

## c430 controller





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## 1 About this document

These instructions only apply to the c430 controller.

If you commission a controller together with other devices (e. g. I/O system, inverter, other network components), please observe the documentation for the other devices in the automation system as well.

### **WARNING!**

Read this documentation carefully before starting any work.

► Please observe the safety instructions!

---



## 1.1 Document description

This documentation is valid up to firmware version:

| Firmware version | Date       | Internal data ID |
|------------------|------------|------------------|
| c430_v1.15.0.3   | 2026-03-06 | V_1_15_0         |



## 1.2 Further documents

Further documents:

- "Cyber Security" manual
- "OPC UA" manual



Further documents on the product can be found on the Internet:

[www.Lenze.com](http://www.Lenze.com) → Products → Controllers → [c430 controller](#)

("Product support" section)

### More information

For certain tasks, information is available in other media.

| Medium              | Contents/topics                                                              |
|---------------------|------------------------------------------------------------------------------|
| Engineering Tools   | For commissioning                                                            |
| AKB articles        | Additional technical information for users in the Application Knowledge Base |
| CAD data            | Download in different formats from the EASY Product Finder                   |
| EPLAN macros        | Project planning, documentation and management of projects for EPLAN P8.     |
| Device descriptions | Standardized files for network configuration                                 |



A detailed description of the EtherCAT modules can be found on the Internet:

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



Information and tools with regard to the Lenze products can be found on the Internet:

[www.lenze.com](http://www.lenze.com) → Downloads



## 1.3 Notations and conventions

Conventions are used in this document to distinguish between different types of information.

|                         |                                                                                   |                                                                                                                                                                                               |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Numeric notation        |                                                                                   |                                                                                                                                                                                               |
| Decimal separator       | Point                                                                             | Generally shown as a decimal point.<br>Example: 1 234.56                                                                                                                                      |
| Warnings                |                                                                                   |                                                                                                                                                                                               |
| UL Warnings             | UL                                                                                | Are used in English and French.                                                                                                                                                               |
| UR warnings             | UR                                                                                |                                                                                                                                                                                               |
| Text                    |                                                                                   |                                                                                                                                                                                               |
| Engineering Tools       | " "                                                                               | Software<br>Example: "EASY Starter", "PLC Designer"                                                                                                                                           |
| Icons                   |                                                                                   |                                                                                                                                                                                               |
| Page reference          |  | Reference to another page with additional information.<br>Example:  16 = see page 16                         |
| Documentation reference |  | Reference to other documentation with additional information.<br>Example:  EDKxxx = see documentation EDKxxx |

### Layout of the safety instructions

#### **DANGER!**

Indicates an extremely hazardous situation. Failure to comply with this instruction will result in severe irreparable injury and even death.

#### **WARNING!**

Indicates an extremely hazardous situation. Failure to comply with this instruction may result in severe irreparable injury and even death.

#### **CAUTION!**

Indicates a hazardous situation. Failure to comply with this instruction may result in slight to medium injury.

#### **NOTICE**

Indicates a material hazard. Failure to comply with this instruction may result in material damage.



## 2 Safety instructions

### 2.1 Basic safety instructions

Disregarding the following basic safety instructions and safety information may lead to severe personal injury and damage to property!

- Only use the product as directed.
- Never commission the product in the event of visible damage.
- Never modify the product technically.
- Never commission the product before assembly has been completed.
- Never operate the product without the required covers.
- Connect/disconnect all pluggable connections only in deenergized condition!
- Only remove the product from the installation in the deenergized state.
- The product can – depending on their degree of protection – have live, movable or rotating parts during or after operation. Surfaces can be hot.
- Observe the specifications of the corresponding documentation. This is the condition for safe and trouble-free operation and the achievement of the specified product features.
- The procedural notes and circuit details given in the associated documentation are suggestions and their transferability to the respective application has to be checked. The manufacturer of the product does not take responsibility for the suitability of the process and circuit proposals.
- All work with and on the product may only be carried out by qualified personnel. IEC 60364 and CENELEC HD 384 define the qualifications of these persons:
  - They are familiar with installing, mounting, commissioning, and operating the product.
  - They have the corresponding qualifications for their work.
  - They know and can apply all regulations for the prevention of accidents, directives, and laws applicable at the place of use.

Please observe the specific safety information in the other sections!



## 2.2 Application as directed

- The product is a professional equipment intended for use by trades, specific professions or industry and not for sale to the general public. IEC 60050 [IEV 161-05-05]
- To prevent personal injury and damage to property, higher-level safety and protection systems must be used!
- All transport locks must be removed.
- The product may only be operated under the specified operating conditions and in the specified mounting positions.
- The product is only suitable for installation in control cabinets and, depending on the protection class and version, for wall mounting or support arm mounting.
- The product may only be operated to implement control concepts, operating concepts or to display information.
- The product must not be operated in private areas, in potentially explosive atmospheres and in areas with harmful gases, oils, acids and radiation.



### 2.3 Residual hazards

Even if notes given are taken into consideration and protective measures are implemented, the occurrence of residual risks cannot be fully prevented.

The user must take the residual hazards mentioned into consideration in the risk assessment for his/her machine/system.

If the above is disregarded, this can lead to severe injuries to persons and damage to property!

#### Product

Observe the warning labels on the product!



**Dangerous electrical voltage:**

Before working on the product, make sure there is no voltage applied to the power terminals!  
After mains disconnection, the power terminals will still carry the hazardous electrical voltage for the time given next to the symbol!



**Electrostatic sensitive devices:**

Before working on the product, the staff must ensure to be free of electrostatic charge!



**High leakage current:**

Carry out fixed installation and PE connection in compliance with:  
EN 61800-5-1 / EN 60204-1



**Hot surface:**

Use personal protective equipment or wait until the device has cooled down!



## 3 Product information

### 3.1 Identification of the products

Each device is fitted with a nameplate containing the type code and other information.

#### Type code structure

|                            |                                                                                     | C | 4 | 3 | A | E | 5 | 0 | E | 00 |  |   |   | 0 |   |      | S |
|----------------------------|-------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|----|--|---|---|---|---|------|---|
| Product type               | Cabinet Controller                                                                  | C |   |   |   |   |   |   |   |    |  |   |   |   |   |      |   |
| Product family             | c400                                                                                |   | 4 |   |   |   |   |   |   |    |  |   |   |   |   |      |   |
| Product                    | c430                                                                                |   |   | 3 |   |   |   |   |   |    |  |   |   |   |   |      |   |
| Product generation         | Generation 1                                                                        |   |   |   | A |   |   |   |   |    |  |   |   |   |   |      |   |
| Mounting type              | Control cabinet mounting                                                            |   |   |   |   | E |   |   |   |    |  |   |   |   |   |      |   |
| Processor                  | Arm® Cortex®-A9 800 MHz                                                             |   |   |   |   |   | 5 |   |   |    |  |   |   |   |   |      |   |
| Degree of protection       | IP20                                                                                |   |   |   |   |   |   | 0 |   |    |  |   |   |   |   |      |   |
| Fieldbus network           | Switchable fieldbus function: Ethernet Switch, PROFINET IO-Device or EtherCAT slave |   |   |   |   |   |   |   | E |    |  |   |   |   |   |      |   |
| -                          | -                                                                                   |   |   |   |   |   |   |   |   | 00 |  |   |   |   |   |      |   |
| Runtime                    | FAST runtime                                                                        |   |   |   |   |   |   |   |   |    |  | A |   |   |   |      |   |
|                            | FAST runtime + extension                                                            |   |   |   |   |   |   |   |   |    |  | B |   |   |   |      |   |
|                            | FAST runtime + extension + CoDeSys WebVisu                                          |   |   |   |   |   |   |   |   |    |  | C |   |   |   |      |   |
| Visualization              | Without visualization                                                               |   |   |   |   |   |   |   |   |    |  |   | 0 |   |   |      |   |
|                            | FAST UI runtime                                                                     |   |   |   |   |   |   |   |   |    |  |   | 1 |   |   |      |   |
| SD card size               | 512 MB                                                                              |   |   |   |   |   |   |   |   |    |  |   |   | 1 |   |      |   |
| -                          | -                                                                                   |   |   |   |   |   |   |   |   |    |  |   |   |   | 0 |      |   |
| SD card/Application Credit | Without SD card                                                                     |   |   |   |   |   |   |   |   |    |  |   |   |   |   | 000  |   |
|                            | SD card with                                                                        |   |   |   |   |   |   |   |   |    |  |   |   |   |   |      |   |
|                            | 0 Application Credit                                                                |   |   |   |   |   |   |   |   |    |  |   |   |   |   | 002  |   |
|                            | 50 Application Credit                                                               |   |   |   |   |   |   |   |   |    |  |   |   |   |   | 001  |   |
|                            | 100 Application Credit                                                              |   |   |   |   |   |   |   |   |    |  |   |   |   |   | 002  |   |
|                            | 150 Application Credit                                                              |   |   |   |   |   |   |   |   |    |  |   |   |   |   | 003  |   |
|                            | 200 Application Credit                                                              |   |   |   |   |   |   |   |   |    |  |   |   |   |   | 004  |   |
|                            | 300 Application Credit                                                              |   |   |   |   |   |   |   |   |    |  |   |   |   |   | 005  |   |
|                            | 400 Application Credit                                                              |   |   |   |   |   |   |   |   |    |  |   |   |   |   | 006  |   |
|                            | 500 Application Credit                                                              |   |   |   |   |   |   |   |   |    |  |   |   |   |   | 007  |   |
|                            | 600 Application Credit                                                              |   |   |   |   |   |   |   |   |    |  |   |   |   |   | 008  |   |
|                            | 700 Application Credit                                                              |   |   |   |   |   |   |   |   |    |  |   |   |   |   | 009  |   |
|                            | 1000 Application Credit                                                             |   |   |   |   |   |   |   |   |    |  |   |   |   |   | 00A  |   |
|                            | 1200 Application Credit                                                             |   |   |   |   |   |   |   |   |    |  |   |   |   |   | 00G  |   |
|                            | 1500 Application Credit                                                             |   |   |   |   |   |   |   |   |    |  |   |   |   |   | 00B  |   |
|                            | 2000 Application Credit                                                             |   |   |   |   |   |   |   |   |    |  |   |   |   |   | 00C  |   |
|                            | 2500 Application Credit                                                             |   |   |   |   |   |   |   |   |    |  |   |   |   |   | 00D  |   |
|                            | 3000 Application Credit                                                             |   |   |   |   |   |   |   |   |    |  |   |   |   |   | 00E  |   |
|                            | 4000 Application Credit                                                             |   |   |   |   |   |   |   |   |    |  |   |   |   |   | 00 F |   |
| -                          | -                                                                                   |   |   |   |   |   |   |   |   |    |  |   |   |   |   |      | S |

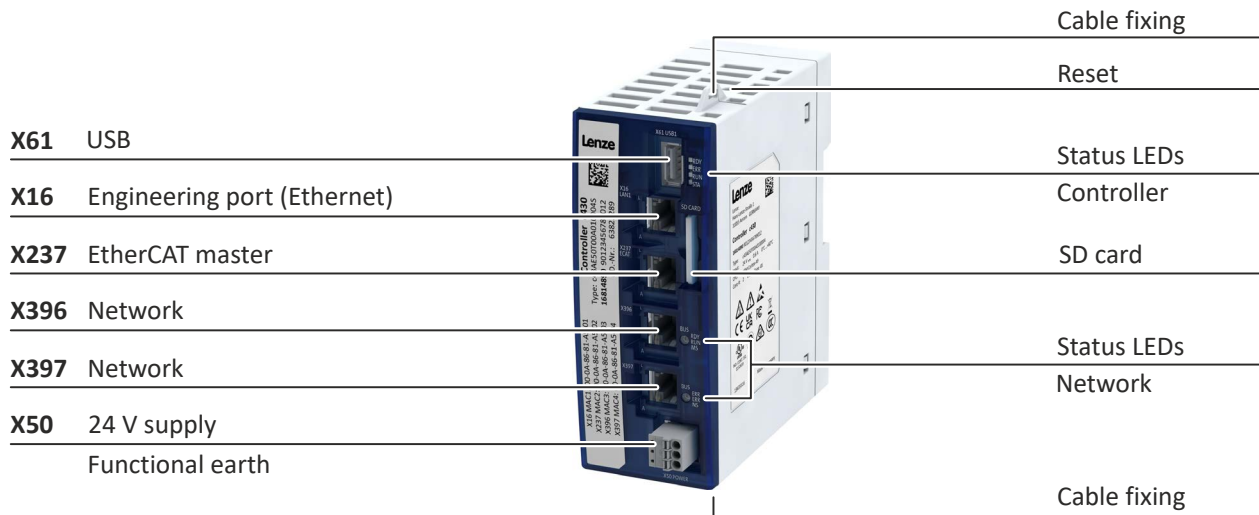
Identification of the products  
Nameplate information





## 3.2 Features

The following figure provides an overview of the elements and connections on the device. Position, size and appearance of elements and connections may vary depending on the options selected for the device.





### Interface functionality

|                   |                                    | Engineering port | EtherCAT master | Ethernet switch | EtherCAT slave | PROFINET IO-Device |
|-------------------|------------------------------------|------------------|-----------------|-----------------|----------------|--------------------|
|                   |                                    | X16              | X237            | X396/X397       |                |                    |
| Network           | EtherCAT                           |                  | Master          |                 | Slave          |                    |
|                   | PROFINET                           |                  |                 |                 |                | IO device          |
|                   | Ethernet switch                    |                  |                 | •               |                |                    |
| Web visualization | EASY UI client                     | •                |                 | •               |                | •                  |
|                   | EASY UI client (encrypted)         | •                |                 | •               |                |                    |
| OPC UA            | Server                             | •                |                 | •               |                | •                  |
|                   | Client                             | •                |                 |                 |                |                    |
|                   | PubSub                             | •                |                 |                 |                |                    |
| Engineering tools | PLC Designer                       | •                |                 | •               |                |                    |
|                   | PLC Designer (encrypted)           | •                |                 | •               |                |                    |
|                   | EASY UI Designer                   | •                |                 | •               |                |                    |
|                   | EASY UI Designer (encrypted)       | •                |                 | •               |                | •                  |
|                   | EASY Starter                       | •                |                 | •               |                | •                  |
|                   | EASY Starter (encrypted)           | •                |                 | •               |                | •                  |
|                   | EtherCAT diagnostic tool           | •                |                 | •               |                |                    |
| IP settings       | IPv4 address                       | •                |                 | •               |                | •                  |
|                   | Subnet mask                        | •                |                 | •               |                | •                  |
|                   | Gateway                            | •                |                 |                 |                | •                  |
|                   | DHCP                               | •                |                 |                 |                |                    |
|                   | Settings via "IP.txt" file         | •                |                 |                 |                |                    |
| Firewall          | Port restrictions                  | •                |                 | •               |                | •                  |
|                   | Client address range               | •                |                 | •               |                |                    |
|                   | Ping flood protection              | •                |                 | •               |                |                    |
|                   | Reject packet (Reject)             | •                |                 | •               |                |                    |
| Network protocols | TCP/IP                             | •                |                 | •               |                | •                  |
|                   | UDP                                | •                |                 |                 |                |                    |
|                   | NTP                                | •                |                 | •               |                | •                  |
|                   | HTTPS (diagnostics, visualization) | •                |                 | •               |                |                    |
|                   | SFTP                               | •                |                 | •               |                | •                  |
|                   | Network-supported services UDP     | •                |                 |                 |                |                    |
|                   | Network-supported services TCP     | •                |                 | •               |                |                    |
|                   | Network variables                  | •                |                 |                 |                |                    |



### 3.3 SD card

An already inserted SD card is included in the scope of supply of the controller.

The combination of control technology software and application data on the SD card ensures that the data match the prevailing application in the present version. The SD card serves to easily exchange data in a different device.

The SD card is used as memory for the following application data:

- PLC boot project with parameter description
- Application credit for the FAST application software
- Retain and logbook data
- User data (SD card/userData folder)
- Open source license description

**Notes:**

- The controller only works with a plugged-in SD card!
- Removal of the SD card while the controller is running will lead to a system failure!
- The SD card is required for the system start since it contains the system files for the starting process.
- If the SD card has been temporarily removed, the controller must be restarted to access the SD card again!
- Only use SD cards provided by Lenze. Only these SD cards have the corresponding licensing.

The operating system of the controller and the application software »FAST« are stored in the internal flash memory of the controller.



---

For using a firmware update, include a memory reserve of 200 MB on the SD card!

---



### 3.4 Application Credit

The controller uses a points system, the so-called “Application Credit”, as a license model for certain functions. The amount of Application Credit required is calculated based on the functions required for your application. An SD card with sufficient Application Credit must be inserted in the controller to execute these functions without restriction. SD cards with different amounts of Application Credit can be purchased directly with the controller or separately from Lenze.

Functions that require a Application Credit are for example:

- Motion functions of the FAST application software
- OPC UA
- EASY UI clients
- Network functions of the X396 and X397 connections



---

The following Application Knowledge Base article lists which functions require how much Application Credit:

[Overview of the Application Credits](#)

---



## 3.5 License information



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Lenze Software may contain software elements that are licensed as free software or open source. The licensing terms and conditions of the open source software components used in this product can be found in the "License" directory on the SD card included in the product.

---



## 4 Mechanical installation

### 4.1 Dimensions



---

The specified installation clearances are minimum dimensions to ensure a sufficient air circulation for cooling purposes. They do not consider the bend radiuses of the connecting cables.

---

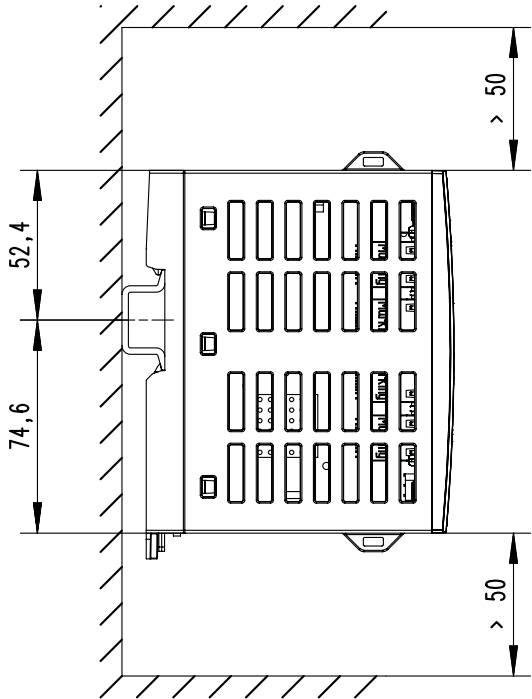
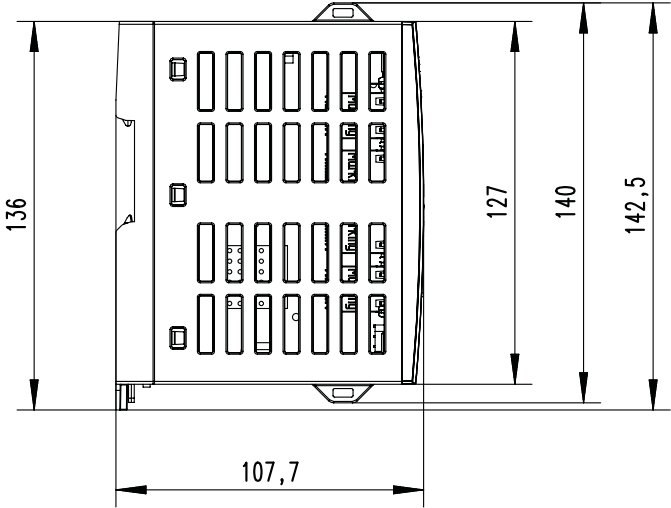
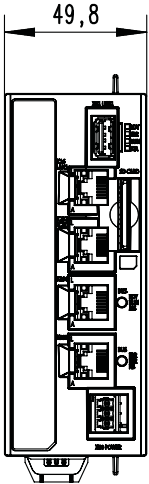


