

There is no response by 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 of monitoring will be effective immediately.
- The monitoring time expires as soon as communication in the "Operational" state is interrupted.

# Monitoring

## Interruption of internal communication

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After the monitoring time has elapsed, the response set is executed with the error message "[Quit "Operational" status \[0x01bc8131\] \(nt04: COM fault 4\)](#)" ([📖 66](#)).

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.

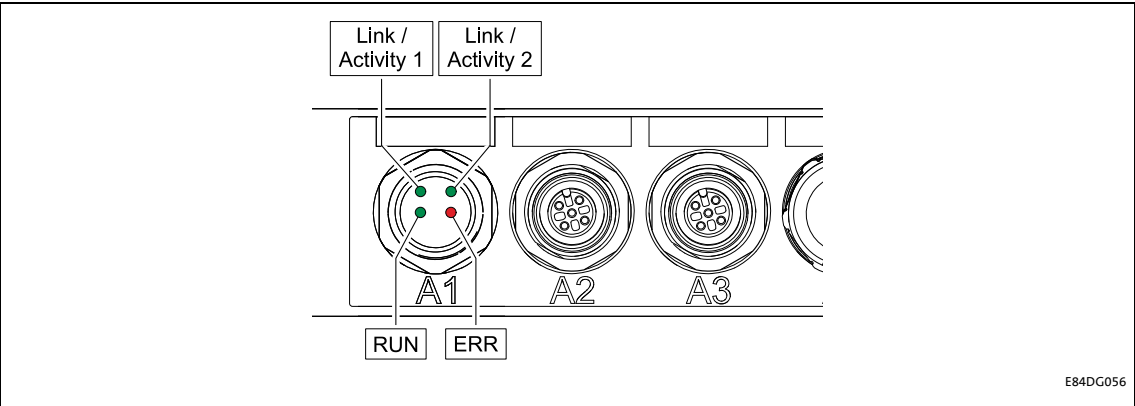
## 10.2 Interruption of internal communication

- The response in the case of a communication error between the Communication Unit and the Drive Unit can be set via code [C01501](#).
- The Communication Unit reports interrupted communication via an emergency telegram to the master and changes to the "Safe-Operational" state.
- The error message "[Connection to 8400 lost \[0x01bc3100\]](#)" ([📖 64](#)) is output.

11 Diagnostics

EtherCAT communication faults can be diagnosed via the LEDs of the communication unit.  
Moreover, the »Engineer« provides diagnostic EtherCAT information.

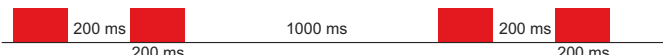
11.1 LED status displays



| LED                    | Colour | Status   | Description                                                                                                                                            |
|------------------------|--------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Link / Activity 1 (A2) | green  | Off      | <ul style="list-style-type: none"><li>No cable is connected to the EtherCAT input (IN).</li><li>No communication</li></ul>                             |
|                        |        | On       | <br>A cable is connected to the EtherCAT input (IN).               |
|                        |        | Flickers | <br>50 ms<br>Communication at the EtherCAT input (IN) is active.   |
| Link / Activity 2 (A3) | green  | Off      | <ul style="list-style-type: none"><li>No cable is connected to the EtherCAT output (OUT).</li><li>No communication</li></ul>                           |
|                        |        | On       | <br>A cable is connected to the EtherCAT output (OUT).             |
|                        |        | Flickers | <br>50 ms<br>Communication at the EtherCAT output (OUT) is active. |

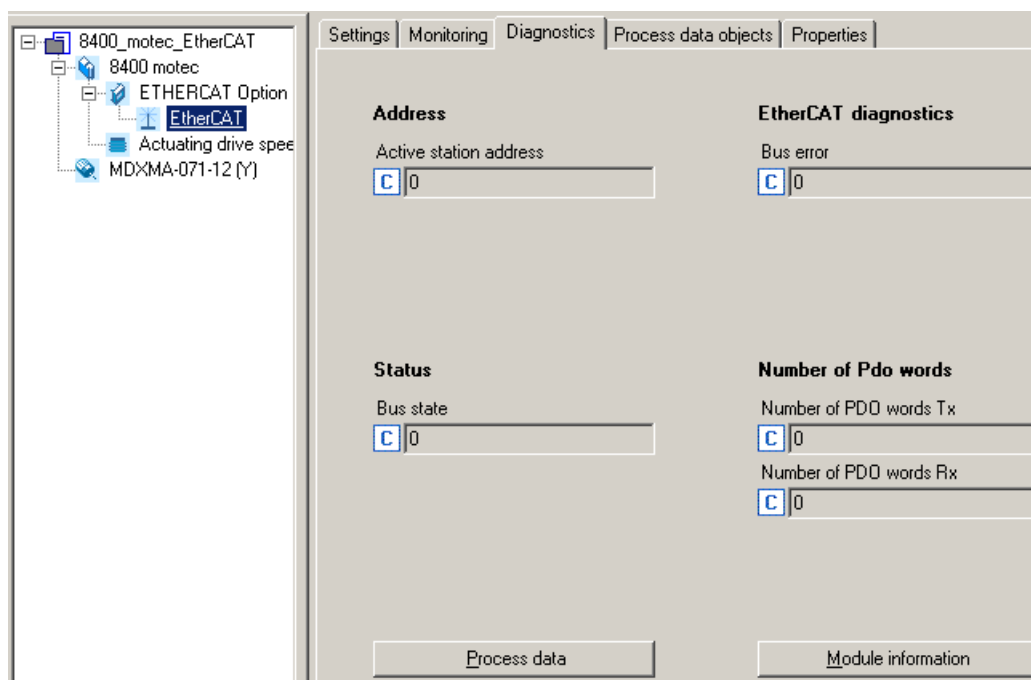
# Diagnostics

## LED status displays

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

### 11.2 Diagnosing with the »Engineer«

In the »Engineer« under the **Diagnostics** tab, you will find EtherCAT diagnostics information.