# Mechanical installation

Dimensions

The dimensions in mm apply to:

|        |        |
|--------|--------|
|        | c430   |
| Weight | 0.3 kg |



8801741-02

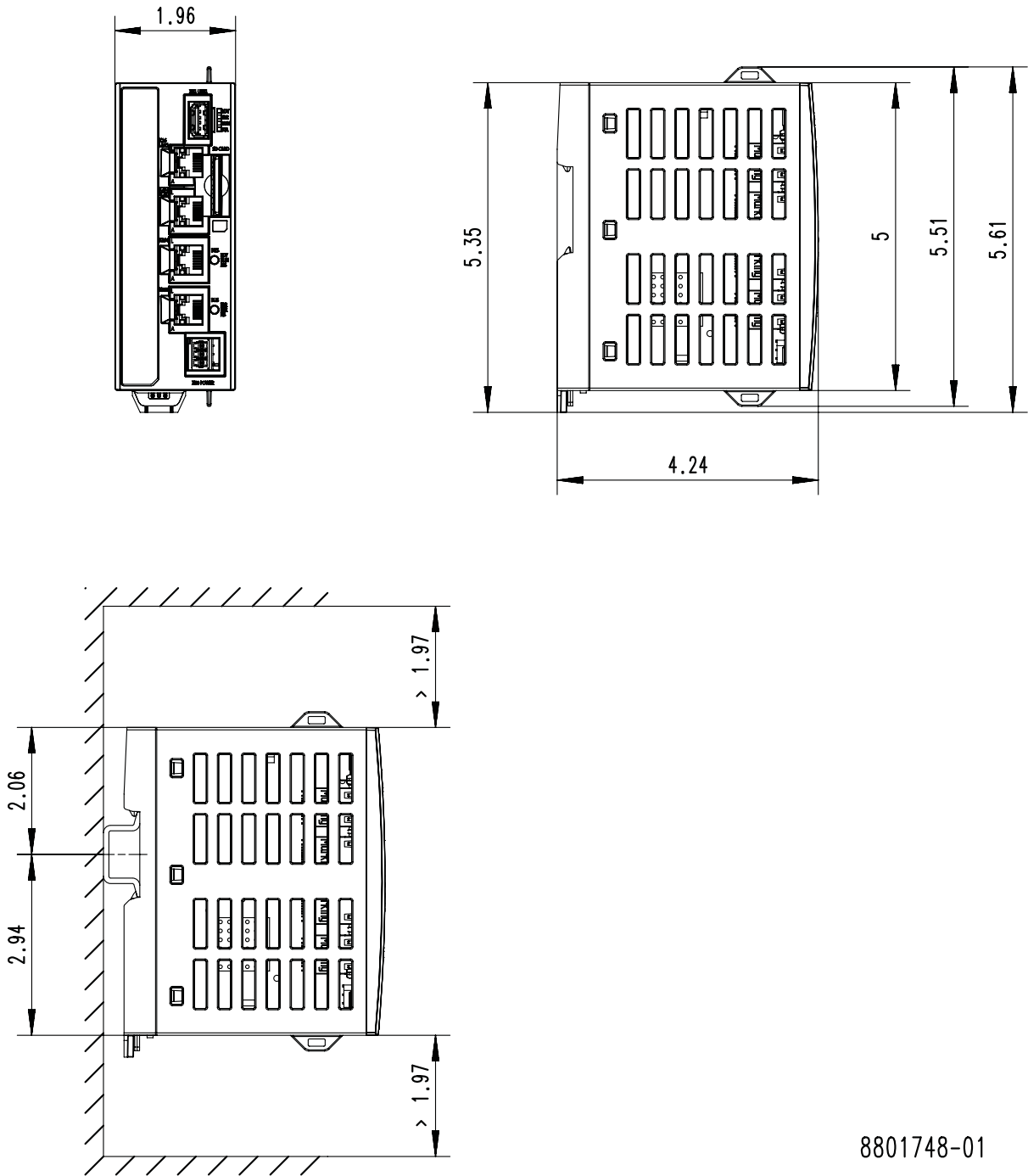
# Mechanical installation

Dimensions



The dimensions in inch apply to:

|        |        |
|--------|--------|
|        | c430   |
| Weight | 0.3 kg |

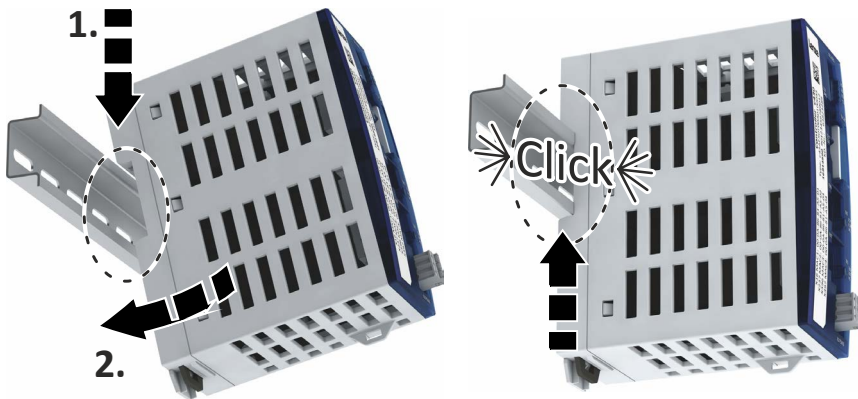


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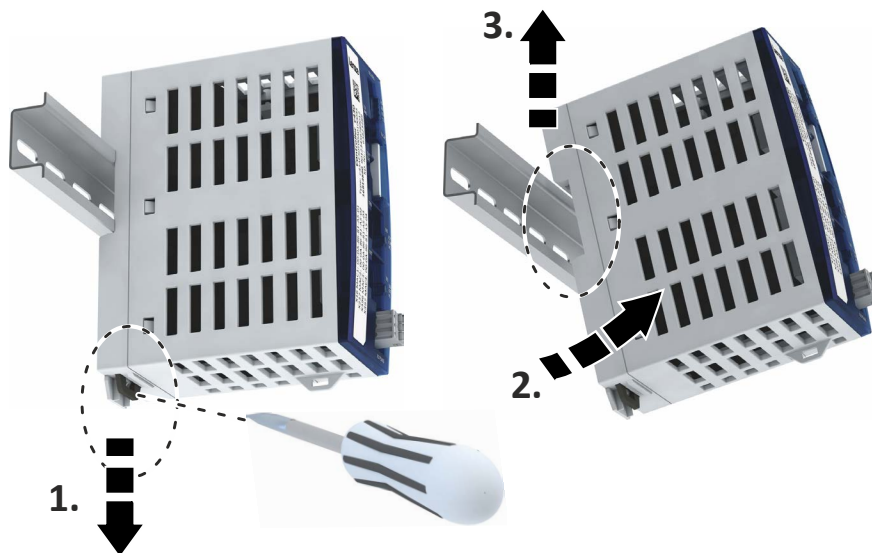


## 4.2 Mounting the controller

### Mounting the controller



### Dismounting the controller





## 5 Electrical installation

### 5.1 Important notes

#### **WARNING!**

Dangerous electrical voltage

Error on device leads to overvoltage in the system.

- ▶ For a voltage supply with 24 V DC ( $\pm 25\%$ ), use a safely separated power supply unit according to the applicable SELV/PELV requirements.
- ▶ All components connected to USB and RJ45 must be electrically isolated from the mains according to class III.
- ▶ All electronic devices in the control system must be properly grounded. Grounding must be effected in accordance with the applicable regulations.

#### **NOTICE**

High input voltage at the device

Possible consequences: Destruction of the device

- ▶ Observe maximum permissible input voltage.
- ▶ Fuse device at the input against too high input voltage.

#### **NOTICE**

Short circuit at the device due to electrostatic discharge

Possible consequences: Destruction of the device

- ▶ The personnel must be free of electrostatic charge prior to working on the device.

#### **NOTICE**

Unstable LAN connection due to the use of incorrect cable types

Possible consequences: LAN connection interruption

- ▶ Exclusively use cables of the CAT5-S/FTP type or better.
- ▶ The unit is to be connected only to internal Ethernet networks without exiting a facility and being subjected to TNVs.

#### **NOTICE**

Unstable USB connection due to USB cable being too long

Possible consequences: Interruption of the USB connection

- ▶ The length of the USB cable must not exceed 3 m.



## 5.2 Mains connection



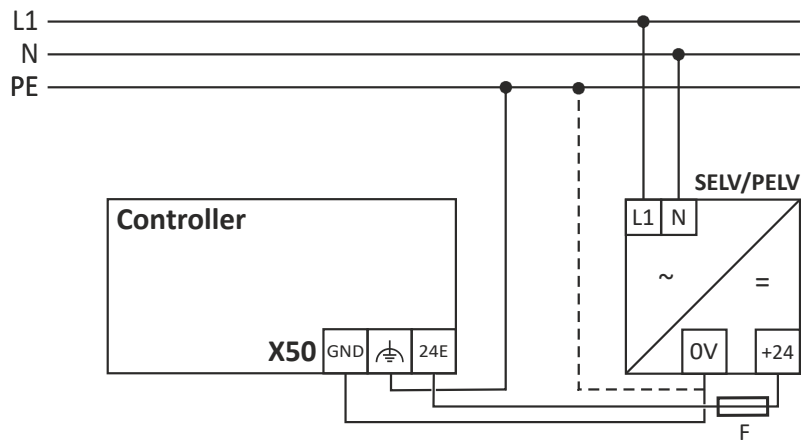
If the PE conductor is not supplied with the power supply, the PE potential must be connected to a grounding point near the mounting location.



Please note the following:

The controller starts as soon as the supply voltage is applied.

After switching off the supply voltage, the controller automatically saves the retain data and then switches itself off.



| X50                      |                                 |                                                 |                  |
|--------------------------|---------------------------------|-------------------------------------------------|------------------|
| Connection               | Connection type                 | Max. connection cross-section                   | Stripping length |
| Mains connection 24 V DC | 3-pole socket with 3.5 mm pitch | 0.75 ... 1.5 mm <sup>2</sup><br>AWG18 ... AWG16 | 9 mm<br>0.35 in  |

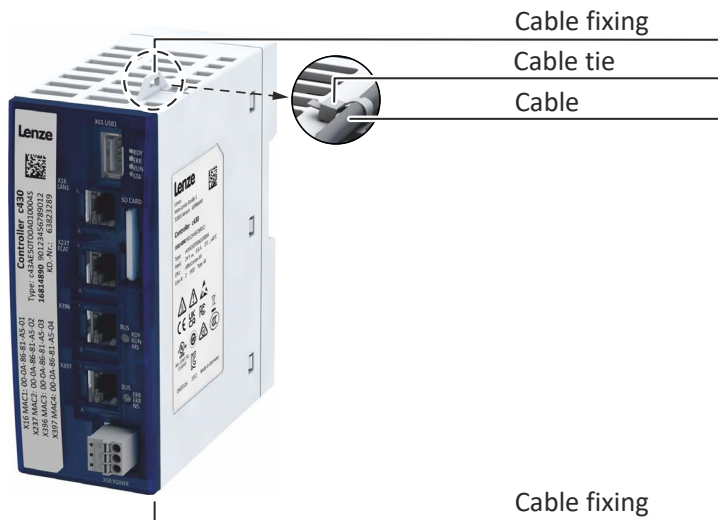


### 5.3 Networks



Tensile stress and vibrations lead to an unstable network connection.

- Lay the network cables in a semicircle and secure the network cables to the lashing eyes.
- Observe the bending radii of the network cables.





## 6 Commissioning

This chapter contains information on how to commission and integrate the controller into an automation system.

### **Required accessories**

- Engineering PC with »PLC Designer« installed.
- Standard network cable



### 6.1 Installation of »PLC Designer«

For the installation, download the »PLC Designer« from the download area on the Lenze homepage to your PC and run the setup file.

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



## 6.2 Commissioning steps

### Recommended sequence of the commissioning steps

1. ▶ [Connect controller and Engineering PC](#) 32
2. ▶ [Set IP address on the PC](#) 33
3. ▶ [Start controller](#) 34
4. ▶ [Create PLC program](#) 36
5. ▶ [Create task](#) 37
6. ▶ [Compile PLC program code](#) 38
7. ▶ [Establish connection between controller and »PLC Designer«](#) 39
8. ▶ [Log in to the controller \(load configuration\)](#) 40
9. ▶ [Parameterize controller](#) 41
10. ▶ [Device name](#) 46
11. ▶ [Start PLC program](#) 44



### 6.3 Connect controller and Engineering PC

A communication link from the engineering PC to the controller is required to commission the controller with the »PLC Designer«. This communication link must be wired.

Connect the engineering PC to the engineering port **X16** of the controller using a network cable.



---

By default, the IP address **192.168.5.99** is preset for the engineering port to enable fast commissioning.

If you want to change the IP address, you can find more information in the chapter "[Configure engineering port](#)". [58](#)

---

The accessibility of the controller can be tested via a ping command on the console with the preset IP address 192.168.5.99 or the newly configured IP address.



## 6.4 Set IP address on the PC



---

Recommended IP address of the engineering PC: 192.168.5.100

Standard IP address of the engineering port **X16** on the controller: 192.168.5.99

---

How to set the static IP address of the Engineering PC:

Preconditions

- Direct connection between the engineering PC and the controller

1. Open the Network connections diagnostics window.

Control Panel\Network and Internet\Network Connections

2. Select the network interface which is connected to the controller.
3. Right-click on **Properties**.
4. Select **Internet Protocol (TCP/IP)**.
5. Click on the **Properties** button.
6. Select the **Alternate Configuration** tab.
7. Select the **User-defined** option.
  - a) Enter the IP address of the engineering PC that matches the IP range of the controller.
  - b) Enter the subnet mask of the engineering PC.
8. Click **OK** to close the dialog box.



## 6.5 Start controller

### Preconditions

- SD card is inserted.
- Controller is supplied with voltage via terminal **X50**.

 The controller takes approx. 180 seconds to start.

The starting sequence is displayed in the LED blinking pattern. When the device is ready for operation, the "RDY" LED lights up in blue.

If there is a boot project on the SD card, the corresponding PLC project is started. The status is indicated by the "RUN" LED.

An error is indicated by the "ERR" LED. Details about the error can be found in the status information in the device and in the logbook. ▶ [Status LEDs](#)  151



| LED "RDY" (blue/<br>yellow)                                                         | Meaning                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Off                                                                                 | Device is switched off.                                                                                                                                                                                       |
|  | Device starts in delivery status. An inserted USB stick is mounted automatically. ▶ <a href="#">Mount USB stick</a>  138 |
|  | Device starts.                                                                                                                                                                                                |
|  | Device is ready for operation.                                                                                                                                                                                |
|  | Value has fallen below the voltage                                                                                                                                                                            |
|  | System time must be set. ▶ <a href="#">Time</a>  49                                                                        |
|  | Reset key was pressed during the boot process.                                                                                                                                                                |

| "RUN" LED (yellow/<br>green)                                                        | Meaning                      |
|-------------------------------------------------------------------------------------|------------------------------|
|  | PLC project is being loaded. |
|  | PLC project is stopped.      |
|  | PLC project is started.      |



## 6.6 Access to SD card

The »PLC-Designer« provides access to the SD card.

How to use the »PLC-Designer« to access the SD card:

Preconditions

- »PLC-Designer« is running.
  - SD card is inserted.
1. Select the controller.
  2. Select the **Files** tab in the project tree.
  3. Click the update symbol.

The SD card directory is displayed.



---

You can also use an sftp connection to access the SD card.

You will find information on establishing a connection in the Lenze Knowledge Base:  
[www.Lenze.com](http://www.Lenze.com).

---



---

The SD card's write protection must not be active for use in the controller.

If write protection is activated, the PLC application will not start. Retain, boot project and logbook information will not be saved.

---



---

Only use SD cards provided by Lenze. Only these SD cards have the corresponding licensing.

---

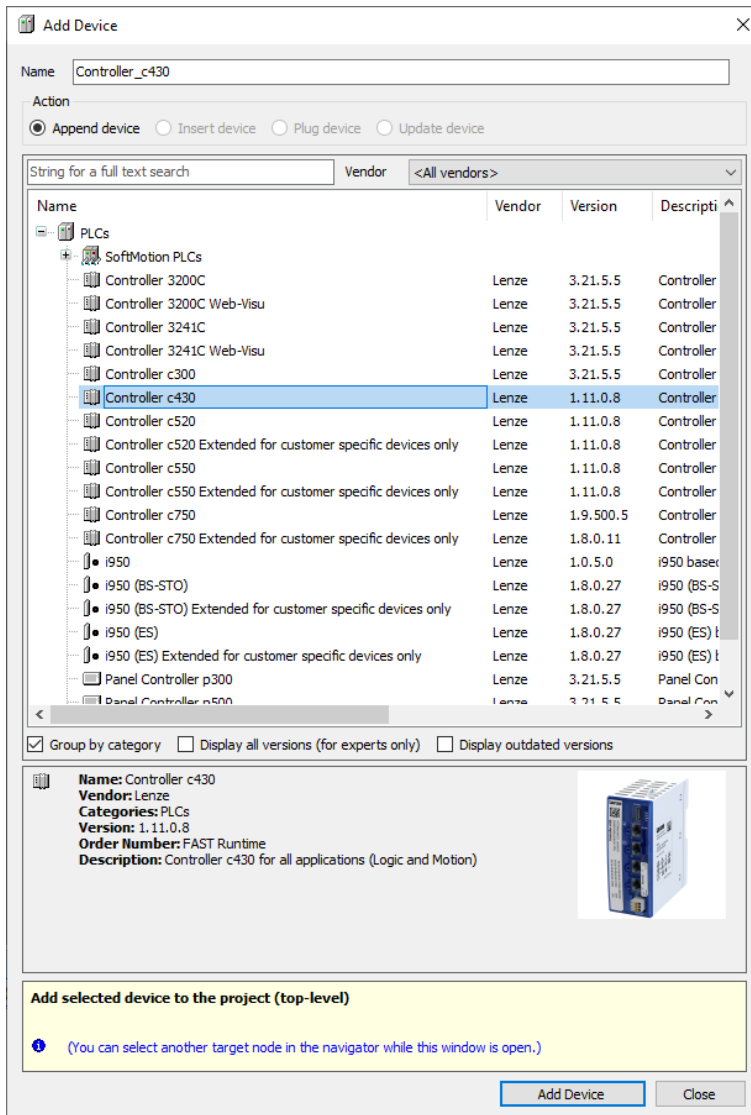


## 6.7 Create PLC program

How to create a PLC program in the target system:

Preconditions

- »PLC Designer« has been started. ▶ [Start controller](#) 34
  - A new project has been created or a FAST Application Template is open.
1. Select the **Add Device** menu command.
  2. Select controller.
  3. Add network module.





## 6.8 Create task

How to create a task:

Preconditions:

- PLC program is created in the target system. ▶ [Create PLC program](#) 36
1. In the context menu of the **Task configuration**, select the **Add object/Task** command.  
A task is created.
  2. Enter a cycle time for the created task.



---

If the EtherCAT master is used:

The task cycle time of the main program part must correspond to the set DC cycle time.

The task priority of the EtherCAT BusCycleTask must have the highest priority so that it cannot be displaced by other IEC tasks and lose its synchronism.

---

3. In the context menu for **Application**, select the command **Add Object**.  
A program block is created in the application.
4. Select the **Add call** button.  
A dialog opens.
5. Select the program call under **Application** and confirm with **OK**.



## 6.9 Compile PLC program code



---

The parameterization for the device is created automatically in the background when the PLC program code is compiled.

---

How to compile the PLC program code:

Preconditions

- A task has been created.
1. Confirm with the **Build Compile** menu command or with the **<F11>** function key.
  2. If no errors have occurred during the compilation process, save the »PLC Designer« project in the project folder.

The parameter list is shown in the Controller tab. Detailed parameterization adjustments can be made there. ▶ [Parameterize controller](#)  41



---

If errors occurred during the compilation process, they can be located and corrected on the basis of the »PLC Designer« error messages. Subsequently, re-compile the program code.

---



## 6.10 Establish connection between controller and »PLC Designer«

How to connect the »PLC Designer« with the controller:

Preconditions

- The PLC program code has been compiled.
1. Go to the **Communication settings** tab of the target system (device) and click the **Add gateway** button.
  2. Enter the IP address of the controller in the **Gateway** dialog box.
  3. Click **OK** to confirm the entry.
  4. Click the **Scan network** button.
  5. Select the controller for the IP address entered and confirm by clicking the **Set active path** button.

The controller is now connected with the »PLC Designer« and appears in the project tree under its assigned name. If a device name has not yet been assigned in the project (standard name = "Device"), the device will be displayed with its device type and MAC address in the default setting.

*Example: "c430-000A86123456"*

# Commissioning

Log in to the controller (load configuration)



## 6.11 Log in to the controller (load configuration)

How to use the »PLC-Designer« to log into the controller:

Preconditions

- A connection between the controller and the »PLC-Designer« has been established.

1. Use the **Online Login** menu command or **<Alt>+<F8>** to log into the controller.

Logging in serves to load the device parameterization and the PLC program into the controller.

Any existing configuration or PLC program is overwritten.



## 6.12 Parameterize controller

### 6.12.1 General information on parameter setting

The controller can be parameterized in individual functions. The basic structure of the parameters is described in the following. The parameter list of the device is only available after the PLC program has been compiled. This list can be found as a tab under the controller in the PLC project tree of the »PLC-Designer«.



Certain device commands or settings which might cause a critical state of the drive behavior can only be carried out when the device is disabled.



User parameters may only be created in a program POU.

#### 6.12.1.1 Addressing of the parameters

Each parameter features a 16-bit index as its address. Under this address, the parameter is stored in the object directory of the device.

- Parameters that belong together functionally are combined in a data set. These parameters are additionally provided with an 8-bit subindex.
- The colon is used as a separator between the index and subindex Example: "0x2540:001"
- There are parameter settings that can be changed, and (diagnostic) parameters that can only be read.

#### 6.12.1.2 Structure of the parameter descriptions

- The parameter descriptions in this documentation are structured in table form.
- The representation distinguishes parameters with a setting range, text, selection list, and bit-coded display.
- The default setting of parameters with a write access feature is shown in **bold**.

##### Example: parameters with a setting range

| Address        | Name / setting range / [default setting]                                                                                                      | Information                                        |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| Index:Subindex | Parameter designation<br>Minimum value ... <b>[default setting]</b> ... maximum value<br>• Optional information with regard to the parameter. | Explanations & notes with regard to the parameter. |

##### Example: parameters with a selection list

| Address        | Name / setting range / [default setting]                                      | Information                                                                                                                                                            |
|----------------|-------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Index:Subindex | Parameter designation<br>• Optional information with regard to the parameter. | Explanations & notes with regard to the parameter.<br><b>Note:</b> The corresponding selection number (here 0, 1, or 2) must be set. Other values are not permissible. |
|                | <b>0</b> Designation of selection 0                                           | Optionally: Explanations & notes with regard to the corresponding selection.<br>The default selection is shown in <b>bold</b> .                                        |
|                | 1 Designation of selection 1                                                  |                                                                                                                                                                        |
|                | 2 Designation of selection 2                                                  |                                                                                                                                                                        |

##### Example with bit coded display

| Address        | Name / setting range / [default setting]                                      | Information                                                            |
|----------------|-------------------------------------------------------------------------------|------------------------------------------------------------------------|
| Index:Subindex | Parameter designation<br>• Optional information with regard to the parameter. | Explanations & notes with regard to the parameter.                     |
|                | Bit 0 Designation of bit 0                                                    | Optionally: Explanations & notes with regard to the corresponding bit. |
|                | Bit 1 Designation of bit 1                                                    |                                                                        |
|                | Bit 2 Designation of bit 2                                                    |                                                                        |
|                | ... ...                                                                       |                                                                        |
|                | Bit 15 Designation of bit 15                                                  |                                                                        |



## 6.12.2 Saving the parameter settings

If parameter settings of the controller are changed, these changes are initially only saved in the RAM memory of the device. The "Save user data" device command saves the controller's parameter settings locally on the device's SD card.

If the parameter settings are saved, they are also saved during a backup and written back to the controller when the data is restored. The saved parameter settings are retained when the device is replaced.

The parameters are part of the boot application. When creating the boot application, the parameter settings are saved automatically on the SD card of the device.

### Parameter

| Address    | Name / setting range / [default setting] | Information                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2022:003 | Device commands: Save user data          | <p>The parameter settings are saved on the SD card.</p> <ul style="list-style-type: none"> <li>When the device command has been executed successfully, the value 0 is shown.</li> <li>Do not switch off the supply voltage or remove the SD card from the controller during the storage process!</li> <li>When the controller is switched on, all parameter settings are automatically loaded from the SD card into the RAM memory of the controller.</li> </ul> |
|            | 0 Off / ready                            | Only status feedback                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|            | 1 On / start                             | Execute device command                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|            | 2 In progress                            | Only status feedback                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|            | 3 Action cancelled                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | 4 No access                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | 5 No access (Device disabled)            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | 101 No SD card connected                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | 102 SD card is write protected           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | 103 SD card is full                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## 6.12.3 Reset parameters to default

Use the "Load default settings" device command to reset the parameters to the default setting.



By executing this device command, all parameter settings made by the user are temporarily lost!

If the changes are not saved, the parameters stored on the SD card will not be changed.

### Parameter

| Address    | Name / setting range / [default setting]                                            | Information                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2022:001 | Device commands: Load default settings                                              | <p>All parameters in the RAM memory of the controller are reset to the default setting that is stored in the controller firmware as default setting.</p> <ul style="list-style-type: none"> <li>All parameter changes made by the user are lost during this process!</li> <li>When the device command has been executed successfully, the value 0 is shown.</li> <li>Loading parameters has a direct effect on cyclic communication: The data exchange for control is interrupted and a communication error is generated.</li> </ul> |
|            | Settings can only be changed if the PLC application is not in the "Running" status. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|            | 0 Off / ready                                                                       | Only status feedback                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|            | 1 On / start                                                                        | Execute device command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|            | 2 In progress                                                                       | Only status feedback                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|            | 3 Action cancelled                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|            | 4 No access                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|            | 5 No access (Device disabled)                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |



# Commissioning

Parameterize controller  
Reset parameters to default

| Address    | Name / setting range / [default setting]  | Information                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2022:039 | Device commands: Load TA default settings | <p>All controller parameters are reset to the default setting. Parameters that are declared separately in the application are set to the corresponding standard values from the technology application.</p> <ul style="list-style-type: none"> <li>• All parameter changes made by the user are lost during this process!</li> <li>• When the device command has been executed successfully, the value 0 is shown.</li> </ul> |
|            | <b>0 Off / ready</b>                      | Only status feedback                                                                                                                                                                                                                                                                                                                                                                                                          |
|            | <b>1 On / start</b>                       | Execute device command                                                                                                                                                                                                                                                                                                                                                                                                        |
|            | <b>2 In progress</b>                      | Only status feedback                                                                                                                                                                                                                                                                                                                                                                                                          |
|            | <b>3 Action cancelled</b>                 |                                                                                                                                                                                                                                                                                                                                                                                                                               |
|            | <b>4 No access</b>                        |                                                                                                                                                                                                                                                                                                                                                                                                                               |
|            | <b>5 No access (Device disabled)</b>      |                                                                                                                                                                                                                                                                                                                                                                                                                               |



### 6.13 Start PLC program

How to start the PLC program:

Preconditions

- The »PLC Designer« is connected to the controller and the current PLC program has already been transferred.
1. Use the menu command **Debug -->Start** or the function key **<F5>** to start the PLC program.

The "RUN" LED indicates the status of the PLC project.

| "RUN" LED (yellow/<br>green)                                                      | Meaning                      |
|-----------------------------------------------------------------------------------|------------------------------|
|  | PLC project is being loaded. |
|  | PLC project is stopped.      |
|  | PLC project is started.      |



### 6.14 Generate boot application

An executable PLC program can be executed when the controller is started.

To do so, a boot application must have been created using the »PLC-Designer« The boot application also stores the parameter set on the SD card of the controller.



# 7 Device settings

## 7.1 Device name

Device identification is provided by the device name of the controller. If the preset name of the controller is modified in the »PLC-Designer« project tree, this name will also be used in the **Device name** parameter. [▶ 0x2001](#)

The device name is also used as the network name, which is displayed when **Scanning the network**.

### Example

If the device name **Device** is changed to a new name, this modification will also be active in the network name.



The device name change must be considered when restoring communication to the controller.

### Parameter

| Address | Name / setting range / [default setting] | Information                                                                         |
|---------|------------------------------------------|-------------------------------------------------------------------------------------|
| 0x2001  | Device name<br>["My Device"]             | Any device name can be set in this object for the purpose of device identification. |



## 7.2 Host name

The host name of the controller is the name of the controller in the network. This name cannot be changed. The name is composed of the controller type and the unique Ethernet MAC address. The host name is only required when using additional network services. The device name is required to communicate with the engineering PC. ▶ [Device name](#) 46

### Parameter

| Address    | Name / setting range / [default setting]                                                             | Information                                          |
|------------|------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| 0x2014:001 | General network identification: Hostname <ul style="list-style-type: none"><li>• Read only</li></ul> | Display of the name of the controller in the network |



### 7.3 Name server addresses

Two corresponding name servers can be entered via IP address for name resolution if network functions are used.



For safety reasons, the Ethernet access must not be connected directly to the Internet. The specified Domain Name Server must be in the local network or available from the local network.

Please observe the firewall settings of the network.

**Parameter**

| Address    | Name / setting range / [default setting]                                                                 | Information                                                                                                                                                                                                                                     |
|------------|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2459:001 | Name server addresses: Name server address 1 <ul style="list-style-type: none"><li>• Read only</li></ul> | Specification of an IP address for a Domain Name Server (DNS). <ul style="list-style-type: none"><li>• As a function of the DHCP setting, the setting of the name server address only becomes effective when the device is restarted.</li></ul> |
| 0x2459:002 | Name server addresses: Name server address 2 <ul style="list-style-type: none"><li>• Read only</li></ul> |                                                                                                                                                                                                                                                 |



## 7.4 Time

The controller has two times of day: system time and local time. Both times are interlinked via the set time zone.

### System time

The system time of the device is the time base for all the time-dependent actions of the controller. The operating system receives the system time via a maintenance-free clock chip (CMOS-RTC time).

The system time should correspond to the international UTC world time. The device saves the system time internally. If the controller is in a deenergized state, the system time is maintained for approx. 14 days. After this time has elapsed, the time will need to be set. A battery is not required.

The system time can be specified manually or via an NTP server.

- System time - Source ▶ [0x245B:001](#)
- System time - Time ▶ [0x245B:002](#)
- NTP - Server addresses ▶ [0x245A:002 ... 0x245A:005](#)

### Local time

The local time is based on the system time. Together with the selected time zone, it is used to specify the local time. The local time can be used, for instance, to provide current events in the logbook with time information.

- Time zone ▶ [0x245C:001](#)
- Local time ▶ [0x245C:002](#)



Set the system time and the required time zone for the site of the controller during commissioning. The local time will then be calculated automatically.

### Parameter

| Address    | Name / setting range / [default setting]                         | Information                                                                                                                                                                                                                                                           |
|------------|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x245B:001 | System time: Setting method                                      | Selection of the time base for the system time of the device.                                                                                                                                                                                                         |
|            | <b>0</b> NTP server                                              | The system time is obtained from an NTP server. <ul style="list-style-type: none"> <li>• NTP server addresses must be set in <a href="#">0x245A:002 ... 0x245A:005</a>.</li> <li>• The device itself is an NTP client and cannot be used as an NTP server.</li> </ul> |
|            | 1 EtherCAT Distributed Clocks                                    | If EtherCAT is DC-synchronized and is in the "Safe-Operational" or "Operational" state, the distributed clock is used as the system time.<br>▶ <a href="#">Synchronisation with "distributed clocks" (DC)</a> <a href="#">88</a>                                      |
|            | 2 Manual input                                                   | The system time can be specified manually via parameter <a href="#">0x245B:002</a> .                                                                                                                                                                                  |
| 0x245B:002 | System time: Current time<br>0 ... [0] ... 2 <sup>64</sup> -1 ns | Specification of the device system time. Store the system time as UTC time.<br>Format: <ul style="list-style-type: none"> <li>• Date MM/DD/YYYY</li> <li>• Time hh:mm:ss.ms</li> </ul>                                                                                |
| 0x245B:003 | System time: NTP server                                          |                                                                                                                                                                                                                                                                       |
|            | <b>0</b> Deactivated                                             |                                                                                                                                                                                                                                                                       |
|            | 1 Activated                                                      |                                                                                                                                                                                                                                                                       |
| 0x245C:001 | Local Time: Time Zone                                            | Setting of the time zone of the device. The system time and time zone are used to determine the local time of the device.                                                                                                                                             |
|            | <b>0</b> Unknown time zone                                       |                                                                                                                                                                                                                                                                       |
|            | 2 UTC+4 (GST) Dubai                                              |                                                                                                                                                                                                                                                                       |
|            | 3 UTC+4:30 (AFT) Kabul                                           |                                                                                                                                                                                                                                                                       |
|            | 19 UTC-3 (ART) Buenos Aires                                      |                                                                                                                                                                                                                                                                       |
|            | 37 UTC+11 (AEDT) Melbourne                                       |                                                                                                                                                                                                                                                                       |
|            | 40 UTC+10 (AEST) Brisbane                                        |                                                                                                                                                                                                                                                                       |
|            | 42 UTC+10:30 (ACDT) Adelaide                                     |                                                                                                                                                                                                                                                                       |
|            |                                                                  |                                                                                                                                                                                                                                                                       |

# Device settings

Time  
NTP server addresses



| Address    | Name / setting range / [default setting]            | Information                                                                                                                                         |
|------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
|            | 43 UTC+9:30 (ACST) Darwin                           |                                                                                                                                                     |
|            | 45 UTC+8:45 (ACWST) Eucla                           |                                                                                                                                                     |
|            | 51 UTC+6 (BST) Dhaka                                |                                                                                                                                                     |
|            | 52 UTC+1/+2 (CET/CEST) Brussels                     |                                                                                                                                                     |
|            | 84 UTC-3:30 (NST) St. John's                        |                                                                                                                                                     |
|            | 102 UTC-7 (MST) Calgary                             |                                                                                                                                                     |
|            | 124 UTC+8 (CST) Beijing                             |                                                                                                                                                     |
|            | 129 UTC-1 (CVT) Praia                               |                                                                                                                                                     |
|            | 145 UTC+2 (EET) Cairo                               |                                                                                                                                                     |
|            | 161 UTC+0 (GMT) London                              |                                                                                                                                                     |
|            | 177 UTC-2 (GST) King Edward Point                   |                                                                                                                                                     |
|            | 187 UTC+7 (WIB) Jakarta                             |                                                                                                                                                     |
|            | 194 UTC+5:30 (IST) New Delhi                        |                                                                                                                                                     |
|            | 203 UTC+9 (JST) Tokyo                               |                                                                                                                                                     |
|            | 209 UTC+14 (LINT) Kiritimati                        |                                                                                                                                                     |
|            | 243 UTC+6:30 (MMT) Rangoon                          |                                                                                                                                                     |
|            | 278 UTC+5:45 (NPT) Kathmandu                        |                                                                                                                                                     |
|            | 280 UTC-11 (NUT) Alofi                              |                                                                                                                                                     |
|            | 281 UTC+13 (NZDT) Auckland                          |                                                                                                                                                     |
|            | 282 UTC+13:45 (CHADT) Chatham Islands               |                                                                                                                                                     |
|            | 287 UTC-9:30 (MART) Taiohae                         |                                                                                                                                                     |
|            | 309 UTC+3 (MSK) Moscow                              |                                                                                                                                                     |
|            | 334 UTC+12 (ANAT) Anadyr                            |                                                                                                                                                     |
|            | 379 UTC-5 (EST) New York                            |                                                                                                                                                     |
|            | 399 UTC-8 (PST) Los Angeles                         |                                                                                                                                                     |
|            | 407 UTC-10 (HST) Honolulu                           |                                                                                                                                                     |
|            | 410 UTC+5 (UZT) Tashkent                            |                                                                                                                                                     |
|            | 413 UTC-4 (VET) Caracas                             |                                                                                                                                                     |
| 0x245C:002 | Local Time: Current time<br>0 ... [0] ... 2^64-1 ns | The current local time of the device.<br>Format:<br><ul style="list-style-type: none"> <li>• Date MM/DD/YYYY</li> <li>• Time hh:mm:ss.ms</li> </ul> |

## 7.4.1 NTP server addresses

The Network Time Protocol (NTP) can be used via the network to synchronize the controller time. Selected NTP servers can be specified using IP addresses.

### Parameter

| Address    | Name / setting range / [default setting]                                                | Information                                                                                                                                                                                                                                                                                               |
|------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x245A:002 | NTP server addresses: NTP server address 1<br>0.0.0.0 ... [0.0.0.0] ... 255.255.255.255 | Specification of the IP address for one or more Network Time Protocol Servers (NTP).<br><ul style="list-style-type: none"> <li>• To use NTP, the "NTP" selection must be set in <a href="#">0x245B:001</a>.</li> <li>• The device itself is an NTP client and cannot be used as an NTP server.</li> </ul> |
| 0x245A:003 | NTP server addresses: NTP server address 2<br>0.0.0.0 ... [0.0.0.0] ... 255.255.255.255 |                                                                                                                                                                                                                                                                                                           |
| 0x245A:004 | NTP server addresses: NTP server address 3<br>0.0.0.0 ... [0.0.0.0] ... 255.255.255.255 |                                                                                                                                                                                                                                                                                                           |
| 0x245A:005 | NTP server addresses: NTP server address 4<br>0.0.0.0 ... [0.0.0.0] ... 255.255.255.255 |                                                                                                                                                                                                                                                                                                           |



## 7.5 Device commands

The response of the controller unit can be controlled using device commands that are defined in the parameter objects.

### Device commands for the logbook

The controller has a logbook. The events that occur in the controller are saved in the logbook.

▶ [Logbook](#) 152

The following device commands are available to the logbook:

- Delete logbook ▶ [0x2022:015](#)
- Export logbook data ▶ [0x2022:036](#)
- Delete log files ▶ [0x2022:037](#)

### Device commands for the application

The application can be reset, started, and stopped.

- Load factory-set default setting of the application ▶ [0x2022:039](#)
- Start program ▶ [0x2022:044](#)
- Stop program ▶ [0x2022:045](#)
- Reset application via a cold start ▶ [0x2022:048](#)
- Application "general reset" ▶ [0x2022:049](#)

### Additional device commands

If parameter settings of the controller are changed, then these modifications are applied initially only in the RAM memory of the device. Use the "Save user data" device command to save the parameter settings on the SD card. ▶ [0x2022:003](#)

Use the "Restart device" device command to restart the controller from any state.

▶ [0x2022:035](#)

Use the "Reload boot project" device command to reload the boot project. ▶ [0x2022:046](#)

Use the "Load default settings" device command to reset all the parameters in RAM memory to the factory-set default settings. ▶ [0x2022:001](#)

### Parameters (short overview)

The following table shows all the parameters for device commands. The device commands are described in detail in the following subchapters.

| Address                    | Name                                          | Default setting |
|----------------------------|-----------------------------------------------|-----------------|
| <a href="#">0x2022:001</a> | Device commands: Load default settings        | Off / ready [0] |
| <a href="#">0x2022:003</a> | Device commands: Save user data               | Off / ready [0] |
| <a href="#">0x2022:015</a> | Device commands: Delete logbook               | Off / ready [0] |
| <a href="#">0x2022:035</a> | Device commands: Restart Device               | Off / ready [0] |
| <a href="#">0x2022:036</a> | Device commands: Export Logbook               | Off / ready [0] |
| <a href="#">0x2022:037</a> | Device commands: Delete Logfiles              | Off / ready [0] |
| <a href="#">0x2022:039</a> | Device commands: Load TA default settings     | Off / ready [0] |
| <a href="#">0x2022:044</a> | Device commands: Start PLC application        | Off / ready [0] |
| <a href="#">0x2022:045</a> | Device commands: Stop PLC application         | Off / ready [0] |
| <a href="#">0x2022:046</a> | Device commands: Reload boot project          | Off / ready [0] |
| <a href="#">0x2022:048</a> | Device commands: Cold restart PLC application | Off / ready [0] |
| <a href="#">0x2022:049</a> | Device commands: Delete PLC application       | Off / ready [0] |



## 7.5.1 Save parameter settings

### Parameter

| Address    | Name / setting range / [default setting] | Information                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2022:003 | Device commands: Save user data          | <p>The parameter settings are saved on the SD card.</p> <ul style="list-style-type: none"> <li>When the device command has been executed successfully, the value 0 is shown.</li> <li>Do not switch off the supply voltage or remove the SD card from the controller during the storage process!</li> <li>When the controller is switched on, all parameter settings are automatically loaded from the SD card into the RAM memory of the controller.</li> </ul> |
|            | 0 Off / ready                            | Only status feedback                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|            | 1 On / start                             | Execute device command                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|            | 2 In progress                            | Only status feedback                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|            | 3 Action cancelled                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | 4 No access                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | 5 No access (Device disabled)            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | 101 No SD card connected                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | 102 SD card is write protected           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | 103 SD card is full                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## 7.5.2 Reset parameters to default

### Parameter

| Address    | Name / setting range / [default setting]                                                                                                                                     | Information                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2022:001 | Device commands: Load default settings <ul style="list-style-type: none"> <li>Settings can only be changed if the PLC application is not in the "Running" status.</li> </ul> | <p>All parameters in the RAM memory of the controller are reset to the default setting that is stored in the controller firmware as default setting.</p> <ul style="list-style-type: none"> <li>All parameter changes made by the user are lost during this process!</li> <li>When the device command has been executed successfully, the value 0 is shown.</li> <li>Loading parameters has a direct effect on cyclic communication: The data exchange for control is interrupted and a communication error is generated.</li> </ul> |
|            | 0 Off / ready                                                                                                                                                                | Only status feedback                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|            | 1 On / start                                                                                                                                                                 | Execute device command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|            | 2 In progress                                                                                                                                                                | Only status feedback                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|            | 3 Action cancelled                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|            | 4 No access                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|            | 5 No access (Device disabled)                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 0x2022:039 | Device commands: Load TA default settings                                                                                                                                    | <p>All controller parameters are reset to the default setting. Parameters that are declared separately in the application are set to the corresponding standard values from the technology application.</p> <ul style="list-style-type: none"> <li>All parameter changes made by the user are lost during this process!</li> <li>When the device command has been executed successfully, the value 0 is shown.</li> </ul>                                                                                                            |
|            | 0 Off / ready                                                                                                                                                                | Only status feedback                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|            | 1 On / start                                                                                                                                                                 | Execute device command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|            | 2 In progress                                                                                                                                                                | Only status feedback                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|            | 3 Action cancelled                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|            | 4 No access                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|            | 5 No access (Device disabled)                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |



### 7.5.3 Restart device



When the **Restart device** command is executed, the network connection is lost. If the network setting was not changed, the device can be accessed again after approx. 60 seconds.