### 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 or Communication Unit occurs;
- if an internal error of the Communication Unit is removed.

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 "[Quit "Operational" status \[0x01bc8131\] \(nt04: COM fault 4\)](#)"

| 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<br>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 display that there is an error.
- Byte 3 display the contents of the error register (I-1001).
- The error code is entered in bytes 5 ... 8.



**Reference manual/»Engineer« Online help for the Inverter Drive 8400 motec**  
Detailed information on the error codes is provided here.

# Error messages

Short overview of the EtherCAT error messages

## 12 Error messages

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

### 12.1 Short overview of the EtherCAT error messages



#### Reference manual/»Engineer« Online help for the Inverter Drive 8400 motec

Here you will find general information on diagnostics & fault analysis and on error messages.

The following table lists all EtherCAT error messages in numerical order of the error number. Furthermore the preset error response and – if available – the parameters for setting the error response are specified.



#### Tip!

If you click on the cross-reference in the first column, you will get a detailed description (causes and remedies) of the corresponding error message.

| Error number               |                        |                 | Error text                                   | Error type     | Adjustable in            |
|----------------------------|------------------------|-----------------|----------------------------------------------|----------------|--------------------------|
| hex                        | dec (Subject area no.) | dec (Error no.) |                                              |                |                          |
| <a href="#">0x01bc3100</a> | 444                    | 12544           | Connection to 8400 lost                      | 1: No Response | <a href="#">C01501/2</a> |
| <a href="#">0x01bc5531</a> | 444                    | 21809           | Memory: No access                            | 1: No Response | <a href="#">C01501/2</a> |
| <a href="#">0x01bc5532</a> | 444                    | 21810           | Memory: Read error                           | 1: No Response | <a href="#">C01501/2</a> |
| <a href="#">0x01bc5533</a> | 444                    | 21811           | Memory: Write error (nt14: COM fault 14)     | 1: No Response | <a href="#">C01501/2</a> |
| <a href="#">0x01bc6010</a> | 444                    | 24592           | Restart by watchdog reset                    | 1: No Response | <a href="#">C01501/2</a> |
| <a href="#">0x01bc6011</a> | 444                    | 24593           | Internal error                               | 1: No Response | <a href="#">C01501/2</a> |
| <a href="#">0x01bc6100</a> | 444                    | 24832           | Internal error                               | 1: No Response | <a href="#">C01501/2</a> |
| <a href="#">0x01bc6101</a> | 444                    | 24833           | Internal error                               | 1: No Response | <a href="#">C01501/2</a> |
| <a href="#">0x01bc641f</a> | 444                    | 25631           | Invalid parameter record                     | 1: No Response | <a href="#">C01501/2</a> |
| <a href="#">0x01bc6420</a> | 444                    | 25632           | Error: Lenze settings loaded                 | 1: No Response | -                        |
| <a href="#">0x01bc6430</a> | 444                    | 25648           | Invalid module configuration                 | 1: No Response | <a href="#">C01501/2</a> |
| <a href="#">0x01bc8131</a> | 444                    | 33073           | State "Operational" left (nt04: COM fault 4) | 0: No Response | <a href="#">C13880</a>   |

# Error messages

## Possible causes and remedies

### 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.

#### Connection to 8400 lost [0x01bc3100]

| <b>Response</b> (Lenze setting printed in bold)                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Setting:</b> <a href="#">C01501/2</a> ( <input checked="" type="checkbox"/> adjustable response) |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> None <input type="checkbox"/> System fault <input checked="" type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Trouble <input type="checkbox"/> Quick stop by trouble <input checked="" type="checkbox"/> Warning locked <input type="checkbox"/> warning <input type="checkbox"/> Information |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                     |
| Cause                                                                                                                                                                                                                                                                                                                                    | Remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                     |
| <ul style="list-style-type: none"><li>• The Communication Unit is supplied with external voltage, but the Inverter Drive 8400 motec is not supplied with voltage.</li><li>• The Communication Unit is not connected correctly to the Drive Unit.</li></ul>                                                                               | <ul style="list-style-type: none"><li>• Switch off and on again the voltage supply of the Inverter Drive 8400 motec.</li><li>• Check wiring and terminals.</li><li>• Check internal plug connection between Communication Unit and Drive Unit.<br/>For this purpose, the Inverter Drive 8400 motec must be unscrewed. Please observe the information in the mounting instructions of the Communication Unit and the Drive Unit!</li><li>• If this error continues to occur, please contact the Lenze Service. (if required, the Communication Unit must be replaced.)</li></ul> |                                                                                                     |

#### Memory: No access [0x01bc5531]

| <b>Response</b> (Lenze setting printed in bold)                                                                                                                                                                                                                                                                                          |                                                          | <b>Setting:</b> <a href="#">C01501/2</a> ( <input checked="" type="checkbox"/> adjustable response) |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> None <input type="checkbox"/> System fault <input checked="" type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Trouble <input type="checkbox"/> Quick stop by trouble <input checked="" type="checkbox"/> Warning locked <input type="checkbox"/> warning <input type="checkbox"/> Information |                                                          |                                                                                                     |
| Cause                                                                                                                                                                                                                                                                                                                                    | Remedy                                                   |                                                                                                     |
| Access to memory was not possible.                                                                                                                                                                                                                                                                                                       | Send the device and a description of the fault to Lenze. |                                                                                                     |

#### Memory: Read error [0x01bc5532]

| <b>Response</b> (Lenze setting printed in bold)                                                                                                                                                                                                                                                                                          |                                                                                                                                                                     | <b>Setting:</b> <a href="#">C01501/2</a> ( <input checked="" type="checkbox"/> adjustable response) |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> None <input type="checkbox"/> System fault <input checked="" type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Trouble <input type="checkbox"/> Quick stop by trouble <input checked="" type="checkbox"/> Warning locked <input type="checkbox"/> warning <input type="checkbox"/> Information |                                                                                                                                                                     |                                                                                                     |
| Cause                                                                                                                                                                                                                                                                                                                                    | Remedy                                                                                                                                                              |                                                                                                     |
| Parameter could not be read.                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"><li>• Download application again (including module).</li><li>• Send the device and a description of the fault to Lenze.</li></ul> |                                                                                                     |

#### Memory: Write error [0x01bc5533] (nt14: COM fault 14)

| <b>Response</b> (Lenze setting printed in bold)                                                                                                                                                                                                                                                                                          |                                                                                                                                                                     | <b>Setting:</b> <a href="#">C01501/2</a> ( <input checked="" type="checkbox"/> adjustable response) |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> None <input type="checkbox"/> System fault <input checked="" type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Trouble <input type="checkbox"/> Quick stop by trouble <input checked="" type="checkbox"/> Warning locked <input type="checkbox"/> warning <input type="checkbox"/> Information |                                                                                                                                                                     |                                                                                                     |
| Cause                                                                                                                                                                                                                                                                                                                                    | Remedy                                                                                                                                                              |                                                                                                     |
| Parameter could not be written.                                                                                                                                                                                                                                                                                                          | <ul style="list-style-type: none"><li>• Download application again (including module).</li><li>• Send the device and a description of the fault to Lenze.</li></ul> |                                                                                                     |

# Error messages

## Possible causes and remedies

### Restart by watchdog reset [0x01bc6010]

|                                                                                                                                                                                                                                                                                                                                          |                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <b>Response</b> (Lenze setting printed in bold)                                                                                                                                                                                                                                                                                          | <b>Setting:</b> <a href="#">C01501/2</a> ( <input checked="" type="checkbox"/> adjustable response) |
| <input checked="" type="checkbox"/> None <input type="checkbox"/> System fault <input checked="" type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Trouble <input type="checkbox"/> Quick stop by trouble <input checked="" type="checkbox"/> Warning locked <input type="checkbox"/> warning <input type="checkbox"/> Information |                                                                                                     |
| <b>Cause</b>                                                                                                                                                                                                                                                                                                                             | <b>Remedy</b>                                                                                       |
| Device is defective.                                                                                                                                                                                                                                                                                                                     | Send the device and a description of the fault to Lenze.                                            |

### Internal error [0x01bc6011]

|                                                                                                                                                                                                                                                                                                                                          |                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <b>Response</b> (Lenze setting printed in bold)                                                                                                                                                                                                                                                                                          | <b>Setting:</b> <a href="#">C01501/2</a> ( <input checked="" type="checkbox"/> adjustable response) |
| <input checked="" type="checkbox"/> None <input type="checkbox"/> System fault <input checked="" type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Trouble <input type="checkbox"/> Quick stop by trouble <input checked="" type="checkbox"/> Warning locked <input type="checkbox"/> warning <input type="checkbox"/> Information |                                                                                                     |
| <b>Cause</b>                                                                                                                                                                                                                                                                                                                             | <b>Remedy</b>                                                                                       |
| Device is defective.                                                                                                                                                                                                                                                                                                                     | Send the device and a description of the fault to Lenze.                                            |

### Internal error [0x01bc6100]

|                                                                                                                                                                                                                                                                                                                                          |                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <b>Response</b> (Lenze setting printed in bold)                                                                                                                                                                                                                                                                                          | <b>Setting:</b> <a href="#">C01501/2</a> ( <input checked="" type="checkbox"/> adjustable response) |
| <input checked="" type="checkbox"/> None <input type="checkbox"/> System fault <input checked="" type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Trouble <input type="checkbox"/> Quick stop by trouble <input checked="" type="checkbox"/> Warning locked <input type="checkbox"/> warning <input type="checkbox"/> Information |                                                                                                     |
| <b>Cause</b>                                                                                                                                                                                                                                                                                                                             | <b>Remedy</b>                                                                                       |
| Device is defective.                                                                                                                                                                                                                                                                                                                     | Send the device and a description of the fault to Lenze.                                            |

### Internal error [0x01bc6101]

|                                                                                                                                                                                                                                                                                                                                          |                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <b>Response</b> (Lenze setting printed in bold)                                                                                                                                                                                                                                                                                          | <b>Setting:</b> <a href="#">C01501/2</a> ( <input checked="" type="checkbox"/> adjustable response) |
| <input checked="" type="checkbox"/> None <input type="checkbox"/> System fault <input checked="" type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Trouble <input type="checkbox"/> Quick stop by trouble <input checked="" type="checkbox"/> Warning locked <input type="checkbox"/> warning <input type="checkbox"/> Information |                                                                                                     |
| <b>Cause</b>                                                                                                                                                                                                                                                                                                                             | <b>Remedy</b>                                                                                       |
| Device is defective.                                                                                                                                                                                                                                                                                                                     | Send the device and a description of the fault to Lenze.                                            |

### Invalid parameter set [0x01bc641f]

|                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Response</b> (Lenze setting printed in bold)                                                                                                                                                                                                                                                                                          | <b>Setting:</b> <a href="#">C01501/2</a> ( <input checked="" type="checkbox"/> adjustable response)                                                                 |
| <input checked="" type="checkbox"/> None <input type="checkbox"/> System fault <input checked="" type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Trouble <input type="checkbox"/> Quick stop by trouble <input checked="" type="checkbox"/> Warning locked <input type="checkbox"/> warning <input type="checkbox"/> Information |                                                                                                                                                                     |
| <b>Cause</b>                                                                                                                                                                                                                                                                                                                             | <b>Remedy</b>                                                                                                                                                       |
| No active parameter set could be loaded.                                                                                                                                                                                                                                                                                                 | <ul style="list-style-type: none"><li>• Download application again (including module).</li><li>• Send the device and a description of the fault to Lenze.</li></ul> |