#### Parameter

| Address    | Name / setting range / [default setting]                                                                                                                            | Information                                                                                                                                                                                                                                                      |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2022:035 | Device commands: Restart Device <ul style="list-style-type: none"><li>Settings can only be changed if the PLC application is not in the "Running" status.</li></ul> | <ul style="list-style-type: none"><li>When the device command has been executed successfully, the value 0 is shown.</li><li>Do not switch off the supply voltage or remove the SD card from the controller while the device command is being executed.</li></ul> |
|            | 0 Off / ready                                                                                                                                                       | Only status feedback                                                                                                                                                                                                                                             |
|            | 1 On / start                                                                                                                                                        | Execute device command                                                                                                                                                                                                                                           |
|            | 2 In progress                                                                                                                                                       | Only status feedback                                                                                                                                                                                                                                             |
|            | 3 Action cancelled                                                                                                                                                  |                                                                                                                                                                                                                                                                  |
|            | 4 No access                                                                                                                                                         |                                                                                                                                                                                                                                                                  |
|            | 5 No access (Device disabled)                                                                                                                                       |                                                                                                                                                                                                                                                                  |

### 7.5.4 Start/stop application



Application credit may be required to execute the PLC application.

When the application is compiled, the required application credit is determined.

The value is entered in the following parameters. ▶ [0x2013:002](#)

Insufficient application credit results in the application being executed with a delay.

Please contact your Lenze service center if you require additional application credit.

The PLC application is controlled using the following device commands:

#### Parameter

| Address    | Name / setting range / [default setting] | Information                                                                                                                                                                                                                                                      |
|------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2022:044 | Device commands: Start PLC application   | <ul style="list-style-type: none"><li>When the device command has been executed successfully, the value 0 is shown.</li><li>Do not switch off the supply voltage or remove the SD card from the controller while the device command is being executed.</li></ul> |
|            | 0 Off / ready                            | Only status feedback                                                                                                                                                                                                                                             |
|            | 1 On / start                             | Execute device command                                                                                                                                                                                                                                           |
|            | 2 In progress                            | Only status feedback                                                                                                                                                                                                                                             |
|            | 3 Action cancelled                       |                                                                                                                                                                                                                                                                  |
|            | 4 No access                              |                                                                                                                                                                                                                                                                  |
|            | 5 No access (Device disabled)            |                                                                                                                                                                                                                                                                  |
| 0x2022:045 | Device commands: Stop PLC application    | <ul style="list-style-type: none"><li>When the device command has been executed successfully, the value 0 is shown.</li><li>Do not switch off the supply voltage or remove the SD card from the controller while the device command is being executed.</li></ul> |
|            | 0 Off / ready                            | Only status feedback                                                                                                                                                                                                                                             |
|            | 1 On / start                             | Execute device command                                                                                                                                                                                                                                           |
|            | 2 In progress                            | Only status feedback                                                                                                                                                                                                                                             |
|            | 3 Action cancelled                       |                                                                                                                                                                                                                                                                  |
|            | 4 No access                              |                                                                                                                                                                                                                                                                  |
|            | 5 No access (Device disabled)            |                                                                                                                                                                                                                                                                  |



## 7.5.5 Load boot project



The reloaded application must be started via the following parameters:

► [0x2022:044](#)

This stops a running application!

### Parameter

| Address    | Name / setting range / [default setting]                                                                                                                                   | Information                                                                                                                                                                                                                                                         |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2022:046 | Device commands: Reload boot project <ul style="list-style-type: none"> <li>Settings can only be changed if the PLC application is not in the "Running" status.</li> </ul> | <ul style="list-style-type: none"> <li>When the device command has been executed successfully, the value 0 is shown.</li> <li>Do not switch off the supply voltage or remove the SD card from the controller while the device command is being executed.</li> </ul> |
|            | <b>0</b> Off / ready                                                                                                                                                       | Only status feedback                                                                                                                                                                                                                                                |
|            | <b>1</b> On / start                                                                                                                                                        | Execute device command                                                                                                                                                                                                                                              |
|            | <b>2</b> In progress                                                                                                                                                       | Only status feedback                                                                                                                                                                                                                                                |
|            | <b>3</b> Action cancelled                                                                                                                                                  |                                                                                                                                                                                                                                                                     |
|            | <b>4</b> No access                                                                                                                                                         |                                                                                                                                                                                                                                                                     |
|            | <b>5</b> No access (Device disabled)                                                                                                                                       |                                                                                                                                                                                                                                                                     |

## 7.5.6 Delete logbook

### Parameter

| Address    | Name / setting range / [default setting] | Information                                                                                                                                                                                                                                                                                                 |
|------------|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2022:015 | Device commands: Delete logbook          | All entries in the logbook are deleted. <ul style="list-style-type: none"> <li>When the device command has been executed successfully, the value 0 is shown.</li> <li>Do not switch off the supply voltage or remove the SD card from the controller while the device command is being executed.</li> </ul> |
|            | <b>0</b> Off / ready                     | Only status feedback                                                                                                                                                                                                                                                                                        |
|            | <b>1</b> On / start                      | Execute device command                                                                                                                                                                                                                                                                                      |
|            | <b>2</b> In progress                     | Only status feedback                                                                                                                                                                                                                                                                                        |
|            | <b>3</b> Action cancelled                |                                                                                                                                                                                                                                                                                                             |
|            | <b>4</b> No access                       |                                                                                                                                                                                                                                                                                                             |
|            | <b>5</b> No access (Device disabled)     |                                                                                                                                                                                                                                                                                                             |

► [Logbook](#) 152

## 7.5.7 Export logbook

### Parameter

| Address    | Name / setting range / [default setting] | Information                                                                                                                                                                                                                                                                                                                        |
|------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2022:036 | Device commands: Export Logbook          | Exports the logbook for the upload into the engineering tools. <ul style="list-style-type: none"> <li>When the device command has been executed successfully, the value 0 is shown.</li> <li>Do not switch off the supply voltage or remove the SD card from the controller while the device command is being executed.</li> </ul> |
|            | <b>0</b> Off / ready                     | Only status feedback                                                                                                                                                                                                                                                                                                               |
|            | <b>1</b> On / start                      | Execute device command                                                                                                                                                                                                                                                                                                             |
|            | <b>2</b> In progress                     | Only status feedback                                                                                                                                                                                                                                                                                                               |
|            | <b>3</b> Action cancelled                |                                                                                                                                                                                                                                                                                                                                    |
|            | <b>4</b> No access                       |                                                                                                                                                                                                                                                                                                                                    |
|            | <b>5</b> No access (Device disabled)     |                                                                                                                                                                                                                                                                                                                                    |

► [Logbook](#) 152



## 7.5.8 Delete log files

### Parameter

| Address    | Name / setting range / [default setting] | Information                                                                                                                                                                                                                                                                                                                                                                                 |
|------------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2022:037 | Device commands: Delete Logfiles         | Deletion of log files on the device that were exported in an earlier step via <a href="#">0x2022:036</a> (Export Logbook). <ul style="list-style-type: none"><li>When the device command has been executed successfully, the value 0 is shown.</li><li>Do not switch off the supply voltage or remove the SD card from the controller while the device command is being executed.</li></ul> |
|            | 0 Off / ready                            | Only status feedback                                                                                                                                                                                                                                                                                                                                                                        |
|            | 1 On / start                             | Execute device command                                                                                                                                                                                                                                                                                                                                                                      |
|            | 2 In progress                            | Only status feedback                                                                                                                                                                                                                                                                                                                                                                        |
|            | 3 Action cancelled                       |                                                                                                                                                                                                                                                                                                                                                                                             |
|            | 4 No access                              |                                                                                                                                                                                                                                                                                                                                                                                             |
|            | 5 No access (Device disabled)            |                                                                                                                                                                                                                                                                                                                                                                                             |

► Logbook 152

## 7.5.9 Reset cold

The "Cold reset" command causes a cold start of the application active in the controller.

**Precondition:** The application is in online operation.

- The cold reset initializes the parameters to the Lenze setting. The previous parameter values are lost.
- The cold reset initializes the retain variables. The previous values are lost.
- The cold reset initializes the persistent variables. The previous values are retained.

### Parameter

| Address    | Name / setting range / [default setting]      | Information            |
|------------|-----------------------------------------------|------------------------|
| 0x2022:048 | Device commands: Cold restart PLC application |                        |
|            | 0 Off / ready                                 | Only status feedback   |
|            | 1 On / start                                  | Execute device command |
|            | 2 In progress                                 | Only status feedback   |
|            | 3 Action cancelled                            |                        |
|            | 4 No access                                   |                        |
|            | 5 No access (Device disabled)                 |                        |

## 7.5.10 Reset origin

The "Reset origin" command causes the active application in the controller to be deleted ("general reset").

**Precondition:** The application is in online operation.

- Reset origin deletes all parameters.
- Reset origin deletes all retain variables.
- Reset origin deletes all persistent variables.

### Parameter

| Address    | Name / setting range / [default setting] | Information            |
|------------|------------------------------------------|------------------------|
| 0x2022:049 | Device commands: Delete PLC application  |                        |
|            | 0 Off / ready                            | Only status feedback   |
|            | 1 On / start                             | Execute device command |
|            | 2 In progress                            | Only status feedback   |
|            | 3 Action cancelled                       |                        |
|            | 4 No access                              |                        |
|            | 5 No access (Device disabled)            |                        |



### 7.6 Firmware update mode for field devices

The "Field device firmware update" parameter is used to define whether and under which conditions the firmware is automatically updated after the firmware versions have been compared.

This function applies to inverters that support firmware download, e.g. frequency inverter i550 cabinet.

The firmware and the settings of the inverter parameters are saved together with the "PLC Designer" project.

During start-up, the Lenze Controller checks whether the firmware version and the parameter settings of the inverter match the data stored in the project for this device.



---

When comparing the firmware versions, pay particular attention to the major version. The firmware consists of four groups of 2 digits each. The groups are separated by periods. The first group indicates the major version, e.g. 06.xx.xx.xx

---



## Parameter

| Address    | Name / setting range / [default setting]     | Information                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x5820:001 | Field devices: Field devices firmware update |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|            | <b>0 Disabled</b>                            | <p>The firmware update is deactivated.</p> <p>The controller does not perform a firmware download, but immediately starts the parameter set download to the inverter (EtherCAT slave).</p> <p>When the parameter set download has been successfully completed, the controller sets the EtherCAT bus to OPERATIONAL state.</p> <p>This setting can be used if devices with an older firmware version are attached to the EtherCAT.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|            | <b>1 Enabled. Slave FW = config. FW</b>      | <p>A firmware update is performed when the firmware of the inverter has the following version:</p> <ul style="list-style-type: none"> <li>identical major version</li> <li>different firmware</li> </ul> <p>Example: Inverter: 06.01.xx.xx, PLC project / controller: 06.02.xx.xx</p> <p>After the firmware download, the parameter set download to the inverter (EtherCAT slave) starts. When the parameter set download has been successfully completed, the controller sets the EtherCAT bus to OPERATIONAL state.</p> <p>If the major version is not the same, no firmware update is performed. The EtherCAT bus remains in the PRE-OPERATIONAL state.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|            | <b>2 Enabled. Slave FW &gt; config. FW</b>   | <p>Four cases must be considered in this setting:</p> <ul style="list-style-type: none"> <li>Case 1: The firmware of the inverter is identical to the firmware archived in the controller. <ul style="list-style-type: none"> <li>No firmware download is performed.</li> <li>After the firmware download, the parameter set download to the inverter (EtherCAT slave) starts. When the parameter set download has been successfully completed, the controller sets the EtherCAT bus to OPERATIONAL state.</li> </ul> </li> <li>Case 2: The major version of the inverter firmware is greater than the major version of the firmware archived in the controller. <ul style="list-style-type: none"> <li>No firmware download is performed.</li> <li>The controller starts the parameter set download to the inverter (EtherCAT slave). When the parameter set download has been successfully completed, the controller sets the EtherCAT bus to OPERATIONAL state.</li> </ul> </li> <li>Case 3: The major version of the inverter firmware is the same as the major version of the firmware archived in the controller. <ul style="list-style-type: none"> <li>A firmware download is performed.</li> <li>After the firmware download, the parameter set download to the inverter (EtherCAT slave) starts. When the parameter set download has been successfully completed, the controller sets the EtherCAT bus to OPERATIONAL state.</li> </ul> </li> <li>Case 4: The major version of the inverter firmware is less than the major version of the firmware archived in the controller. <ul style="list-style-type: none"> <li>No firmware download is performed.</li> <li>No parameter set download is performed.</li> <li>The EtherCAT bus remains in the PRE-OPERATIONAL state.</li> </ul> </li> </ul> |

Please note that even in case of a failed parameter set download, the EtherCAT bus does not leave the PRE-OPERATIONAL state.

If the cause preventing the state transition to OPERATIONAL has been eliminated (e.g. by replacing the inverter or updating the parameter set), the network must be restarted.

Learn how to restart the network in chapter [Restart network](#) 75.



## 8 Configure engineering port

The engineering port **X16** is used to commission and diagnose the controller with an engineering PC.



---

By default, the IP address **192.168.5.99** is preset for the engineering port to enable fast commissioning.

---



---

Changed engineering port settings are retained after a restart of the controller.  
If there is an active connection, changing and activating the engineering port settings will abort the communication with the controller.

---



## 8.1 Automatic configuration via parameters

In the "as delivered" condition, the IP address is non-adjustable. However, the IP settings can also be specified via a DHCP server.



When using DHCP, changing the IP address may also lead to the network name being changed. ▶ [Device name](#) 46

Therefore, DHCP should only be used if there is a local name server in the network and the network name is not used for the gateway function.

### Parameter

| Address    | Name / setting range / [default setting] | Information                                                     |
|------------|------------------------------------------|-----------------------------------------------------------------|
| 0x2451:004 | Engineering port settings: DHCP          | Use (enable) of the Dynamic Host Configuration Protocol (DHCP). |
|            | <b>0 Disabled</b>                        |                                                                 |
|            | <b>1 Enabled</b>                         |                                                                 |



## 8.2 Manual configuration via parameters

The engineering port must be configured manually via parameters when a static IP address is to be assigned.



Please note that a "Restart with current values" must be carried out after each address change for the new setting to take effect. ▶ [0x2450](#)

The configuration is only saved persistently in the parameter set by the "Save user data" device command or by creating a boot project. ▶ [0x2022:003](#)

### Preconditions

DHCP must be set to "Blocked". ▶ [0x2451:004](#)

### Parameter

| Address    | Name / setting range / [default setting]                                           | Information                     |
|------------|------------------------------------------------------------------------------------|---------------------------------|
| 0x2451:001 | Engineering port settings: IP address<br>0.0.0.0 ... [0.0.0.0] ... 255.255.255.255 | Setting of the IP address.      |
| 0x2451:002 | Engineering port settings: Subnet<br>0.0.0.0 ... [0.0.0.0] ... 255.255.255.255     | Setting of the subnet mask.     |
| 0x2451:003 | Engineering port settings: Gateway<br>0.0.0.0 ... [0.0.0.0] ... 255.255.255.255    | Setting of the gateway address. |



## 8.3 Configuration via file

A file named "ip.txt" can be used to set the IP address directly. This file must be stored on the SD card in the root directory. The file can be created and copied on a Windows PC.

The network settings are evaluated and accepted when the controller is booting. This transfers the IP settings to the parameter setting of the controller automatically; these settings are persistent. The file is then renamed "ip\_old.txt". It is possible to change the IP addressing at any time if the file is available again as "ip.txt".

The "ip.txt" file must have the following structure:

|                                              |
|----------------------------------------------|
| IP address<br>Subnet mask<br>Gateway address |
|----------------------------------------------|

Example:

|                                                   |
|---------------------------------------------------|
| 192.168.101.221<br>255.255.255.0<br>192.168.101.1 |
|---------------------------------------------------|

If the static IP address is to be reset to DHCP, only the contents of the "ip.txt" file must be set to "DHCP". This serves to use DHCP for a dynamic address allocation at next boot.



## 8.4 Perform restart with current settings

The engineering tool can use this parameter to restart the device in order to adopt the current settings for the engineering port.

### Parameter

| Address | Name / setting range / [default setting] | Information                                                               |
|---------|------------------------------------------|---------------------------------------------------------------------------|
| 0x2450  | Engineering port control                 | Acceptance of the current settings (0x2451:xxx) for the engineering port. |
|         | <b>0 No action/No error</b>              | Only status feedback                                                      |
|         | <b>1 Restart with current values</b>     | Restart the device to apply the current settings.                         |
|         | <b>10 Busy</b>                           | Only status feedback                                                      |
|         | <b>11 Action cancelled</b>               |                                                                           |
|         | <b>12 Faulted</b>                        |                                                                           |



## 8.5 Diagnostics

### 8.5.1 Active engineering port settings

The following parameters show the currently active settings of the engineering port.

#### Parameter

| Address    | Name / setting range / [default setting]                     | Information                            |
|------------|--------------------------------------------------------------|----------------------------------------|
| 0x2452:001 | Active engineering port settings: IP address<br>• Read only  | Display of the active IP address.      |
| 0x2452:002 | Active engineering port settings: Subnet<br>• Read only      | Display of the active subnet mask.     |
| 0x2452:003 | Active engineering port settings: Gateway<br>• Read only     | Display of the active gateway address. |
| 0x2452:004 | Active engineering port settings: DHCP<br>• Read only        | Display of the DHCP status.            |
|            | 0 Disabled                                                   |                                        |
|            | 1 Enabled                                                    |                                        |
| 0x2452:005 | Active engineering port settings: MAC address<br>• Read only | Display of the MAC-ID.                 |



## 9 Configuring the network

The **X237** connection is used to connect the EtherCAT slaves to the controller. The **X396** and **X397** connections are also available for connection to an Ethernet-based network.

**X237** EtherCAT master

**X396** Network

**X397** Network



Information on configuring the controller as an EtherCAT master can be found in the following subchapter.

► [EtherCAT master](#) 65

Information on configuring the two connections **X396** and **X397** can be found here:

► [Network selection for X396/X397](#) 93



## 9.1 EtherCAT master

### Chapter overview

- ▶ EtherCAT state machine [66](#)
- ▶ Addressing of the slaves [68](#)
- ▶ Commissioning [69](#)
- ▶ Determine the physical EtherCAT configuration (network scan) [70](#)
- ▶ Edit EtherCAT I/O mapping [73](#)
- ▶ Restart network [75](#)
- ▶ Parameter data transfer [76](#)
- ▶ Diagnostics [76](#)
- ▶ Advanced configuration [86](#)
- ▶ Error scenarios [84](#)



EtherCAT® (Ethernet for Controller and Automation Technology) is an Ethernet-based fieldbus system which fulfils the application profile for industrial realtime systems.

- EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.
- Detailed information on EtherCAT can be found on the web page of EtherCAT Technology Group (ETG): [www.ethercat.org](http://www.ethercat.org)

### Preconditions

- For commissioning, load the current device description files for the EtherCAT devices onto your engineering PC via the »Package Manager«.
- For EtherCAT devices from other manufacturers, the device description must be imported accordingly from the homepage of the manufacturer.

### EtherCAT connection

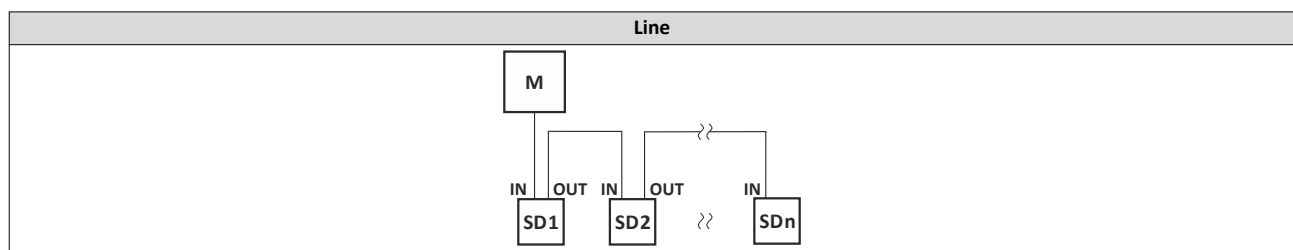
- The EtherCAT slaves are connected to the controller (EtherCAT master) via the RJ45 socket **X237**.
- An Ethernet cable CAT 5/5e, 2-pair with AWG22 or 4-pair with AWG22/24 is suitable for the connection.