### Error: Lenze setting loaded [0x01bc6420]

|                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Response</b> (Lenze setting printed in bold)                                                                                                                                                                                                                                                                    | <b>Setting:</b> not possible                                                                                                                                        |
| <input type="checkbox"/> None <input type="checkbox"/> System fault <input checked="" type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Trouble <input type="checkbox"/> Quick stop by trouble <input type="checkbox"/> Warning locked <input type="checkbox"/> warning <input type="checkbox"/> Information |                                                                                                                                                                     |
| <b>Cause</b>                                                                                                                                                                                                                                                                                                       | <b>Remedy</b>                                                                                                                                                       |
| Access to parameter set was not possible.                                                                                                                                                                                                                                                                          | <ul style="list-style-type: none"><li>• Download application again (including module).</li><li>• Send the device and a description of the fault to Lenze.</li></ul> |

# Error messages

Possible causes and remedies

## Invalid module configuration [0x01bc6430]

| Response (Lenze setting printed in bold)                                                                                                                                                                                                                                                                                                 | Setting: <b>C01501/2</b> ( <input checked="" type="checkbox"/> adjustable response) |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> None <input type="checkbox"/> System fault <input checked="" type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Trouble <input type="checkbox"/> Quick stop by trouble <input checked="" type="checkbox"/> Warning locked <input type="checkbox"/> warning <input type="checkbox"/> Information |                                                                                     |
| Cause                                                                                                                                                                                                                                                                                                                                    | Remedy                                                                              |
| The number of process data words configured via EtherCAT does not comply with the length saved in the memory module.                                                                                                                                                                                                                     | Save parameter set with <b>C00002/11 = 1</b> .                                      |

## Quit "Operational" status [0x01bc8131] (nt04: COM fault 4)

| Response (Lenze setting printed in bold)                                                                                                                                                                                                                                                                                                                              | Setting: <b>C13880</b> ( <input checked="" type="checkbox"/> Adjustable response)                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> <b>None</b> <input type="checkbox"/> System fault <input checked="" type="checkbox"/> <b>Fault</b> <input type="checkbox"/> Trouble <input checked="" type="checkbox"/> Quick stop by trouble <input checked="" type="checkbox"/> Warning locked <input type="checkbox"/> Warning <input checked="" type="checkbox"/> Information |                                                                                                                                                                                                                                                                                                                                 |
| Cause                                                                                                                                                                                                                                                                                                                                                                 | Remedy                                                                                                                                                                                                                                                                                                                          |
| The EtherCAT data exchange was stopped in the "Operational" state. <ul style="list-style-type: none"><li>• Also see the chapter "<a href="#">Interruption of EtherCAT communication</a>" (📖 57).</li></ul>                                                                                                                                                            | <ul style="list-style-type: none"><li>• Check cables and terminals.</li><li>• The master must reset the inverter to the "Operational" status (<b>C13930</b> = 1).<br/>If required, check a pending emergency message first.<br/>▶ <a href="#">State change after "Operational" in the stay-alive operation</a> (📖 27)</li></ul> |

# Parameter reference

Communication-relevant parameters of the operating system

## 13 Parameter reference

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



**Reference manual/online help for the Inverter Drive 8400 motec**

Here you will find general information on 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<br>Index: 23074 <sub>d</sub> = 5A22 <sub>h</sub>   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------------------------------------------------------------------|
| <b>C01501   Response in case of communication fault with MCI</b>                                                                                                                                                                                                                     |                |                                                                          |
| Configuration of monitoring functions for the Communication Unit                                                                                                                                                                                                                     |                |                                                                          |
| <b>Selection list</b> (Lenze setting printed in bold)                                                                                                                                                                                                                                |                |                                                                          |
| 0                                                                                                                                                                                                                                                                                    | No response    |                                                                          |
| 1                                                                                                                                                                                                                                                                                    | Error          |                                                                          |
| 4                                                                                                                                                                                                                                                                                    | Warning Locked |                                                                          |
| Subcodes                                                                                                                                                                                                                                                                             | Lenze setting  | Info                                                                     |
| C01501/1                                                                                                                                                                                                                                                                             | 1: No Response | Resp. to MCI fault 1<br>• Response to a communication fault.             |
| C01501/2                                                                                                                                                                                                                                                                             | 1: No Response | Resp. to MCI fault 2<br>• Response to a fault in the Communication Unit. |
| <input checked="" type="checkbox"/> Read access <input checked="" type="checkbox"/> Write access <input type="checkbox"/> CINH <input type="checkbox"/> PLC STOP <input type="checkbox"/> No transfer <input type="checkbox"/> COM <input type="checkbox"/> MOT    Scaling factor: 1 |                |                                                                          |

**C01503**

| Parameter   Name:                                                                                                                                                                                                                                                                    |               | Data type: UNSIGNED_16<br>Index: 23072 <sub>d</sub> = 5A20 <sub>h</sub> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------------------------------------------------|
| <b>C01503   MCI timeout</b>                                                                                                                                                                                                                                                          |               |                                                                         |
| <b>Setting range</b> (min. value   unit   max. value)                                                                                                                                                                                                                                |               |                                                                         |
| 0                                                                                                                                                                                                                                                                                    | ms            | 1000                                                                    |
| Subcodes                                                                                                                                                                                                                                                                             | Lenze setting | Info                                                                    |
| C01503/1                                                                                                                                                                                                                                                                             | 200 ms        | MCI timeout                                                             |
| <input checked="" type="checkbox"/> Read access <input checked="" type="checkbox"/> Write access <input type="checkbox"/> CINH <input type="checkbox"/> PLC STOP <input type="checkbox"/> No transfer <input type="checkbox"/> COM <input type="checkbox"/> MOT    Scaling factor: 1 |               |                                                                         |

# Parameter reference

## Parameters of the Communication Unit

### 13.2 Parameters of the Communication Unit

This chapter lists the parameters of the Communication Unit E84DGFCTxxx (EtherCAT) in numerically ascending order.