More information about connections can be found on the Internet:

<https://www.ethercat.org> → ETG1600\_V1i0i2\_G\_R\_InstallationGuideline.pdf

### Typical topology



M Master  
SD Slave device



## 9.1.1 EtherCAT state machine

Before communication via EtherCAT is possible, the fieldbus scans the EtherCAT state machine when booting. The following illustration shows the possible state change from the point of view of an EtherCAT slave:

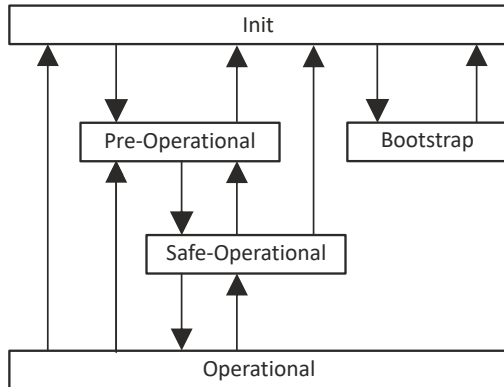


Fig. 1: EtherCAT state machine

| State            | Description                                                                                                                                                                                                                                                                                                                             |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Init             | <ul style="list-style-type: none"> <li>Initialization 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 is updated.</li> <li>The output data from the process image is not transferred to the slaves.</li> </ul> </li> </ul> |
| Operational      | Normal operation <ul style="list-style-type: none"> <li>SDO communication</li> <li>PDO communication</li> <li>Fieldbus synchronization has been successful (if used)</li> </ul>                                                                                                                                                         |



A fieldbus scan is possible in any EtherCAT state.

The SDO communication via the EtherCAT bus is only possible if at least the "Pre-Operational" state has been reached.



## AL status code

Possible errors during transitions between states are entered in the EtherCAT register of the concerned slave in **AL Status Code** (address 0x0134:0x0135).

| Often indicated AL status code [hex] | Description                                          |
|--------------------------------------|------------------------------------------------------|
| 0x0000                               | No error                                             |
| 0x0011                               | Invalid status change requested                      |
| 0x0012                               | Unknown status requested                             |
| 0x0013                               | <b>Bootstrap</b> status is not supported             |
| 0x0016                               | Invalid mailbox configuration <b>Pre-Operational</b> |
| 0x001A                               | Synchronization 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 synchronization          |
| 0x9001                               | Firmware watchdog error                              |
| 0x9002                               | Mapping error                                        |



## 9.1.2 Addressing of the slaves

The EtherCAT system uses two types of addressing for the slaves:

1. Auto-increment addressing
2. Fixed-address addressing

### Auto-increment addressing

Auto-increment addressing is used by the master during the initialization phase of the fieldbus. When the **Pre-Operational** state has been reached, the master uses fixed-address addressing.

### Synchronizing the internal EtherCAT slave



---

The controller contains an internal EtherCAT slave with its own address to provide the synchronization.

---

Thus, the connected first nodes have the following start address:

- **0xFFFFE** by the auto-increment procedure
- **1002** by fixed-address addressing

The additional internal slave is also to be taken into consideration when running network diagnostics.

### Fixed-address addressing

With the fixed-address addressing, the slaves are addressed via the station address distributed by the master during the start-up phase. In the EtherCAT bus topology in the »PLC Designer«, the first slave is given the address **1001**, the second slave the address **1002** and so on. The EtherCAT addresses cannot be changed. The EtherCAT address of the master is **0**. Access to master objects with the address **0** is possible.

### Example of the auto-increment procedure and fixed-address addressing

The first slave of a configuration is an **internal** slave and is given the following address:

- Auto-increment procedure: **0**
- Fixed-address addressing procedure: **1001**

The first **external** slave of a configuration is given the following addresses:

- Auto-increment procedure: **-1**
- Fixed-address addressing procedure: **1002**



---

The auto-increment procedure uses negative numbering.

---



## 9.1.3 Commissioning

The EtherCAT master enables the control of the subordinate EtherCAT device. Connected EtherCAT slaves can be configured in this way using the engineering PC.

### Preconditions

- The field devices are installed as per the information in the device-specific mounting instructions.
- The commissioning of the controller is completed.

### Recommended sequence of the commissioning steps

1. Use the **Online Login** menu command or the <Alt> + <F11> keys to log into the controller.
2. ▶ [Determine the physical EtherCAT configuration \(network scan\)](#) 70
3. Adapt the network configuration.
4. ▶ [Edit EtherCAT I/O mapping](#) 73
5. Use the **Build Compile** menu command or the <F11> function key to compile the program code.
6. Use the **Online Login** menu command or the <Alt> + <F11> keys to load the configuration.
7. Use the **Debug Start** menu command or the <F5> function key to start the PLC program.

# Configuring the network

EtherCAT master

Determine the physical EtherCAT configuration (network scan)



## 9.1.4 Determine the physical EtherCAT configuration (network scan)

In order to check the physical EtherCAT configuration, you can use the »PLC Designer« to carry out a network scan on the controller online.

Preconditions:

- The communication parameters are configured.
- The PLC Designer is logged into the controller.



- A proper operation requires that the network topology generated in the project corresponds to the physical order of the EtherCAT devices in the network. Otherwise, an error message displays which slave (vendor ID/product code) is to be expected at which position.
- The master automatically assigns the station addresses to the slaves. Therefore, a manual address assignment is not required.
- If a device is not available on the EtherCAT, an error message indicates this.
- When using the S130 EtherCAT bus coupler, the connected IO-1000 discs are only detected in the **Pre-Operational** state. Therefore, the scan (Scan for Devices) must be performed twice.



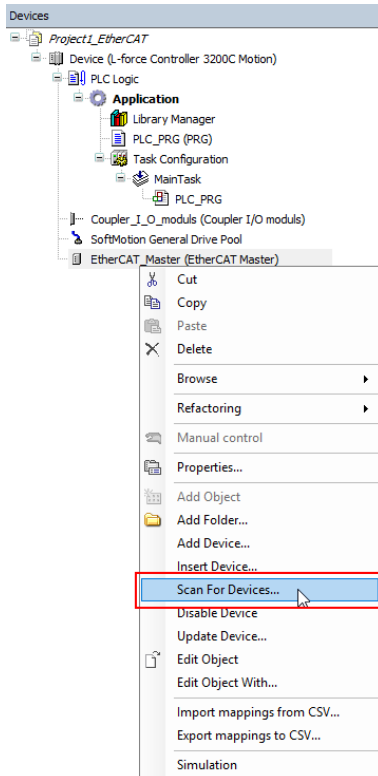
# Configuring the network

EtherCAT master

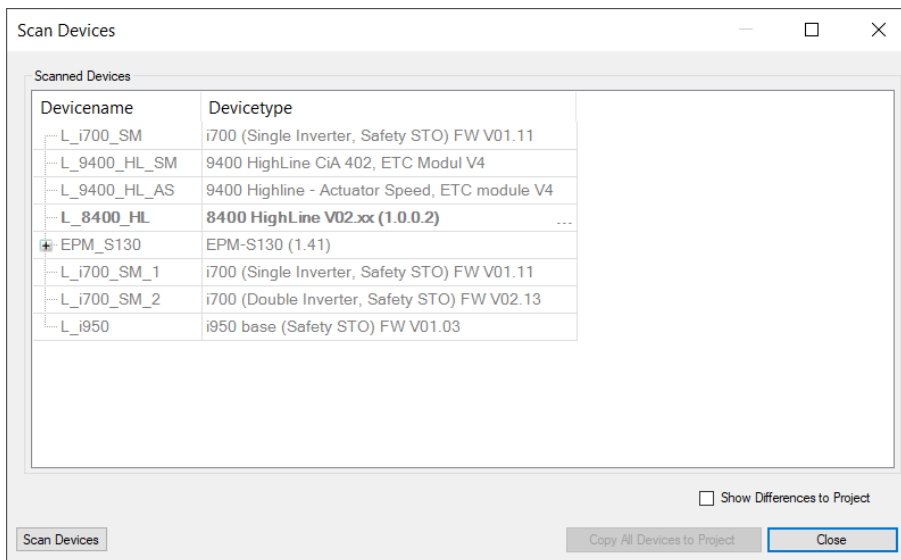
Determine the physical EtherCAT configuration (network scan)

How to determine the physical EtherCAT configuration:

1. Select the **Scan for Devices** command in the context menu of the EtherCAT master.



A dialog opens.



2. Click the **Copy All Devices in Project** button to copy them to the PLC project or select individual devices and copy them to the PLC project.

# Configuring the network

EtherCAT master

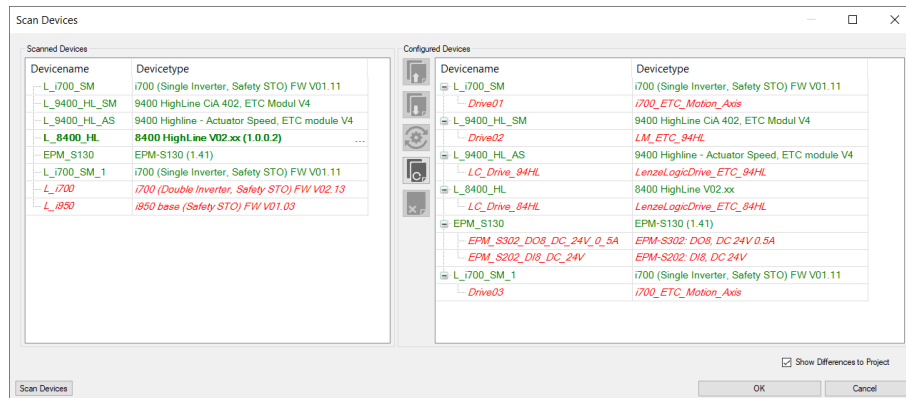
Determine the physical EtherCAT configuration (network scan)

Set PDO mapping



## 3. Select the **Show Differences to Project** checkbox.

The devices found and the devices configured are compared.



## 4. Adapting the configuration:

- Click the **Copy all** button to copy all devices into the project.
- Copy individual devices into the project.

The devices are added to the project.



## 9.1.5 Edit EtherCAT I/O mapping



---

If you insert additional field devices in the control configuration or change the PDO mapping, the object addresses change. Therefore, the input and output objects in the PLC program must be accessed via individual unambiguous variables. The variable names must comply with the IEC 61131 syntax.

---



---

The manual assignment of object addresses in the Address column is not supported.

---

On the **EtherCAT I/O image** tab, you can enter variable names by double-clicking the variable fields or pressing the space key. By clicking the menu button, you can reference already existing variables or enter variable names directly in the input field to create system variables. For the PLC program, the corresponding system variables are available.

# Configuring the network

EtherCAT master  
Edit EtherCAT I/O mapping  
Set PDO mapping



## 9.1.5.1 Set PDO mapping

Set the PDO mapping in the selected EtherCAT slave. The process data serves to select the inputs and outputs.

The PDO mapping for the EtherCAT slave can be composed of 3 parts:

- Unchangeable static part.
- Dynamic part. Contains PDOs for the different operation modes.
- Freely configurable part. Activated in the »PLC Designer« and enables individual mapping.

## Changing PDO mapping settings

Sync Manager:

| SM | Size | Type        |
|----|------|-------------|
| 0  | 0    | Mailbox Out |
| 1  | 0    | Mailbox In  |
| 2  | 31   | Outputs     |
| 3  | 45   | Inputs      |

Edit

Delete

PDO List:

| Index   | Size | Name                                  | Flags | SM |
|---------|------|---------------------------------------|-------|----|
| 16#1600 | 17.0 | Axis A: csp                           | F     | 2  |
| 16#1601 | 17.0 | Axis A: cst                           | F     |    |
| 16#1602 | 11.0 | Axis A: csv                           | F     |    |
| 16#1603 | 7.0  | Axis A: vl                            | F     |    |
| 16#1604 | 2.0  | Axis A: TP                            | F     | 2  |
| 16#1605 | 0.0  | Axis A: Free configuration            |       |    |
| 16#1606 | 4.0  | Axis A: Torque limits                 | F     | 2  |
| 16#1607 | 8.0  | Axis A: Speed limits                  | F     | 2  |
| 16#1A00 | 21.0 | Axis A: csp                           | F     | 3  |
| 16#1A01 | 13.0 | Axis A: cst                           | F     |    |
| 16#1A02 | 17.0 | Axis A: csv                           | F     |    |
| 16#1A03 | 9.0  | Axis A: vl                            | F     |    |
| 16#1A04 | 18.0 | Axis A: TP                            | F     | 3  |
| 16#1A05 | 0.0  | Axis A: Free configuration            |       |    |
| 16#1A06 | 6.0  | Axis A: Additional status information |       | 3  |

PDO Assignment (16#1C12):

☒ 16#1600

☐ 16#1601 (excluded by 16#1600)

☐ 16#1602 (excluded by 16#1600)

☐ 16#1603 (excluded by 16#1600)

☒ 16#1604

☐ 16#1605

☒ 16#1606

☒ 16#1607

Edit

Delete

Move Up

Move Down

PDO Content (16#1600):

| Index      | Size | Offs | Name                                   | Type |
|------------|------|------|----------------------------------------|------|
| 16#6040:00 | 2.0  | 0.0  | Controlword                            | UINT |
| 16#2830:00 | 2.0  | 2.0  | Lenze control word                     | UINT |
| 16#6060:00 | 1.0  | 4.0  | Modes of operation                     | SINT |
| 16#60B2:00 | 2.0  | 5.0  | Torque offset                          | INT  |
| 16#607A:00 | 4.0  | 7.0  | Target position                        | DINT |
| 16#60B1:00 | 4.0  | 11.0 | Velocity offset                        | DINT |
| 16#2902:00 | 2.0  | 15.0 | Speed controller: I component load val | INT  |
|            |      | 17.0 |                                        |      |

Download

☒ PDO Assignment ☒ PDO Configuration

Load PDO Info from the Device

How to change the PDO mapping settings:

1. Activate expert settings in the »PLC Designer«
2. Remove the checkmark in the PDO assignment checkbox.
3. Check the desired setting.

The setting has been changed.



## 9.1.5.2 Activate PDO mapping

If the device descriptions for corresponding EtherCAT devices that are supplied with the »PLC Designer« are used, the process data is copied to the subordinate node automatically.

### Manually link process data

If the process data is still to be linked manually, activate the **Direct access to I/O addresses by the application** option on the **LenzeLogicDrive Configuration** tab. In this setting, you cannot use the prepared function blocks. The process data (I/O addresses) must be linked manually.

## 9.1.6 Restart network

The EtherCAT master communication is restarted automatically if a new configuration is loaded on the controller.

These are the options for restarting the communication:

1. Request restart of the EtherCAT master.
  - Commands for EtherCAT master system bus. ▶ [0x5850:001](#)
  - Via a function block that is added to the EtherCAT master in the project. Via the function block input xRestart (positive edge), the EtherCAT slaves are started up after **INIT** and again after **Operational**.
2. Switch controller off and on again.



The EtherCAT configuration is part of the PLC program. If the changes are to remain even after the voltage switching of the controller, the boot project must be recreated.

### Parameter

| Address    | Name / setting range / [default setting]            | Information                                                                                                                                                                   |
|------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2360     | EtherCAT communication                              | Restart communication. <ul style="list-style-type: none"> <li>When the device command has been executed successfully, the value 0 is shown.</li> </ul>                        |
|            | <b>0 No action/no error</b>                         | Only status feedback                                                                                                                                                          |
|            | 1 Restart with current values                       | Execute command                                                                                                                                                               |
|            | 2 Restart with default values                       |                                                                                                                                                                               |
|            | 5 Stop network communication                        |                                                                                                                                                                               |
|            | 10 In process                                       | Only status feedback                                                                                                                                                          |
|            | 11 Action cancelled                                 |                                                                                                                                                                               |
|            | 12 Fault                                            |                                                                                                                                                                               |
| 0x5850:001 | EtherCAT master commands: Kommunikation neu starten | Restart of the EtherCAT master. <ul style="list-style-type: none"> <li>The current configuration becomes active.</li> <li>The EtherCAT communication is restarted.</li> </ul> |
|            | <b>0 No action/no error</b>                         | Only status feedback                                                                                                                                                          |
|            | 1 Neustart                                          | Execute command<br>Execute command                                                                                                                                            |
|            | 10 Busy                                             | Only status feedback                                                                                                                                                          |
|            | 11 Action cancelled                                 |                                                                                                                                                                               |
|            | 12 Faulted                                          |                                                                                                                                                                               |
| 0x5850:002 | EtherCAT master commands: Reset counters            |                                                                                                                                                                               |
|            | <b>0 No action/no error</b>                         | Only status feedback                                                                                                                                                          |
|            | 1 Reset master counters                             | Execute command                                                                                                                                                               |
|            | 2 Reset slave counters                              |                                                                                                                                                                               |
|            | 3 Reset all counters                                |                                                                                                                                                                               |
|            | 10 Busy                                             | Only status feedback                                                                                                                                                          |
|            | 11 Action cancelled                                 |                                                                                                                                                                               |
|            | 12 Faulted                                          |                                                                                                                                                                               |

# Configuring the network

EtherCAT master  
Parameter data transfer  
EtherCAT master diagnostics



## 9.1.7 Parameter data transfer

For configuring and diagnosing the EtherCAT devices, the parameters are accessed by means of acyclic communication.

- Parameter data is transferred as SDOs (Service Data Objects) .
- The SDO services enable write and read access to parameters, EtherCAT objects and profile-specific objects.
- The transfer of parameter data is usually not time-critical.
- Parameter data is, for instance, operating parameters, motor data and diagnostic information.

SDOs are read and written internally automatically via the EtherCAT master. SDO access is also possible via the function blocks of the PLC program.

## 9.1.8 Diagnostics

### 9.1.8.1 EtherCAT master diagnostics

Information is only displayed in the parameter list under **Diagnostic Master** if an online connection to the master has been established.

The following information is displayed:

- Most recent error
- Number of emergency frames
- Status information
- Information on the network topology
- Frame and error counter

In addition to the EtherCAT states, additional diagnostic information of up to 4 selected EtherCAT slaves is displayed under **Diagnostic Slaves**.

The following information is displayed:

- Slave information
- Addresses
- State
- Count values
- DC sync times

The EtherCAT slave address can be specified using the following parameters:

▶ 0x585C:001

▶ 0x585D:001

▶ 0x585E:001

▶ 0x585F:001

### Parameter

| Address    | Name / setting range / [default setting]         | Information                           |
|------------|--------------------------------------------------|---------------------------------------|
| 0x5851:001 | EtherCAT master diagnosis: EtherCAT master state | Display of the EtherCAT master state. |
|            | • Read only                                      |                                       |
|            | 0 Unknown                                        |                                       |
|            | 1 Init                                           |                                       |
|            | 2 Pre-Operational                                |                                       |
|            | 3 Bootstrap                                      |                                       |
|            | 4 Safe-Operational                               |                                       |
|            | 8 Operational                                    |                                       |



# Configuring the network

EtherCAT master  
Diagnostics  
EtherCAT master diagnostics

| Address    | Name / setting range / [default setting]                                | Information                                                                                                                                                    |
|------------|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x5851:002 | EtherCAT master diagnosis: EtherCAT master state summary<br>• Read only | Display of the EtherCAT master state overview.                                                                                                                 |
|            | Bit 0 Master OK                                                         |                                                                                                                                                                |
|            | Bit 3 Reserved                                                          |                                                                                                                                                                |
|            | Bit 4 Init                                                              |                                                                                                                                                                |
|            | Bit 5 Pre-Operational                                                   |                                                                                                                                                                |
|            | Bit 6 Safe-Operational                                                  |                                                                                                                                                                |
|            | Bit 7 Operational                                                       |                                                                                                                                                                |
|            | Bit 8 Slaves in requested state                                         |                                                                                                                                                                |
|            | Bit 9 Master in requested state                                         |                                                                                                                                                                |
|            | Bit 10 Bus scan match                                                   |                                                                                                                                                                |
|            | Bit 12 DC enabled                                                       |                                                                                                                                                                |
|            | Bit 13 DC in sync                                                       |                                                                                                                                                                |
|            | Bit 14 DC busy                                                          |                                                                                                                                                                |
|            | Bit 16 Link up                                                          |                                                                                                                                                                |
| 0x5851:003 | EtherCAT master diagnosis: EtherCAT error<br>• Read only                | Display whether an EtherCAT network error has occurred.                                                                                                        |
| 0x5851:004 | EtherCAT master diagnosis: Bus scan match<br>• Read only                | Display whether a "Bus Scan Match" exists.                                                                                                                     |
|            | 0 Mismatch                                                              |                                                                                                                                                                |
|            | 1 Match                                                                 |                                                                                                                                                                |
| 0x5851:005 | EtherCAT master diagnosis: Configured cycle time<br>• Read only: x µs   |                                                                                                                                                                |
| 0x5851:006 | EtherCAT master diagnosis: Connected slaves<br>• Read only              | Display of the number of slaves available in the network.                                                                                                      |
| 0x5851:007 | EtherCAT master diagnosis: Configured slaves<br>• Read only             | Display of the number of configured slaves.                                                                                                                    |
| 0x5851:008 | EtherCAT master diagnosis: TX frame counter<br>• Read only              | Displayed information corresponds to the values from the EtherCAT register content.                                                                            |
| 0x5851:009 | EtherCAT master diagnosis: Lost frame counter<br>• Read only            |                                                                                                                                                                |
| 0x5851:010 | EtherCAT master diagnosis: Working counter error<br>• Read only         |                                                                                                                                                                |
| 0x5851:011 | EtherCAT master diagnosis: DC slave sync deviation limit<br>• Read only |                                                                                                                                                                |
| 0x5851:012 | EtherCAT master diagnosis: DC current deviation<br>• Read only          |                                                                                                                                                                |
| 0x5851:013 | EtherCAT master diagnosis: Master mode<br>• Read only                   | Display of the current mode in which the EtherCAT master is being operated.                                                                                    |
|            | 0 None                                                                  |                                                                                                                                                                |
|            | 1 Normal                                                                |                                                                                                                                                                |
|            | 100 Modular machine configuration                                       |                                                                                                                                                                |
|            | 200 SuperSetENI                                                         |                                                                                                                                                                |
| 0x5851:014 | EtherCAT master diagnosis: Slave state summary<br>• Read only           | Display of the sum status of all connected EtherCAT slaves.<br>The sum status results from the OR of the "AL Status Register" [0x0130] of the EtherCAT slaves. |
|            | Bit 0 Initialization                                                    |                                                                                                                                                                |
|            | Bit 1 Pre-Operational                                                   |                                                                                                                                                                |
|            | Bit 2 Safe-Operational                                                  |                                                                                                                                                                |
|            | Bit 3 Operational                                                       |                                                                                                                                                                |
|            | Bit 4 Fehler                                                            |                                                                                                                                                                |
|            | Bit 5 Bootstrap                                                         |                                                                                                                                                                |

# Configuring the network

EtherCAT master  
Diagnostics  
EtherCAT master diagnostics



| Address    | Name / setting range / [default setting]                                               | Information                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x5851:015 | EtherCAT master diagnosis: State machine<br>• Read only                                | Display of the current internal "Master State" of the EtherCAT master.                                                                                                                                                                                                                                                                                                                                                                                   |
|            | 0 None                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|            | 1 Configuration                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|            | 2 Initialized                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|            | 10 Pre-Operational                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|            | 20 Download service                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|            | 21 Firmware download                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|            | 22 Firmware reload                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|            | 30 Operational                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|            | 100 Address assignment                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|            | 65519 Unkonwn                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 0x5851:030 | EtherCAT master diagnosis: Connection error level<br>• Read only                       | The EtherCAT I/O driver cyclically collects the RX error counters from the connected EtherCAT slaves every few seconds. This parameter shows the maximum value of all slave RX error counters.<br>• The display "100 %" corresponds to the counter value 255                                                                                                                                                                                             |
| 0x5851:031 | EtherCAT master diagnosis: Error counter threshold for logging<br>0 ... [100] ... 255  | The EtherCAT I/O driver cyclically collects the RX error counters from the connected EtherCAT slaves every few seconds. This parameter defines the threshold above which a message is entered in the logbook.<br>• If set to "0", there is no message in the logbook.                                                                                                                                                                                    |
| 0x5851:032 | EtherCAT master diagnosis: RX error counter<br>• Read only                             | The EtherCAT I/O driver cyclically collects the RX error counters from the connected EtherCAT slaves every few seconds. This parameter shows the resulting maximum.                                                                                                                                                                                                                                                                                      |
| 0x5851:033 | EtherCAT master diagnosis: Processing unit error counter<br>• Read only                | The EtherCAT I/O driver cyclically collects the processing unit error counters from the connected EtherCAT slaves every few seconds. This parameter shows the resulting maximum.                                                                                                                                                                                                                                                                         |
| 0x5851:034 | EtherCAT master diagnosis: PDI error counter<br>• Read only                            | The EtherCAT I/O driver cyclically collects the PDI error counters from the connected EtherCAT slaves every few seconds. This parameter shows the resulting maximum.                                                                                                                                                                                                                                                                                     |
| 0x5851:035 | EtherCAT master diagnosis: Lost link counter<br>• Read only                            | The EtherCAT I/O driver cyclically collects the counters for lost links from the connected EtherCAT slaves every few seconds. This parameter shows the resulting maximum.                                                                                                                                                                                                                                                                                |
| 0x585C:001 | EtherCAT master slave information: Slave address<br>-2147483648 ... [0] ... 2147483647 | Specification of the slave address to be diagnosed.<br>The first slave is an internal slave; therefore, the first external slave must receive the address 1002, the second slave must receive the address 1003, etc. This also applies to the auto increment procedure. The address of the first external slave is the -2, the second address is the -3, etc.<br><br>Displayed information corresponds to the values from the EtherCAT register content. |
| 0x585C:002 | EtherCAT master slave information: Vendor ID<br>• Read only                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 0x585C:003 | EtherCAT master slave information: Product code<br>• Read only                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 0x585C:004 | EtherCAT master slave information: Revision<br>• Read only                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 0x585C:005 | EtherCAT master slave information: Serial number<br>• Read only                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 0x585C:006 | EtherCAT master slave information: Auto-increment address<br>• Read only               |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 0x585C:007 | EtherCAT master slave information: Fixed address<br>• Read only                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 0x585C:008 | EtherCAT master slave information: Second station address<br>• Read only               |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |



# Configuring the network

EtherCAT master  
Diagnostics  
EtherCAT master diagnostics

| Address    | Name / setting range / [default setting]                                                                           | Information                                                                                                                                                                                                                                                                                                                                                   |
|------------|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x585C:010 | EtherCAT master slave information: Master data link status<br>• Read only                                          |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 0 EEPROM loaded correctly and PDI operational                                                                  |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 1 PDI watchdog status (reloaded)                                                                               |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 2 Enhanced link detection                                                                                      |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 4 Physical link on port 0                                                                                      |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 5 Physical link on port 1                                                                                      |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 6 Physical link on port 2                                                                                      |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 7 Physical link on port 3                                                                                      |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 8 Loop port 0 (closed)                                                                                         |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 9 Communication on port 0 (stable)                                                                             |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 10 Loop port 1 (closed)                                                                                        |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 11 Communication on port 1 (stable)                                                                            |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 12 Loop port 2 (closed)                                                                                        |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 13 Communication on port 2 (stable)                                                                            |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 14 Loop port 3 (closed)                                                                                        |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 15 Communication on port 3 (stable)                                                                            |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585C:011 | EtherCAT master slave information: Master AL Status<br>• Read only                                                 |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 0 Init                                                                                                         |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 1 Pre-Operational                                                                                              |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 2 Safe-Operational                                                                                             |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 3 Operational                                                                                                  |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 4 Error Ind                                                                                                    |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585C:012 | EtherCAT master slave information: Master RX Error Counter (Port 0-3)<br>• Read only                               |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585C:013 | EtherCAT master slave information: Master Forwarded RX Error Counter (Port 0-3)<br>• Read only                     |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585C:014 | EtherCAT master slave information: Master Processing Unit Error Counter<br>• Read only                             |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585C:015 | EtherCAT master slave information: Master PDI Error Counter<br>• Read only                                         |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585C:016 | EtherCAT master slave information: Master Lost Link Counter (Port 0-3)<br>• Read only                              |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585C:017 | EtherCAT master slave information: Master DC Sync 0 Period<br>• Read only                                          |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585C:018 | EtherCAT master slave information: Master DC Sync 1 Period<br>• Read only                                          |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585D:001 | EtherCAT master slave information: Master - Slave Address (AutoInc or Fixed)<br>-2147483648 ... [0] ... 2147483647 | Specification of the slave address to be diagnosed.<br>The first slave is an internal slave; therefore, the first external slave must receive the address 1002, the second slave must receive the address 1003, etc. This also applies to the auto increment procedure. The address of the first external slave is the -2, the second address is the -3, etc. |
| 0x585D:002 | EtherCAT master slave information: Master VendorID<br>• Read only                                                  | Displayed information corresponds to the values from the EtherCAT register content.                                                                                                                                                                                                                                                                           |
| 0x585D:003 | EtherCAT master slave information: Master Product code<br>• Read only                                              |                                                                                                                                                                                                                                                                                                                                                               |

# Configuring the network

EtherCAT master

Diagnostics

EtherCAT master diagnostics



| Address    | Name / setting range / [default setting]                                                       | Information |
|------------|------------------------------------------------------------------------------------------------|-------------|
| 0x585D:004 | EtherCAT master slave information: Master Revision<br>• Read only                              |             |
| 0x585D:005 | EtherCAT master slave information: Master Serial number<br>• Read only                         |             |
| 0x585D:006 | EtherCAT master slave information: Master Auto-increment address<br>• Read only                |             |
| 0x585D:007 | EtherCAT master slave information: Master Fixed address<br>• Read only                         |             |
| 0x585D:008 | EtherCAT master slave information: Master Second station address<br>• Read only                |             |
| 0x585D:010 | EtherCAT master slave information: Master data link status<br>• Read only                      |             |
|            | Bit 0 EEPROM loaded correctly and PDI operational                                              |             |
|            | Bit 1 PDI watchdog status (reloaded)                                                           |             |
|            | Bit 2 Enhanced link detection                                                                  |             |
|            | Bit 4 Physical link on port 0                                                                  |             |
|            | Bit 5 Physical link on port 1                                                                  |             |
|            | Bit 6 Physical link on port 2                                                                  |             |
|            | Bit 7 Physical link on port 3                                                                  |             |
|            | Bit 8 Loop port 0 (closed)                                                                     |             |
|            | Bit 9 Communication on port 0 (stable)                                                         |             |
|            | Bit 10 Loop port 1 (closed)                                                                    |             |
|            | Bit 11 Communication on port 1 (stable)                                                        |             |
|            | Bit 12 Loop port 2 (closed)                                                                    |             |
|            | Bit 13 Communication on port 2 (stable)                                                        |             |
|            | Bit 14 Loop port 3 (closed)                                                                    |             |
|            | Bit 15 Communication on port 3 (stable)                                                        |             |
| 0x585D:011 | EtherCAT master slave information: Master AL Status<br>• Read only                             |             |
|            | Bit 0 Init                                                                                     |             |
|            | Bit 1 Pre-Operational                                                                          |             |
|            | Bit 2 Safe-Operational                                                                         |             |
|            | Bit 3 Operational                                                                              |             |
|            | Bit 4 Error Ind                                                                                |             |
| 0x585D:012 | EtherCAT master slave information: Master RX Error Counter (Port 0-3)<br>• Read only           |             |
| 0x585D:013 | EtherCAT master slave information: Master Forwarded RX Error Counter (Port 0-3)<br>• Read only |             |
| 0x585D:014 | EtherCAT master slave information: Master Processing Unit Error Counter<br>• Read only         |             |
| 0x585D:015 | EtherCAT master slave information: Master PDI Error Counter<br>• Read only                     |             |
| 0x585D:016 | EtherCAT master slave information: Master Lost Link Counter (Port 0-3)<br>• Read only          |             |
| 0x585D:017 | EtherCAT master slave information: Master DC Sync 0 Period<br>• Read only                      |             |



# Configuring the network

EtherCAT master  
Diagnostics  
EtherCAT master diagnostics

| Address    | Name / setting range / [default setting]                                                                           | Information                                                                                                                                                                                                                                                                                                                                                   |
|------------|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x585D:018 | EtherCAT master slave information: Master DC Sync 1 Period<br>• Read only                                          |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585E:001 | EtherCAT master slave information: Master - Slave Address (AutoInc or Fixed)<br>-2147483648 ... [0] ... 2147483647 | Specification of the slave address to be diagnosed.<br>The first slave is an internal slave; therefore, the first external slave must receive the address 1002, the second slave must receive the address 1003, etc. This also applies to the auto increment procedure. The address of the first external slave is the -2, the second address is the -3, etc. |
| 0x585E:002 | EtherCAT master slave information: Master VendorID<br>• Read only                                                  | Displayed information corresponds to the values from the EtherCAT register content.                                                                                                                                                                                                                                                                           |
| 0x585E:003 | EtherCAT master slave information: Master Product code<br>• Read only                                              |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585E:004 | EtherCAT master slave information: Master Revision<br>• Read only                                                  |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585E:005 | EtherCAT master slave information: Master Serial number<br>• Read only                                             |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585E:006 | EtherCAT master slave information: Master Auto-increment address<br>• Read only                                    |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585E:007 | EtherCAT master slave information: Master Fixed address<br>• Read only                                             |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585E:008 | EtherCAT master slave information: Master Second station address<br>• Read only                                    |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585E:010 | EtherCAT master slave information: Master data link status<br>• Read only                                          |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 0 EEPROM loaded correctly and PDI operational                                                                  |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 1 PDI watchdog status (reloaded)                                                                               |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 2 Enhanced link detection                                                                                      |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 4 Physical link on port 0                                                                                      |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 5 Physical link on port 1                                                                                      |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 6 Physical link on port 2                                                                                      |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 7 Physical link on port 3                                                                                      |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 8 Loop port 0 (closed)                                                                                         |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 9 Communication on port 0 (stable)                                                                             |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 10 Loop port 1 (closed)                                                                                        |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 11 Communication on port 1 (stable)                                                                            |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 12 Loop port 2 (closed)                                                                                        |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 13 Communication on port 2 (stable)                                                                            |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 14 Loop port 3 (closed)                                                                                        |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 15 Communication on port 3 (stable)                                                                            |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585E:011 | EtherCAT master slave information: Master AL Status<br>• Read only                                                 |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 0 Init                                                                                                         |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 1 Pre-Operational                                                                                              |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 2 Safe-Operational                                                                                             |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 3 Operational                                                                                                  |                                                                                                                                                                                                                                                                                                                                                               |
|            | Bit 4 Error Ind                                                                                                    |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585E:012 | EtherCAT master slave information: Master RX Error Counter (Port 0-3)<br>• Read only                               |                                                                                                                                                                                                                                                                                                                                                               |
|            |                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                               |

# Configuring the network

EtherCAT master  
Diagnostics  
EtherCAT master diagnostics



| Address    | Name / setting range / [default setting]                                                                           | Information                                                                                                                                                                                                                                                                                                                                                   |
|------------|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x585E:013 | EtherCAT master slave information: Master Forwarded RX Error Counter (Port 0-3)<br>• Read only                     |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585E:014 | EtherCAT master slave information: Master Processing Unit Error Counter<br>• Read only                             |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585E:015 | EtherCAT master slave information: Master PDI Error Counter<br>• Read only                                         |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585E:016 | EtherCAT master slave information: Master Lost Link Counter (Port 0-3)<br>• Read only                              |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585E:017 | EtherCAT master slave information: Master DC Sync 0 Period<br>• Read only                                          |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585E:018 | EtherCAT master slave information: Master DC Sync 1 Period<br>• Read only                                          |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585F:001 | EtherCAT master slave information: Master - Slave Address (AutoInc or Fixed)<br>-2147483648 ... [0] ... 2147483647 | Specification of the slave address to be diagnosed.<br>The first slave is an internal slave; therefore, the first external slave must receive the address 1002, the second slave must receive the address 1003, etc. This also applies to the auto increment procedure. The address of the first external slave is the -2, the second address is the -3, etc. |
| 0x585F:002 | EtherCAT master slave information: Master VendorID<br>• Read only                                                  | Displayed information corresponds to the values from the EtherCAT register content.                                                                                                                                                                                                                                                                           |
| 0x585F:003 | EtherCAT master slave information: Master Product code<br>• Read only                                              |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585F:004 | EtherCAT master slave information: Master Revision<br>• Read only                                                  |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585F:005 | EtherCAT master slave information: Master Serial number<br>• Read only                                             |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585F:006 | EtherCAT master slave information: Master Auto-increment address<br>• Read only                                    |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585F:007 | EtherCAT master slave information: Master Fixed address<br>• Read only                                             |                                                                                                                                                                                                                                                                                                                                                               |
| 0x585F:008 | EtherCAT master slave information: Master Second station address<br>• Read only                                    |                                                                                                                                                                                                                                                                                                                                                               |



# Configuring the network

EtherCAT master  
Diagnostics  
EtherCAT master diagnostics

| Address    | Name / setting range / [default setting]                                                       | Information |
|------------|------------------------------------------------------------------------------------------------|-------------|
| 0x585F:010 | EtherCAT master slave information: Master data link status<br>• Read only                      |             |
|            | Bit 0 EEPROM loaded correctly and PDI operational                                              |             |
|            | Bit 1 PDI watchdog status (reloaded)                                                           |             |
|            | Bit 2 Enhanced link detection                                                                  |             |
|            | Bit 4 Physical link on port 0                                                                  |             |
|            | Bit 5 Physical link on port 1                                                                  |             |
|            | Bit 6 Physical link on port 2                                                                  |             |
|            | Bit 7 Physical link on port 3                                                                  |             |
|            | Bit 8 Loop port 0 (closed)                                                                     |             |
|            | Bit 9 Communication on port 0 (stable)                                                         |             |
|            | Bit 10 Loop port 1 (closed)                                                                    |             |
|            | Bit 11 Communication on port 1 (stable)                                                        |             |
|            | Bit 12 Loop port 2 (closed)                                                                    |             |
|            | Bit 13 Communication on port 2 (stable)                                                        |             |
|            | Bit 14 Loop port 3 (closed)                                                                    |             |
|            | Bit 15 Communication on port 3 (stable)                                                        |             |
| 0x585F:011 | EtherCAT master slave information: Master AL Status<br>• Read only                             |             |
|            | Bit 0 Init                                                                                     |             |
|            | Bit 1 Pre-Operational                                                                          |             |
|            | Bit 2 Safe-Operational                                                                         |             |
|            | Bit 3 Operational                                                                              |             |
|            | Bit 4 Error Ind                                                                                |             |
| 0x585F:012 | EtherCAT master slave information: Master RX Error Counter (Port 0-3)<br>• Read only           |             |
| 0x585F:013 | EtherCAT master slave information: Master Forwarded RX Error Counter (Port 0-3)<br>• Read only |             |
| 0x585F:014 | EtherCAT master slave information: Master Processing Unit Error Counter<br>• Read only         |             |
| 0x585F:015 | EtherCAT master slave information: Master PDI Error Counter<br>• Read only                     |             |
| 0x585F:016 | EtherCAT master slave information: Master Lost Link Counter (Port 0-3)<br>• Read only          |             |
| 0x585F:017 | EtherCAT master slave information: Master DC Sync 0 Period<br>• Read only                      |             |
| 0x585F:018 | EtherCAT master slave information: Master DC Sync 1 Period<br>• Read only                      |             |

# Configuring the network

EtherCAT master

Error scenarios

"Pre-Operational" EtherCAT state is not achieved



## 9.1.9 Error scenarios

The most common errors, faults and possibilities to correct errors can be found in the chapter

► [Diagnostics and fault elimination](#) 150

### 9.1.9.1 "Pre-Operational" EtherCAT state is not achieved

During the start-up of the EtherCAT bus, a check is carried out at the transition from **Init** to **Pre-Operational** to determine whether the physical bus configuration corresponds to the configured bus configuration. If these configurations are different, the master does not enter the **Pre-Operational** state. Furthermore, the slaves are initialized during the transition from **Init** to **Pre-Operational**. If this fails because, for instance, a slave rejects the configuration, the master does not enter the **Pre-Operational** state.

### 9.1.9.2 "Operational" EtherCAT state is not achieved

The EtherCAT bus can only reach the **Operational** state if the fieldbus has already been set to the **Pre-Operational** state.

If the master is set to the RUN mode, the EtherCAT bus will be set to the **Operational** state.

### 9.1.9.3 The EtherCAT master reports "SYNC error - BusCycleTask is not in-sync"

|                      |                                                                                                                                                                                                                                                                                                                                                |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Cause</b>         | The EtherCAT master BusCycleTask is synchronized with the DC reference clock so that the PLC task and the EtherCAT bus run synchronously. If the EtherCAT master BusCycleTask does not have the highest priority, it can be displaced by other tasks and thus loses its synchronicity.                                                         |
| <b>Error message</b> | EtherCAT_Master: SYNC error - BusCycleTask is not in-sync                                                                                                                                                                                                                                                                                      |
| <b>Remedies</b>      | Check the following settings and correct them if necessary. The bus cycle task of the EtherCAT master must have the highest priority task! <ul style="list-style-type: none"><li>• Task configuration: Task priority</li><li>• Device/PLC settings: BusCycle options</li><li>• EtherCAT_Master/EtherCAT IO mapping: BusCycle options</li></ul> |

### 9.1.9.4 A slave does not accept a cyclic frame

In the **Operational** state, the process data is exchanged cyclically.

If a slave does not accept the cyclical frame (WKC is not increased), this error is caused.