#### C13850

|                                                                                                                                                                                                                                                                                                                              |  |       |                                                                         |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------|-------------------------------------------------------------------------|--|--|
| Parameter   Name:<br><b>C13850   All words to master</b>                                                                                                                                                                                                                                                                     |  |       | Data type: UNSIGNED_16<br>Index: 10725 <sub>d</sub> = 29E5 <sub>h</sub> |  |  |
| Display of the process data words (subcodes 1 ... 10) which are transferred from the inverter to the master.<br>Only those which are configured are valid.                                                                                                                                                                   |  |       |                                                                         |  |  |
| Display range (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                                                              |  |  |
| <input checked="" type="checkbox"/> Read access <input type="checkbox"/> Write access <input type="checkbox"/> CINH <input type="checkbox"/> PLC-STOP <input type="checkbox"/> No transfer <input type="checkbox"/> PDO_MAP_RX <input type="checkbox"/> PDO_MAP_TX <input type="checkbox"/> COM <input type="checkbox"/> MOT |  |       |                                                                         |  |  |

#### C13851

|                                                                                                                                                                                                                                                                                                                              |  |       |                                                                         |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------|-------------------------------------------------------------------------|--|--|
| Parameter   Name:<br><b>C13851   All words from master</b>                                                                                                                                                                                                                                                                   |  |       | Data type: UNSIGNED_16<br>Index: 10724 <sub>d</sub> = 29E4 <sub>h</sub> |  |  |
| Display of the process data words (subcodes 1 ... 8) which are transferred from the inverter to the master.<br>Only those which are configured are valid.                                                                                                                                                                    |  |       |                                                                         |  |  |
| Display range (min. value   unit   max. value)                                                                                                                                                                                                                                                                               |  |       |                                                                         |  |  |
| 0                                                                                                                                                                                                                                                                                                                            |  | 65535 |                                                                         |  |  |
| Subcodes                                                                                                                                                                                                                                                                                                                     |  |       | Info                                                                    |  |  |
| C13851/1                                                                                                                                                                                                                                                                                                                     |  |       | 1st word                                                                |  |  |
| ...                                                                                                                                                                                                                                                                                                                          |  |       | ...                                                                     |  |  |
| C13851/8                                                                                                                                                                                                                                                                                                                     |  |       | 8th word                                                                |  |  |
| <input checked="" type="checkbox"/> Read access <input type="checkbox"/> Write access <input type="checkbox"/> CINH <input type="checkbox"/> PLC-STOP <input type="checkbox"/> No transfer <input type="checkbox"/> PDO MAP RX <input type="checkbox"/> PDO MAP TX <input type="checkbox"/> COM <input type="checkbox"/> MOT |  |       |                                                                         |  |  |

#### C13859

|                                                                                                                                                                                                                                                                                                                              |  |                                                                         |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------|--|
| Parameter   Name:<br><b>C13859   All words to standard device</b>                                                                                                                                                                                                                                                            |  | Data type: UNSIGNED_16<br>Index: 10716 <sub>d</sub> = 29DC <sub>h</sub> |  |
| Number of process data words to be sent                                                                                                                                                                                                                                                                                      |  |                                                                         |  |
| Display range (min. value   unit   max. value)                                                                                                                                                                                                                                                                               |  |                                                                         |  |
| 0                                                                                                                                                                                                                                                                                                                            |  |                                                                         |  |
| <input checked="" type="checkbox"/> Read access <input type="checkbox"/> Write access <input type="checkbox"/> CINH <input type="checkbox"/> PLC-STOP <input type="checkbox"/> No transfer <input type="checkbox"/> PDO MAP RX <input type="checkbox"/> PDO MAP TX <input type="checkbox"/> COM <input type="checkbox"/> MOT |  |                                                                         |  |

# Parameter reference

## Parameters of the Communication Unit

### C13860

|                                                                                                                                                                                                                                                                                                                              |                                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Parameter   Name:<br><b>C13860   All words from standard device</b>                                                                                                                                                                                                                                                          | Data type: UNSIGNED_16<br>Index: 10715 <sub>d</sub> = 29DB <sub>h</sub> |
| Number of process data words to be received                                                                                                                                                                                                                                                                                  |                                                                         |
| <b>Display range</b> (min. value   unit   max. value)                                                                                                                                                                                                                                                                        |                                                                         |
| 0                                                                                                                                                                                                                                                                                                                            | 8                                                                       |
| <input checked="" type="checkbox"/> Read access <input type="checkbox"/> Write access <input type="checkbox"/> CINH <input type="checkbox"/> PLC-STOP <input type="checkbox"/> No transfer <input type="checkbox"/> PDO_MAP_RX <input type="checkbox"/> PDO_MAP_TX <input type="checkbox"/> COM <input type="checkbox"/> MOT |                                                                         |

### C13861

|                                                                                                                                                                                                                                                                                                                              |                                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Parameter   Name:<br><b>C13861   Bus status</b>                                                                                                                                                                                                                                                                              | Data type: UNSIGNED_16<br>Index: 10714 <sub>d</sub> = 29DA <sub>h</sub> |
| Display of the current bus status<br>▶ <a href="#">EtherCAT state machine</a> (□ 36)                                                                                                                                                                                                                                         |                                                                         |
| <b>Display range</b> (min. value   unit   max. value)                                                                                                                                                                                                                                                                        |                                                                         |
| 0                                                                                                                                                                                                                                                                                                                            | 65535                                                                   |
| <input checked="" type="checkbox"/> Read access <input type="checkbox"/> Write access <input type="checkbox"/> CINH <input type="checkbox"/> PLC-STOP <input type="checkbox"/> No transfer <input type="checkbox"/> PDO_MAP_RX <input type="checkbox"/> PDO_MAP_TX <input type="checkbox"/> COM <input type="checkbox"/> MOT |                                                                         |

### C13864

|                                                                                                                                                                                                                                                                                                                              |                                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Parameter   Name:<br><b>C13864   Active station address</b>                                                                                                                                                                                                                                                                  | Data type: UNSIGNED_16<br>Index: 10711 <sub>d</sub> = 29D7 <sub>h</sub> |
| Display of the station address allocated by the master                                                                                                                                                                                                                                                                       |                                                                         |
| <b>Display range</b> (min. value   unit   max. value)                                                                                                                                                                                                                                                                        |                                                                         |
| 0                                                                                                                                                                                                                                                                                                                            | 32767                                                                   |
| <input checked="" type="checkbox"/> Read access <input type="checkbox"/> Write access <input type="checkbox"/> CINH <input type="checkbox"/> PLC-STOP <input type="checkbox"/> No transfer <input type="checkbox"/> PDO_MAP_RX <input type="checkbox"/> PDO_MAP_TX <input type="checkbox"/> COM <input type="checkbox"/> MOT |                                                                         |

### C13867

|                                                                                                                                                                                                                                                                                                                              |                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Parameter   Name:<br><b>C13867   Display of emergency data</b>                                                                                                                                                                                                                                                               | Data type: OCTET_STRING<br>Index: 10708 <sub>d</sub> = 29D4 <sub>h</sub> |
| Display of the emergency data sent by the inverter (string with a length of 8 bytes).<br>▶ <a href="#">Emergency requests / Emergency messages</a> (□ 62)                                                                                                                                                                    |                                                                          |
| <input checked="" type="checkbox"/> Read access <input type="checkbox"/> Write access <input type="checkbox"/> CINH <input type="checkbox"/> PLC-STOP <input type="checkbox"/> No transfer <input type="checkbox"/> PDO_MAP_RX <input type="checkbox"/> PDO_MAP_TX <input type="checkbox"/> COM <input type="checkbox"/> MOT |                                                                          |

### C13879

|                                                                                                                                                                                                                                                                                                                              |                                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Parameter   Name:<br><b>C13879   Bus error</b>                                                                                                                                                                                                                                                                               | Data type: UNSIGNED_16<br>Index: 10696 <sub>d</sub> = 29C8 <sub>h</sub> |
| Bit coded display of the bus error<br>Additionally, an error message is entered in the EtherCAT register " <a href="#">AL Status Code</a> " (□ 37).                                                                                                                                                                          |                                                                         |
| <b>Value is bit-coded:</b>                                                                                                                                                                                                                                                                                                   | <b>Info</b>                                                             |
| Bit 0                                                                                                                                                                                                                                                                                                                        | General bus error                                                       |
| Bit 1                                                                                                                                                                                                                                                                                                                        | Reserved                                                                |
| ...                                                                                                                                                                                                                                                                                                                          | ...                                                                     |
| Bit 31                                                                                                                                                                                                                                                                                                                       | Reserved                                                                |
| <input checked="" type="checkbox"/> Read access <input type="checkbox"/> Write access <input type="checkbox"/> CINH <input type="checkbox"/> PLC-STOP <input type="checkbox"/> No transfer <input type="checkbox"/> PDO_MAP_RX <input type="checkbox"/> PDO_MAP_TX <input type="checkbox"/> COM <input type="checkbox"/> MOT |                                                                         |

# Parameter reference

## Parameters of the Communication Unit

### C13880

|                                                                                                                                                                                                                                                                                                                                         |                      |                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------------------------------------------------------------|
| Parameter   Name:<br><b>C13880   Monitoring reaction</b>                                                                                                                                                                                                                                                                                |                      | Data type: UNSIGNED_8<br>Index: 10695 <sub>d</sub> = 29C7 <sub>h</sub> |
| <p>The set response will be executed if the node detects that it is no longer in the "Operational" state and the monitoring time (<a href="#">C13881</a>) has elapsed.</p> <p>The notes in code <a href="#">C13881</a> must be observed!</p> <p>► <a href="#">Interruption of EtherCAT communication</a> (<a href="#">57</a>)</p>       |                      |                                                                        |
| <b>Selection list</b> (Lenze setting printed in bold)                                                                                                                                                                                                                                                                                   |                      |                                                                        |
| 0                                                                                                                                                                                                                                                                                                                                       | No response          |                                                                        |
| 1                                                                                                                                                                                                                                                                                                                                       | Error                |                                                                        |
| 4                                                                                                                                                                                                                                                                                                                                       | Warning Locked       |                                                                        |
| <b>Subcodes</b>                                                                                                                                                                                                                                                                                                                         | <b>Lenze setting</b> | <b>Info</b>                                                            |
| C13880/1                                                                                                                                                                                                                                                                                                                                | 0: No Response       |                                                                        |
| <input checked="" type="checkbox"/> Read access <input checked="" type="checkbox"/> Write access <input type="checkbox"/> CINH <input type="checkbox"/> PLC-STOP <input type="checkbox"/> No transfer <input type="checkbox"/> PDO_MAP_RX <input type="checkbox"/> PDO_MAP_TX <input type="checkbox"/> COM <input type="checkbox"/> MOT |                      |                                                                        |