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Cause</b>         | <ul style="list-style-type: none"><li>• The bus cable between two EtherCAT devices has been unplugged.</li><li>• The node at position X is deenergised.</li><li>• A slave no longer receives cyclical frames, such that the watchdog determined by the device description is triggered. This message will usually only be transmitted if the connection to the master has been re-established.</li></ul>                                                                                                                                                   |
| <b>Error message</b> | <ul style="list-style-type: none"><li>• EtherCAT_Master: Not all slaves 'Operational' (repeated 100 times)</li><li>• EtherCAT_Master: Not all slaves 'Operational' (repeated 10 times)</li><li>• EtherCAT_Master: Cyclic command WKC error (repeated 10 times) [DeviceName] (1002): Communication to device interrupted</li><li>• EtherCAT_Master: Not all slaves 'Operational' (repeated 1 time)</li><li>• EtherCAT_Master: Cyclic command WKC error (repeated 1 time)</li><li>• EtherCAT_Master: Cyclic command WKC error (repeated 100 times)</li></ul> |
| <b>Remedies</b>      | Correct bus topology and restart the EtherCAT fieldbus. ► <a href="#">Restart network</a> 75                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

### 9.1.9.5 The sync manager configuration is invalid

When the status changes from **Pre-Operational** to **Safe-Operational**, a slave reports **Invalid SyncManager Configuration**.

|                      |                                                                                                                                                                          |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Cause</b>         | <ul style="list-style-type: none"><li>• One of the slaves does not support an LRW command (Logical Read/Write).</li><li>• A slave is not written to correctly.</li></ul> |
| <b>Error message</b> | [DeviceName] (1001): Invalid SyncManager Configuration                                                                                                                   |
| <b>Remedies</b>      | In the EtherCAT master tab, do not select the "Use LRW instead of LWR/LRD" checkbox.                                                                                     |



## 9.1.9.6 The I/O configuration is invalid

When the status changes from **Pre-Operational** to **Safe-Operational**, a slave reports **Invalid Output Configuration**.

|                      |                                                                                                                                                                                                                                                                                                                                                      |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Cause</b>         | The process data configuration of a slave is not correct. <ul style="list-style-type: none"> <li>In case of a modular device such as the I/O system 1000 (EPM-Sxxx), the configuration in the project does not comply with the real assembly.</li> <li>More process data than permissible is mapped for the device.</li> </ul>                       |
| <b>Error message</b> | <ul style="list-style-type: none"> <li>[DeviceName] (1001): Slave signals Error. AL state: 'PRE-OPERATIONAL' (0x12), AL state code: 'Invalid Input Configuration' (0x1E)</li> <li>[DeviceName] (1001): Slave signals Error. AL state: 'PRE-OPERATIONAL' (0x12), AL state code: 'Invalid Output Configuration' (0x1D)</li> </ul>                      |
| <b>Remedies</b>      | <ul style="list-style-type: none"> <li>In case of modular devices such as the I/O system 1000 (EPM-Sxxx): Correct the control configuration in the »PLC Designer« (adjustment with the real structure).</li> <li>Reduction of the process data: The maximum process data length must not be exceeded (see also the device documentation).</li> </ul> |

## 9.1.9.7 Error during process data transfer

A faulty EtherCAT I/O mapping causes errors during the process data transfer.

|                      |                                                                                                                                                                                                                                                                                                          |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Cause</b>         | Use of logic addresses <ul style="list-style-type: none"> <li>In the »PLC Designer« application, access does not take place symbolically but directly via the I/O addresses (%Ixx, %Qxx) of the EtherCAT input and output objects and the bus structure, the PDO selection etc. have changed.</li> </ul> |
| <b>Error message</b> | -                                                                                                                                                                                                                                                                                                        |
| <b>Remedies</b>      | In the »PLC Designer« application, the input and output objects must be accessed via individual non-ambiguous variables. The variable names must comply with the IEC 61131 syntax (no space characters and leading digits in the variable names).                                                        |

|                      |                                                                                      |
|----------------------|--------------------------------------------------------------------------------------|
| <b>Cause</b>         | Manual definition of the logic address in the EtherCAT I/O mapping                   |
| <b>Error message</b> | -                                                                                    |
| <b>Remedies</b>      | It is not permissible to manually manipulate the I/O addresses for the EtherCAT bus! |

## 9.1.9.8 The network cable is not connected.

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Cause</b>         | The bus cable between the Lenze Controller and the first node has been unplugged. If a previously removed bus cable has been plugged back into the first EtherCAT device, the message <b>EtherCAT_Master: EtherCAT cable connected</b> is entered in the logbook of the controller. The EtherCAT connection is re-established. Since the EtherCAT slave sync managers do not receive any messages, a timeout expires and the slaves change to the <b>Safe-Operational</b> state. |
| <b>Error message</b> | <ul style="list-style-type: none"> <li>EtherCAT_Master: EtherCAT cable not connected ... EtherCAT_Master: EtherCAT cable connected</li> </ul>                                                                                                                                                                                                                                                                                                                                    |
| <b>Remedies</b>      | After the bus cable has been plugged in again, restart the EtherCAT fieldbus. ▶ <a href="#">Restart network</a> □ 75                                                                                                                                                                                                                                                                                                                                                             |

## 9.1.9.9 A sent frame is not returned to the master

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Cause</b>         | A frame sent by the master does not return to the master until the next cycle. <ul style="list-style-type: none"> <li>The task utilization is too high, such that a sent frame takes longer than the time to the next start of the bus cycle task.</li> <li>The EtherCAT bus cycle task does not have the highest IEC task priority or another task has the same IEC task priority, such that the EtherCAT bus cycle task is suppressed.</li> <li>Due to an error, the slave does not forward any frames.</li> <li>Only a switch or an ET2000 is connected to the controller, but no further slave.</li> </ul> |
| <b>Error message</b> | <ul style="list-style-type: none"> <li>EtherCAT_Master: Frame response error (repeated 1 time)</li> <li>EtherCAT_Master: Frame response error (repeated 10 times)</li> <li>EtherCAT_Master: Frame response error (repeated 100 times)</li> </ul>                                                                                                                                                                                                                                                                                                                                                               |
| <b>Remedies</b>      | <ul style="list-style-type: none"> <li>Reduce the program code or increase the bus task cycle time.</li> <li>Correct the bus structure.</li> <li>Correct the slave error.</li> <li>Assign the sole and highest IEC task priority to the EtherCAT bus cycle task.</li> </ul>                                                                                                                                                                                                                                                                                                                                    |

# Configuring the network

EtherCAT master  
Advanced configuration  
The output shafts make a cracking sound



## 9.1.9.10 The output shafts make a cracking sound

For motion applications in drive technology, a defective synchronization of 2 shafts leads to an audible clicking noise.

|               |                                                                    |
|---------------|--------------------------------------------------------------------|
| Cause         | The task and DC cycle times set in the logic/motion system differ. |
| Error message | -                                                                  |
| Remedies      | Adjust the task cycle time and DC cycle time.                      |

|               |                                                                                                                         |
|---------------|-------------------------------------------------------------------------------------------------------------------------|
| Cause         | Wiring error: The EtherCAT terminals (IN/OUT) of the slave were inverted. A fieldbus scan does not indicate this error! |
| Error message | EtherCAT_Master: Set master 'Operational' failed. DCM not in-sync                                                       |
| Remedies      | Correct wiring. Afterwards, reload the »PLC Designer« application into the automation system.                           |

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cause         | Clicking noise of the shafts after "out-of-sync"<br>If due to a fault, the preset DC deviation limit is exceeded, a re-synchronization of the DC slaves is carried out until the slaves are synchronized again ("In-Sync") and the DC deviation is under the preset limit value again.<br>Currently, the Lenze controller is not re-synchronized to the distributed clocks, such that the sync pulses of the master and the ones of the slaves are different. |
| Error message | EtherCAT_Master: DC slaves 'out-of-sync'. Deviation xxxxxxxx ns                                                                                                                                                                                                                                                                                                                                                                                               |
| Remedies      | Restart the EtherCAT fieldbus so that the DC slaves and the DC master synchronize again.                                                                                                                                                                                                                                                                                                                                                                      |

|               |                                                                                                                                                                                             |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cause         | Wrong selection of the device sync source. After the sync source has been changed, the subsequent download and the setting of the slave to the <b>Operational</b> state may fail.           |
| Error message | -                                                                                                                                                                                           |
| Remedies      | <ul style="list-style-type: none"><li>Manual setting of the code</li><li>Repeated download with PLC start</li><li>Restart the EtherCAT fieldbus by resetting the SoftMotion drive</li></ul> |

## 9.1.9.11 The drive shafts do not rotate

|               |                                                                     |
|---------------|---------------------------------------------------------------------|
| Cause         | The EtherCAT bus could not be set to the <b>Operational</b> state   |
| Error message | -                                                                   |
| Remedies      | ► "Operational" EtherCAT state is not achieved <a href="#">□ 84</a> |

|               |                                                           |
|---------------|-----------------------------------------------------------|
| Cause         | Clicking noise of the shafts after <b>out-of-sync</b>     |
| Error message | -                                                         |
| Remedies      | ► Error during process data transfer <a href="#">□ 85</a> |

|               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cause         | Clicking noise of the shafts after <b>out-of-sync</b><br>If due to a fault, the preset DC deviation limit is exceeded, a re-synchronization of the DC slaves is carried out until the slaves are synchronized again ( <b>In-Sync</b> ) and the DC deviation is under the preset limit value again.<br>Currently, the Lenze controller is not re-synchronized to the distributed clocks, such that the sync pulses of the master and the ones of the slaves are different. |
| Error message | EtherCAT_Master: DC slaves 'out-of-sync'. Deviation xxxxxxxx ns                                                                                                                                                                                                                                                                                                                                                                                                           |
| Remedies      | Restart the EtherCAT fieldbus so that the DC slaves and the DC master synchronize again.                                                                                                                                                                                                                                                                                                                                                                                  |

|               |                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cause         | Faulty SoftMotion scaling/mapping<br>With SoftMotion scaling/mapping, the increments per revolution are not set.                                                                                                                                                                                                                                                                                       |
| Error message | -                                                                                                                                                                                                                                                                                                                                                                                                      |
| Remedies      | Check the following settings and correct them if required: <ul style="list-style-type: none"><li>Gearbox ratio in the »PLC Designer« application</li><li>Mapping settings in the master configuration</li></ul> When the Lenze controller is started, the complete configuration/PDO mapping is written into the EtherCAT slaves. Mapping entries, e.g. from the »Engineer«, will then be overwritten. |

## 9.1.10 Advanced configuration

### 9.1.10.1 Device identification

#### Parameter

| Address | Name / setting range / [default setting]                              | Information                                            |
|---------|-----------------------------------------------------------------------|--------------------------------------------------------|
| 0x1000  | Device type <ul style="list-style-type: none"><li>Read only</li></ul> | EtherCAT device type: Classification according to ETG: |



# Configuring the network

EtherCAT master  
Advanced configuration  
Device identification

| Address    | Name / setting range / [default setting]        | Information                                          |
|------------|-------------------------------------------------|------------------------------------------------------|
| 0x1008     | Manufacturer device name<br>• Read only         | Device name: Type and version of the device:         |
| 0x1009     | Manufacturer hardware version<br>• Read only    | Hardware version: Currently not supported            |
| 0x100A     | Manufacturer software version<br>• Read only    | Software version: Version of the controller firmware |
| 0x1018:001 | Identity object: Vendor ID<br>• Read only       | Vendor ID: Manufacturer's identification mark        |
| 0x1018:002 | Identity object: Product ID<br>• Read only      | Product ID: Product key and application key          |
| 0x1018:003 | Identity object: Revision number<br>• Read only | Revision number: Device version                      |
| 0x1018:004 | Identity object: Serial number<br>• Read only   | Serial number: Currently not supported               |

# Configuring the network

EtherCAT master  
Advanced configuration  
Synchronisation with "distributed clocks" (DC)



## 9.1.10.2 Synchronisation with "distributed clocks" (DC)

The **Distributed Clocks** (DC) functionality enables an exact time leveling for applications, in which several axes execute simultaneous, coordinated movements. The data is accepted synchronously with the PLC program. For DC synchronization, all slaves are synchronized with a reference clock, the so-called "DC master".

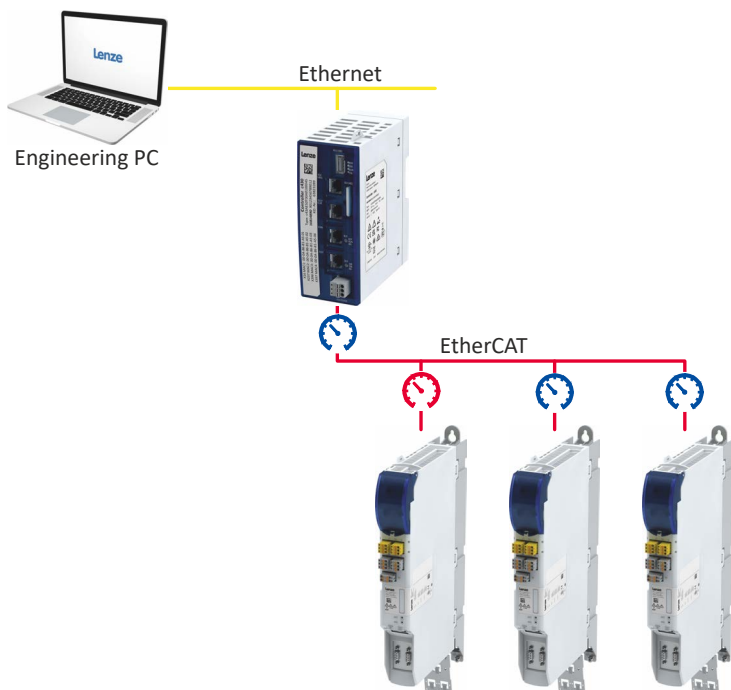


Fig. 2: EtherCAT bus system with c430 controller and i700 servo inverter



DC synchronization is absolutely essential for motion applications!

DC synchronization can be used as an option for logic applications.



DC synchronization only takes place in the "Operational" state.

After a "Out-of-sync", the EtherCAT master synchronizes the slaves. Successful synchronization is indicated by the message "In-Sync".



Not all slaves support the DC functionality. DC-capable and non-DC-capable devices can be mixed when arranging the other slaves. The first EtherCAT slave after the Lenze Controller must be the DC master, which supplies the other EtherCAT devices and the controller with the exact time.



Manual configuration of the slave DC properties requires detailed knowledge of EtherCAT and the field device. DC settings should therefore only be made by experts!

We recommend you to keep the basic DC settings to ensure correct DC synchronization.

### Set DC synchronization

The DC synchronization is set using the »PLC Designer«. It ensures that the master and slaves run in phase synchronization: Within a bus cycle, the transfer of the setpoint values and the recording of the actual values in the field devices always take place at exactly the same time. If the Lenze Controller (master) is synchronized with the distributed clocks, the actual values recorded by the slave are sent to the master at the end of the bus cycle and setpoints are sent



# Configuring the network

EtherCAT master  
Advanced configuration  
Synchronisation with "distributed clocks" (DC)

from the master to the slaves for processing. The data is transferred at the next DC synchronization event.

The controller is the EtherCAT master. The cycle time of the bus system is determined by the cycle time of the task, which is assigned to the drives (slaves) integrated in the "PLC Designer". It is between 1 ... 10 ms (according to the technical data). The DC cycle time to be set must match this task cycle time.

Notes:

- The DC cycle time set below is valid for all logic and motion devices synchronized by Distributed Clocks.
- The settings of some slaves must be parameterized locally.
- If the DC setting and the selection of the sync source are contradictory, the devices cannot be set to the "Operational" status.
- The settings for the parameters "Sync cycle time", "Sync phase position", "Sync tolerance" and "Sync PLL increment" cannot be made with EtherCAT. These values are calculated automatically by the EtherCAT communication module and set internally in the device.

# Configuring the network

EtherCAT master

Advanced configuration

Synchronisation with "distributed clocks" (DC)



How to set the DC synchronization:

1. Determine task cycle time under "MainTask":

2. Set the DC cycle time in the master ("EtherCAT\_Master") on the "Master" tab according to the determined task cycle time:



# Configuring the network

EtherCAT master  
Advanced configuration  
Synchronisation with "distributed clocks" (DC)

3. Select the bus cycle task for the master on the "EtherCAT I/O image" tab:

The screenshot shows the 'EtherCAT\_Master' configuration window with the 'EtherCAT I/O Mapping' tab selected. The 'IEC Objects' table lists two variables: 'EtherCAT\_Master' mapped to 'L\_IODrvEtherCAT' and 'EtherCAT\_Master-Ta...' mapped to 'L\_SuspendWatchdog'. Below the table, a legend indicates that a lightning bolt icon means 'Create new variable' and a plug icon means 'Map to existing variable'. In the 'Bus cycle options' section, the 'Bus cycle task' dropdown is set to 'Use parent bus cycle setting' and is highlighted with a red rectangle.

| Variable              | Mapping | Type              |
|-----------------------|---------|-------------------|
| EtherCAT_Master       |         | L_IODrvEtherCAT   |
| EtherCAT_Master-Ta... |         | L_SuspendWatchdog |

= Create new variable    = Map to existing variable

Bus cycle options  
Bus cycle task: Use parent bus cycle setting



If "Cycle settings of the higher-level bus" is selected, the bus cycle task set on the "PLC settings" tab of the Lenze Controller (Device) is used.

The screenshot shows the 'Device' configuration window with the 'PLC Settings' tab selected. Under 'PLC settings', there are checkboxes for 'Update IO while in stop' (checked) and 'Show I/O warnings as errors' (unchecked), and dropdowns for 'Behaviour for outputs in Stop' (Set all outputs to default) and 'Always update variables' (Disabled). Below this, the 'Bus cycle options' section shows the 'Bus cycle task' dropdown set to 'MainTask', which is highlighted with a red rectangle. At the bottom, there are checkboxes for 'Generate force variables for IO mapping' and 'Enable Diagnosis for devices'.

Application for I/O handling: Application

PLC settings

☒ Update IO while in stop

Behaviour for outputs in Stop: Set all outputs to default

Always update variables: Disabled (update only if used in a task)

Edit Licenses...

Bus cycle options  
Bus cycle task: MainTask

Additional settings

☐ Generate force variables for IO mapping    ☐ Enable Diagnosis for devices

☐ Show I/O warnings as errors

# Configuring the network

EtherCAT master  
Advanced configuration  
Synchronisation with "distributed clocks" (DC)



4. In the device tree on the first slave (DC master), select the DC functionality "DC for synchronization" under the master:

Note: If a slave does not support distributed clocks, only "DC unused" can be selected here.

5. Also select the DC functionality "DC for synchronization" on all other slaves that are to use DC synchronization.  
DC synchronization is set.

## Test of DC synchronicity

DC synchronicity is only available in the **Operational** state.

DC synchronicity check in the »PLC Designer«

- EtherCAT master (Diagnostic master tab):  
**DC In-Sync** is set to TRUE if the DC master and all DC slaves have been synchronized.
- L\_ETC\_GetMasterDiagnostic function block (FB)/visualization of the L\_ETC\_GetMasterDiagnostic function block:  
**DC In-Sync** is set to TRUE at the **oDiagnostic.xDC\_InSync** output if the DC master and all DC slaves are synchronized.
- L\_IODrvEtherCAT function block (FB):  
**DC In-Sync** is set to TRUE at the **xDistributedClockInSync** output if all DC slaves are synchronized.



## 9.2 Network selection for X396/X397

The **X396** and **X397** connections on the c430 controller are sized as a multi-Ethernet interface.

By default, the two connections are configured as an Ethernet switch.

► [Ethernet switch](#)  94

Alternatively, the controller can be connected to a corresponding fieldbus network as an EtherCAT slave or PROFINET IO device via these two connections.

► [EtherCAT slave](#)  95

► [PROFINET IO-Device](#)  103

### Details

Change network/function of the **X396** and **X397** connections:

1. Set network/function in [0x231F:005](#).
2. Restart device (via Engineering Tool or [0x2022:035](#)).

The controller is switched to the newly selected network. All parameters connected with the old network are lost, but all other settings are retained.



Executing the device command "Load presets" ([0x2022:001](#)), uploading a new firmware or power cycles do not change the selected network.

### Parameter

| Address    | Name / setting range / [default setting]   | Information                                                                                                                                  |
|------------|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 0x231F:005 | Communication module ID: Network selection | Network selection. <ul style="list-style-type: none"><li>• A changed network only becomes effective after a restart of the device.</li></ul> |
|            | 82 PROFINET                                | ► <a href="#">PROFINET IO-Device</a>  103               |
|            | 84 EtherCAT                                | ► <a href="#">EtherCAT slave</a>  95                      |
|            | 90 Ethernet switch                         | ► <a href="#">Ethernet switch</a>  94                     |

# Configuring the network

Ethernet switch  
Basic setting  
Status LEDs



## 9.3 Ethernet switch

The default configuration of the **X396** and **X397** connections as an Ethernet switch allows the user to set up a second subnetwork in addition to the technical network. This makes it possible to operate additional devices (e.g. web panels) in a separate network. It is also possible to set up a line topology across several devices.

### Preconditions

In [0x231F:005](#), the network selection is set to "Ethernet Switch".

### Details

In this configuration, the **X16**, **X396** and **X397** connections are connected internally (3-port Ethernet switch) and telegrams can be exchanged between the connected devices.