### C13881

|                                                                                                                                                                                                                                                                                                                                                           |    |                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-------------------------------------------------------------------------|
| Parameter   Name:<br><b>C13881   Response time when exiting "Operational"</b>                                                                                                                                                                                                                                                                             |    | Data type: UNSIGNED_16<br>Index: 10694 <sub>d</sub> = 29C6 <sub>h</sub> |
| <p>If the "Operational" state is exited, the response parameterised with <a href="#">C13880</a> occurs after the time set here has elapsed.</p> <ul style="list-style-type: none"><li>• A value of "0" or "65535" in this code deactivates the monitoring.</li></ul> <p>► <a href="#">Interruption of EtherCAT communication</a> (<a href="#">57</a>)</p> |    |                                                                         |
| <b>Setting range</b> (min. value   unit   max. value)                                                                                                                                                                                                                                                                                                     |    | <b>Lenze setting</b>                                                    |
| 0                                                                                                                                                                                                                                                                                                                                                         | ms | 65535 <b>0 ms</b>                                                       |
| <input checked="" type="checkbox"/> Read access <input checked="" type="checkbox"/> Write access <input type="checkbox"/> CINH <input type="checkbox"/> PLC-STOP <input type="checkbox"/> No transfer <input type="checkbox"/> PDO_MAP_RX <input type="checkbox"/> PDO_MAP_TX <input type="checkbox"/> COM <input type="checkbox"/> MOT                   |    |                                                                         |

### C13885

|                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |                                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------|
| Parameter   Name:<br><b>C13885   Clear process data</b>                                                                                                                                                                                                                                                                                                                                                                         |  | Data type: UNSIGNED_8<br>Index: 10690 <sub>d</sub> = 29C2 <sub>h</sub> |
| <p>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.</p> <ul style="list-style-type: none"><li>• 0: The data last sent by the master are used.</li><li>• 1: The process data contents is set to a value of "0".</li></ul> <p>► <a href="#">Interruption of EtherCAT communication</a> (<a href="#">57</a>)</p> |  |                                                                        |
| <b>Setting range</b> (min. value   unit   max. value)                                                                                                                                                                                                                                                                                                                                                                           |  | <b>Lenze setting</b>                                                   |
| 0                                                                                                                                                                                                                                                                                                                                                                                                                               |  | 1 <b>1</b>                                                             |
| <input checked="" type="checkbox"/> Read access <input checked="" type="checkbox"/> Write access <input type="checkbox"/> CINH <input type="checkbox"/> PLC-STOP <input type="checkbox"/> No transfer <input type="checkbox"/> PDO_MAP_RX <input type="checkbox"/> PDO_MAP_TX <input type="checkbox"/> COM <input type="checkbox"/> MOT                                                                                         |  |                                                                        |

### C13899

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |                                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------|
| Parameter   Name:<br><b>C13899   Station Alias address</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  | Data type: UNSIGNED_16<br>Index: 10676 <sub>d</sub> = 29B4 <sub>h</sub> |
| <p>This code serves to set a station alias address.</p> <p>In order to use a station alias address, you must select a value &gt; "0".</p> <ul style="list-style-type: none"><li>• The station alias address must only be set if the node is part of a "hot connect" group.</li><li>• The station alias address must be unambiguous and may only be assigned once within the EtherCAT network.</li><li>• Use the same station alias address in the EtherCAT master and in the slave.</li></ul> <p>► <a href="#">Address allocation</a> (<a href="#">31</a>)</p> |  |                                                                         |
| <b>Setting range</b> (min. value   unit   max. value)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  | <b>Lenze setting</b>                                                    |
| 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  | 32767 <b>0</b>                                                          |
| <input checked="" type="checkbox"/> Read access <input checked="" type="checkbox"/> Write access <input type="checkbox"/> CINH <input type="checkbox"/> PLC-STOP <input type="checkbox"/> No transfer <input type="checkbox"/> PDO_MAP_RX <input type="checkbox"/> PDO_MAP_TX <input checked="" type="checkbox"/> COM <input type="checkbox"/> MOT                                                                                                                                                                                                             |  |                                                                         |

# Parameter reference

## Parameters of the Communication Unit

### C13900

|                                                                                                                                                                                                                                                                                                                              |                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Parameter   Name:<br><b>C13900   Firmware product type</b>                                                                                                                                                                                                                                                                   | Data type: VISIBLE_STRING<br>Index: 10675 <sub>d</sub> = 29B3 <sub>h</sub> |
| The code contains a string with a length of 8 bytes.<br>The following identification code is displayed: "E84DFFET".                                                                                                                                                                                                          |                                                                            |
| <input checked="" type="checkbox"/> Read access <input type="checkbox"/> Write access <input type="checkbox"/> CINH <input type="checkbox"/> PLC-STOP <input type="checkbox"/> No transfer <input type="checkbox"/> PDO_MAP_RX <input type="checkbox"/> PDO_MAP_TX <input type="checkbox"/> COM <input type="checkbox"/> MOT |                                                                            |

### C13901

|                                                                                                                                                                                                                                                                                                                              |                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Parameter   Name:<br><b>C13901   Firmware compilation date</b>                                                                                                                                                                                                                                                               | Data type: VISIBLE_STRING<br>Index: 10674 <sub>d</sub> = 29B2 <sub>h</sub> |
| The code contains a string with a length of 20 bytes.<br>Here, the compilation date ("MM DD YYYY") and time ("hh:mm:ss") of the software are provided.<br>Example: "Mar 21 2005 12:31:21"                                                                                                                                    |                                                                            |
| <input checked="" type="checkbox"/> Read access <input type="checkbox"/> Write access <input type="checkbox"/> CINH <input type="checkbox"/> PLC-STOP <input type="checkbox"/> No transfer <input type="checkbox"/> PDO_MAP_RX <input type="checkbox"/> PDO_MAP_TX <input type="checkbox"/> COM <input type="checkbox"/> MOT |                                                                            |

### C13902

|                                                                                                                                                                                                                                                                                                                              |                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Parameter   Name:<br><b>C13902   Firmware version</b>                                                                                                                                                                                                                                                                        | Data type: VISIBLE_STRING<br>Index: 10673 <sub>d</sub> = 29B1 <sub>h</sub> |
| The code contains a string with a length of 11 bytes.<br>Here, the firmware version is provided.<br>Example: "01.00.00.00"                                                                                                                                                                                                   |                                                                            |
| <input checked="" type="checkbox"/> Read access <input type="checkbox"/> Write access <input type="checkbox"/> CINH <input type="checkbox"/> PLC-STOP <input type="checkbox"/> No transfer <input type="checkbox"/> PDO_MAP_RX <input type="checkbox"/> PDO_MAP_TX <input type="checkbox"/> COM <input type="checkbox"/> MOT |                                                                            |

### C13930

|                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------|
| Parameter   Name:<br><b>C13930   Reach Operational</b>                                                                                                                                                                                                                                                                                                                                    |  | Data type: UNSIGNED_8<br>Index: 10645 <sub>d</sub> = 2995 <sub>h</sub> |
| <div>▶ <a href="#">State change after "Operational" in the stay-alive operation (📖 27)</a></div> <p>The parameter is a volatile parameter that is not saved and must therefore be reset to '1' each time the controller (master) is restarted.</p> <ul style="list-style-type: none"><li>• Setting '1': State change after "Operational"</li><li>• Setting '0': No state change</li></ul> |  |                                                                        |
| Setting range (min. value   unit   max. value)                                                                                                                                                                                                                                                                                                                                            |  | Lenze setting                                                          |
| 0                                                                                                                                                                                                                                                                                                                                                                                         |  | 1 0                                                                    |
| <input checked="" type="checkbox"/> Read access <input checked="" type="checkbox"/> Write access <input type="checkbox"/> CINH <input type="checkbox"/> PLC-STOP <input type="checkbox"/> No transfer <input type="checkbox"/> PDO_MAP_RX <input type="checkbox"/> PDO_MAP_TX <input checked="" type="checkbox"/> COM <input type="checkbox"/> MOT                                        |  |                                                                        |

# Parameter reference

## Table of attributes

### 13.3 Table of attributes

The table of attributes contains information that is required for communication with the inverter 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 under which the parameter is addressed. The subindex for array variables corresponds to the Lenze subcode number. | 24575 - Lenze code number                                                                            | Is only required for access via a bus system.                                                                  |
|        | hex    |                                                                                                                         | 5FFF <sub>h</sub> - 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<br>10 = 1 decimal position<br>100 = 2 decimal positions<br>1000 = 3 decimal positions |
| Access | R      | Read access                                                                                                             | <input checked="" type="checkbox"/> Reading permitted                                                |                                                                                                                |
|        | W      | Write access                                                                                                            | <input checked="" type="checkbox"/> Writing permitted                                                |                                                                                                                |
|        | CINH   | Controller inhibit (CINH) required                                                                                      | <input checked="" type="checkbox"/> Writing is only possible when the controller is inhibited (CINH) |                                                                                                                |

# Parameter reference

## Table of attributes

Table of attributes

| Code                   | Name                                     | Index |      | Data |    |                |        | Access                              |                                     |      |
|------------------------|------------------------------------------|-------|------|------|----|----------------|--------|-------------------------------------|-------------------------------------|------|
|                        |                                          | dec   | hex  | DS   | DA | Data type      | Factor | R                                   | W                                   | CINH |
| <a href="#">C13850</a> | All words from drive to master           | 10725 | 29E5 | A    | 9  | UNSIGNED_16    | 1      | <input checked="" type="checkbox"/> |                                     |      |
| <a href="#">C13851</a> | All words from master to drive           | 10724 | 29E4 | A    | 8  | UNSIGNED_16    | 1      | <input checked="" type="checkbox"/> |                                     |      |
| <a href="#">C13859</a> | All words to the basic device            | 10716 | 29DC | E    | 1  | UNSIGNED_16    | 1      | <input checked="" type="checkbox"/> |                                     |      |
| <a href="#">C13860</a> | All words to the basic device            | 10715 | 29DB | E    | 1  | UNSIGNED_16    | 1      | <input checked="" type="checkbox"/> |                                     |      |
| <a href="#">C13861</a> | Bus status                               | 10714 | 29DA | E    | 1  | UNSIGNED_16    | 1      | <input checked="" type="checkbox"/> |                                     |      |
| <a href="#">C13864</a> | Active station address                   | 10711 | 29D7 | E    | 1  | UNSIGNED_16    | 1      | <input checked="" type="checkbox"/> |                                     |      |
| <a href="#">C13867</a> | Display of emergency data                | 10708 | 29D4 | E    | 1  | OCTET_STRING   |        | <input checked="" type="checkbox"/> |                                     |      |
| <a href="#">C13879</a> | Bus error                                | 10696 | 29C8 | E    | 1  | UNSIGNED_16    | 1      | <input checked="" type="checkbox"/> |                                     |      |
| <a href="#">C13880</a> | Reaction on communication failure        | 10695 | 29C7 | A    | 1  | UNSIGNED_8     | 1      | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |      |
| <a href="#">C13881</a> | Response time when exiting "Operational" | 10694 | 29C6 | E    | 1  | UNSIGNED_16    | 1      | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |      |
| <a href="#">C13885</a> | Delete process data                      | 10690 | 29C2 | E    | 1  | UNSIGNED_8     | 1      | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |      |
| <a href="#">C13899</a> | Station alias address                    | 10676 | 29B4 | E    | 1  | UNSIGNED_16    | 1      | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |      |
| <a href="#">C13900</a> | Firmware product type                    | 10675 | 29B3 | E    | 1  | VISIBLE_STRING |        | <input checked="" type="checkbox"/> |                                     |      |
| <a href="#">C13901</a> | Firmware compilation date                | 10674 | 29B2 | E    | 1  | VISIBLE_STRING |        | <input checked="" type="checkbox"/> |                                     |      |
| <a href="#">C13902</a> | Firmware version                         | 10673 | 29B1 | E    | 1  | VISIBLE_STRING |        | <input checked="" type="checkbox"/> |                                     |      |
| <a href="#">C13930</a> | Reach Operational                        | 10645 | 2995 | A    | 1  | UNSIGNED_8     | 1      | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |      |

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## **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:

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Thank you very much for your support.

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