### 9.3.1 Basic setting

The Ethernet switch is configured using the same parameter structure as for the engineering network. However, it is configured via a separate parameter area:

#### Parameter

| Address    | Name / setting range / [default setting]                                                 | Information                                                              |
|------------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| 0x2453:001 | Ethernet switch: Restart                                                                 | Acceptance of the current settings (0x2454:xxx) for the Ethernet switch. |
|            | <b>0</b> No action/No error                                                              | Only status feedback                                                     |
|            | <b>1</b> Restart with current values                                                     | Restart the device to apply the current settings.                        |
|            | <b>10</b> Busy                                                                           | Only status feedback                                                     |
|            | <b>11</b> Action cancelled                                                               |                                                                          |
|            | <b>12</b> Faulted                                                                        |                                                                          |
| 0x2454:001 | Ethernet switch settings: IP address<br>0.0.0.0 ... <b>[0.0.0.0]</b> ... 255.255.255.255 |                                                                          |
| 0x2454:002 | Ethernet switch settings: Subnet<br>0.0.0.0 ... <b>[0.0.0.0]</b> ... 255.255.255.255     |                                                                          |

### 9.3.2 Diagnostics

#### 9.3.2.1 Status LEDs

The LEDs "L/A" at the RJ45 sockets indicate the connection status to the network.

| LED "L" (Link, green)                                                                  | Status        | Meaning                                           |
|----------------------------------------------------------------------------------------|---------------|---------------------------------------------------|
| Off                                                                                    | Not connected | No connection to the network                      |
|  On | Connected     | A physical connection to the network is available |

| LED "A" (Activity, yellow)                                                                         | Status  | Meaning                           |
|----------------------------------------------------------------------------------------------------|---------|-----------------------------------|
|  On or flickers | Traffic | Data is exchanged via the network |

#### 9.3.2.2 Active ethernet switch settings

The following parameters show the currently active settings of the Ethernet switch.

#### Parameter

| Address    | Name / setting range / [default setting]                    | Information |
|------------|-------------------------------------------------------------|-------------|
| 0x2455:001 | Active ethernet switch settings: IP address<br>• Read only  |             |
| 0x2455:002 | Active ethernet switch settings: Subnet<br>• Read only      |             |
| 0x2455:005 | Active ethernet switch settings: MAC address<br>• Read only |             |



## 9.4 EtherCAT slave

### Chapter overview

- ▶ Commissioning [97](#)
- ▶ Process data transfer [98](#)
- ▶ Parameter data transfer [99](#)
- ▶ EtherCAT I/O mapping status [100](#)
- ▶ Diagnostics [101](#)
- ▶ Error scenarios [102](#)



EtherCAT® (Ethernet for Controller and Automation Technology) is an Ethernet-based fieldbus system which fulfils the application profile for industrial realtime systems.

- EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.
- Detailed information on EtherCAT can be found on the web page of EtherCAT Technology Group (ETG): [www.ethercat.org](http://www.ethercat.org)

### Preconditions

- In [0x231F:005](#) the network selection is set to "EtherCAT".
- For commissioning, load the current device description files for Lenze EtherCAT devices via the "Package Manager" onto your engineering PC.

### EtherCAT connection

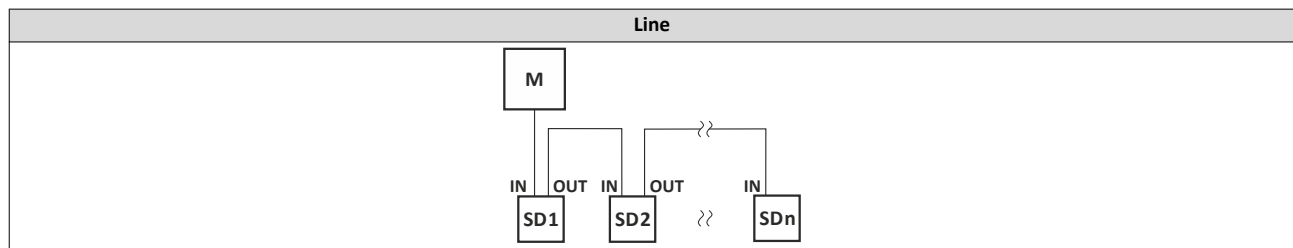
- The controller is connected as an EtherCAT slave to an EtherCAT master via the RJ45 sockets **X396** (IN) and **X397** (OUT).
- An Ethernet cable CAT 5/5e, 2-pair with AWG22 or 4-pair with AWG22/24 is suitable for the connection.



More information about connections can be found on the Internet:

[www.ethercat.org](http://www.ethercat.org) → ETG.1600 EtherCAT Installation Guideline

### Typical topology



M Master  
SD Slave device

| Bus-related information |  |                                  |  |
|-------------------------|--|----------------------------------|--|
| Name                    |  | EtherCAT                         |  |
| Communication medium    |  | Ethernet 100 Mbps/s, full duplex |  |
| Application             |  | Connection as EtherCAT slave     |  |
| Status display          |  | 2 LEDs (BUS RUN, BUS ERR)        |  |
| Connection designation  |  | X396 (IN)<br>X397 (OUT)          |  |



| Technical data                        |    |                                      |                                                        |
|---------------------------------------|----|--------------------------------------|--------------------------------------------------------|
| Communication profile                 |    | EtherCAT                             |                                                        |
|                                       |    | CANopen over EtherCAT                |                                                        |
| Safety over EtherCAT (FSoE)           |    | No                                   |                                                        |
| Vendor ID [hex]                       |    | 0x3B                                 |                                                        |
| Network topology                      |    | Line, tree, ring                     |                                                        |
| Device                                |    |                                      |                                                        |
| Type                                  |    | EtherCAT slave                       |                                                        |
| Max. number                           |    | 65535                                | In the entire network                                  |
| Address                               |    | Automatically assigned by the master |                                                        |
| Max. cable length                     | m  | Not limited                          | The decisive factor is the length between the devices. |
| Max. cable length between two devices | m  | 100                                  |                                                        |
| Process data                          |    |                                      |                                                        |
| Transmit PDOs                         |    | 0 ... 32                             | Max. 1024 bytes                                        |
| Receive PDOs                          |    | 0 ... 32                             | 2-, 4-, 8-, 16-, 32-, 64-, 96-word PDOs                |
| Cycle time                            | ms | Integer multiple of 1 ms             |                                                        |

| Communication time              |  |                                                       |                                                                     |
|---------------------------------|--|-------------------------------------------------------|---------------------------------------------------------------------|
| Communication time depending on |  | processing time in the controller                     | time between the start of a request and the arrival of the response |
|                                 |  | telegram runtime (transmission rate, telegram length) |                                                                     |
|                                 |  | nesting depth of the network                          |                                                                     |
|                                 |  | bus load                                              |                                                                     |

| Processing time of process data                                                |    |         |                   |
|--------------------------------------------------------------------------------|----|---------|-------------------|
| Update cycle                                                                   | ms | 1       | In the controller |
| Processing time                                                                | ms | 0 ... 1 |                   |
| Runtime of the application task of the technology application used (tolerance) | ms | 1 ... x |                   |



## 9.4.1 Commissioning

For commissioning a control unit with an EtherCAT device located in a lower-level EtherCAT network, it is necessary to perform a custom configuration of the master and the device.

Both configurations must be represented identically on the master control unit (e.g., using the software TwinCAT 3.x® from Beckhoff) and the slave control unit (with the engineering tool "PLC Designer" from Lenze). Failure to do so will render a transition to the "Operational" status impossible.

### Configuration of the EtherCAT device using the "PLC Designer"

The term "EtherCAT device" is used to describe the EtherCAT slave interface of the slave control unit. The EtherCAT device specifies the process image which needs to be reproduced identically in the master configuration for the EtherCAT slave.

How to integrate EtherCAT devices in the control configuration:

1. Select the "Add device" command in the context menu of the target system (device, Lenze controller, etc.) to extend the control configuration with the EtherCAT device.

The EtherCAT device is located in the category under /Fieldbusses/EtherCAT/Slave/EtherCAT-Device

2. Name the inserted EtherCAT device sensibly.

You can enter a name by clicking on the element. The designations must only contain the characters "A ... Z", "a ... z", "0 ... 9", or "\_" and must not begin with a digit.

3. Go to the context menu of the EtherCAT device and execute the "Add device" command.
4. In the dialog box that appears, select the I/O modules to be used for the EtherCAT device and add them to the EtherCAT device by clicking the "Add device" button. The structure of the process image is defined via the modules.
5. In the tab for the module, define the variables for the IO signals.

The control configuration of the EtherCAT device in the "PLC Designer" is completed.

Continue with the control configuration of the EtherCAT slave; see [EtherCAT-Slave configuration in Beckhoff TwinCAT 3.x®](#) 98.

### 9.4.1.1 EtherCAT device configuration with »PLC Designer«

How to integrate the EtherCAT IO device in the control configuration:

1. Select the "Add device" command in the context menu of the target system (device, Lenze controller, etc.) to extend the control configuration with the IO device.

The EtherCAT device is located in the category under /Fieldbusses/EtherCAT/Slave/EtherCAT-Device

2. Name the inserted IO device sensibly.

You can enter a name by clicking on the element. The designations must only contain the characters "A ... Z", "a ... z", "0 ... 9", or "\_" and must not begin with a digit.

3. Go to the context menu of the EtherCAT device and execute the "Add device" command.
4. In the dialog box that appears, select the I/O modules to be used for the EtherCAT device and add them to the EtherCAT device by clicking the "Add device" button. The structure of the process image is defined via the modules.
5. In the tab for the module, define the variables for the IO signals.

The control configuration of the EtherCAT device in the »PLC Designer« is completed.

Continue with the configuration of the EtherCAT slave with TwinCAT 3.x® (see next chapter).

# Configuring the network

EtherCAT slave  
Process data transfer  
EtherCAT-Slave configuration in Beckhoff TwinCAT 3.x®



## 9.4.1.2 EtherCAT-Slave configuration in Beckhoff TwinCAT 3.x®

How to integrate the EtherCAT slave in TwinCAT 3.x®:

1. Install device description ▶ [Device description file](#) 98
2. In the context menu of the EtherCAT device (master), select the EtherCAT slave using the "Add New Item ..." command. In this case, "cxxx" refers to the control unit model (e.g. c430, c520, c550). The EtherCAT slaves are located in the group "/Lenze/Controller".
3. Defining the process image: In the slots tab for the cxxx EtherCAT slave object, add the modules to be used.

The slots must be added continuously from the first (topmost) slot without any gaps.

If the EtherCAT slave is at least in the "Pre-Operational" status, the module can also be configured via the parameter 0xF050 "Detected Module Ident List" via a device scan.

The configuration of the EtherCAT slave in TwinCAT 3.x® is now complete.

## 9.4.1.3 Device description file

To integrate the EtherCAT slave in a master configuration, the device description file in the engineering tool for the project planning of the network must be installed.

Downloading ESI files: The designation of the ESI device description file is "Lenze\_cxxx\_ECS\_V<Version>.xml"

| Wildcard | Info                                                                                                    |
|----------|---------------------------------------------------------------------------------------------------------|
| Version  | 8-digit version number in the format AABBCDD<br>(Format AA.BB.CC.DD: AA major, BB minor version number) |

## 9.4.2 Process data transfer

The process data interface is determined by the EtherCAT device via the number and type of modules inserted into the slots.

For the compilation of the process data, modules with the same name are available for the EtherCAT device and the EtherCAT slave:

| Module                   | Info                                                                                 |
|--------------------------|--------------------------------------------------------------------------------------|
| Mixed In / Out Word 0002 | Rx and Tx process data object, each with 2 words (RxPDO 4 bytes, TxPDO 4 bytes)      |
| Mixed In / Out Word 0004 | Rx and Tx process data object, each with 4 words (RxPDO 8 bytes, TxPDO 8 bytes)      |
| Mixed In / Out Word 0008 | Rx and Tx process data object, each with 8 words (RxPDO 16 bytes, TxPDO 16 bytes)    |
| Mixed In / Out Word 0016 | Rx and Tx process data object, each with 16 words (RxPDO 32 bytes, TxPDO 32 bytes)   |
| Mixed In / Out Word 0032 | Rx and Tx process data object, each with 32 words (RxPDO 64 bytes, TxPDO 64 bytes)   |
| Mixed In / Out Word 0064 | Rx and Tx process data object, each with 64 words (RxPDO 128 bytes, TxPDO 128 bytes) |
| Mixed In / Out Word 0096 | Rx and Tx process data object, each with 96 words (RxPDO 192 bytes, TxPDO 192 bytes) |

The length of the process data is 2 ... 96 words (max. 32 PDO and max. 512 words per direction).



## 9.4.3 Parameter data transfer

The EtherCAT device possesses two categories of parameters:

- Standard communication parameters (index range 0x1000 ... 0x1FFF and 0xF050, Detected Module List).

These parameters are only visible/accessible for the EtherCAT masters connected via this interface.

The controller itself is unable to access the standard communication parameters.

- For diagnostic parameters, see [EtherCAT device diagnostics](#) 101

### Standard communication parameters

| Address          | Name / setting range / [default setting] | Information |
|------------------|------------------------------------------|-------------|
| 0x1000           | Device type                              | RO          |
| 0x1001           | Error register                           | RO          |
| 0x1008           | Manufacturer's device name               | RO          |
| 0x1009           | Manufacturer's hardware version          | RO          |
| 0x100A           | Manufacturer's software version          | RO          |
| 0x1018           | Identity object                          | RO          |
| 0x1630<br>0x164F | RxPDO mapping                            | RW          |
| 0x1A30<br>0x1A4F | TxPDO mapping                            | RW          |
| 0x1C00           | Sync manager type                        | RO          |
| 0x1C12           | SM2 PDO assignment                       | RW          |
| 0x1C13           | SM3 PDO assignment                       | RW          |

Tab. 1: Standard communication parameters (via EtherCAT interface)

| Address | Name / setting range / [default setting] | Information                                                                                                                                                                                                                                                                |
|---------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0xF050  | Detected module list                     | RO/ARRAY OF UDINT<br>Array with objects of type "UDINT" which contains the currently configured/detected modules. Can be used for a device scan for reading the current configuration.<br>SubIndex 0 (USINT) contains the currently configured/detected number of modules. |

Tab. 2: Detected module list (via EtherCAT interface)



## 9.4.4 EtherCAT I/O mapping status

In addition to the actual I/O mapping of the process data, the EtherCAT device also has input and output channels in which additional information is supplied for the PLC application.

This information can be accessed directly from the PLC code.

| Name                | Info                                                                                                                                                                                                                                                                                                                                |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Configuration valid | RO/BOOL<br>Indicates whether the currently active configuration is valid.<br>FALSE: There is no valid configuration.<br>TRUE: Configuration is valid.<br>A configuration consists both of a component from the slave application (EtherCAT device) and a component of the configuration from the EtherCAT master. These must match. |
| EtherCAT state      | RO/UINT<br>Specifies the current EtherCAT status of the slave.<br>0: No EtherCAT module<br>1: Initialization<br>2: Pre-Operational<br>3: Bootstrap<br>4: Safe-Operational<br>8: "Operational"                                                                                                                                       |
| Process data valid  | RO/BOOL<br>This flag indicates whether the process data is valid.<br>FALSE: The process data is not valid.<br>TRUE: The process data is current and valid.                                                                                                                                                                          |
| Watchdog error      | RO/BOOL<br>This flag indicates whether there is a SyncManager watchdog error.<br>FALSE: No SyncManager watchdog error.<br>TRUE: The SyncManager watchdog was triggered.<br>The value of the watchdog is set by the configuration tool of the EtherCAT master.                                                                       |

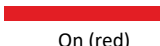


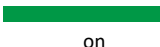
## 9.4.5 Diagnostics

### 9.4.5.1 Status LEDs

The EtherCAT-Device interface indicates the connection status via the LEDs "BUS RUN" and "BUS ERR". In addition, the LEDs "L/A" at the RJ45 sockets indicate the connection status to the network.

| LED "BUS RUN" (green)                                                                             | Status           | Meaning                                                  |
|---------------------------------------------------------------------------------------------------|------------------|----------------------------------------------------------|
| Off                                                                                               | INIT             | The EtherCAT device is in the "Initialization" status.   |
| <br>blinking     | Pre-Operational  | The EtherCAT device is in the "Pre-Operational" status.  |
| <br>Single flash | Safe-Operational | The EtherCAT device is in the "Safe-Operational" status. |
| <br>On           | "Operational"    | The EtherCAT device is in the "Operational" status.      |

| LED "BUS ERR" (red)                                                                            | Status                 | Meaning                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Off                                                                                            | No fault               | No fault                                                                                                                                                                                                                               |
| <br>blinking  | Impermissible settings | Impermissible settings/configuration.<br>The settings and/or configuration are made by the EtherCAT master and/or the configuration tool.<br>A more advanced analysis must be performed by the master or the slave controller logbook. |
| <br>blinking  | Watchdog               | Timeout during PDO communication (e. g. Ethernet cable removed)                                                                                                                                                                        |
| <br>On (red) | Fault                  | Communication error (e. g. incorrectly plugged network option)                                                                                                                                                                         |

| LED "L/A" (green)                                                                               | Status        | Meaning               |
|-------------------------------------------------------------------------------------------------|---------------|-----------------------|
| off                                                                                             | Not connected | Network not available |
| <br>on       | Connected     | Network available     |
| <br>blinking | Traffic       | Data transfer         |

### 9.4.5.2 EtherCAT device diagnostics

The diagnostic parameters are parameters of the controller.

The master is unable to access these parameters via the EtherCAT device interface.

#### Parameter

| Address    | Name / setting range / [default setting]           | Information                                                                                                                                                                                                                                                                                                         |
|------------|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2362:007 | Active EtherCAT settings: Tx length<br>• Read only | Display of the length of the transmitted cyclic data in bytes.<br>A value other than zero is only displayed if the master / slave process data is configured correctly.                                                                                                                                             |
| 0x2362:008 | Active EtherCAT settings: Rx length<br>• Read only | Display of the length of the received cyclic data in bytes.<br>A value other than zero is only displayed if the master / slave process data is configured correctly.                                                                                                                                                |
| 0x2368     | EtherCAT status<br>• Read only                     | Display of the current network status.                                                                                                                                                                                                                                                                              |
|            | 0 No EtherCAT module                               |                                                                                                                                                                                                                                                                                                                     |
|            | 1 Initialization                                   | Network initialization is active.                                                                                                                                                                                                                                                                                   |
|            | 2 Pre-Operational                                  | The network is active.                                                                                                                                                                                                                                                                                              |
|            | 3 Bootstrap                                        | Firmware update active.                                                                                                                                                                                                                                                                                             |
|            | 4 Safe-Operational                                 | <ul style="list-style-type: none"> <li>SDO transmission (CoE communication via mailbox) is possible.</li> <li>PDO transmission: <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 transmitted.</li> </ul> </li> </ul> |
|            | 8 Operational                                      | Normal operation                                                                                                                                                                                                                                                                                                    |

# Configuring the network

EtherCAT slave  
Error scenarios  
No EtherCAT module plugged or detected



| Address | Name / setting range / [default setting] | Information                                               |
|---------|------------------------------------------|-----------------------------------------------------------|
| 0x2369  | EtherCAT error                           |                                                           |
|         | • Read only                              |                                                           |
|         | Bit 0 Watchdog elapsed                   | The SyncManager watchdog has triggered.                   |
|         | Bit 2 Invalid configuration              | The configuration sent by the EtherCAT master is invalid. |
|         | Bit 3 Stack init error                   | Internal error when initializing the interface.           |
|         | Bit 4 Invalid process data               | The flag indicates that the process data is invalid.      |

## 9.4.6 Error scenarios

The most common errors, faults and possibilities to correct errors can be found in the chapter

► [Diagnostics and fault elimination](#) 150

### 9.4.6.1 No EtherCAT module plugged or detected

Even though the EtherCAT module is inserted and defined as an EtherCAT device in the project, it is not detected.

- The **EtherCAT device** icon in the »PLC Designer« remains red.
- The diagnostic parameters remain set to zero.
- The status "I/O Mapping" remains set to zero.
- The parameters 0x231F:001/002 do not display an EtherCAT device module.

#### Remedy

- Check that the EtherCAT device module is properly fitted in the slot, remove and re-insert if necessary.
- Check for problems with contacts.

### 9.4.6.2 Process data mapping in master / slave does not match

- The "EtherCAT device" icon in the »PLC Designer« remains red.
- The EtherCAT master issues one of the following messages for the slave during the transition to the "Safe-Operational" status:
  - CoE 0x16xx:0 SDO abort 'object cannot be mapped in PDO'.
  - CoE 0x1C1x:0 SDO abort 'object cannot be mapped in PDO'.
- The 'Process Data Valid' flag in 'Status I/O Mapping' remains set to FALSE.

#### Remedy

- Check the mapping in the master and slave.
- Perform a device scan in the master when the EtherCAT slave is at least in the "Pre-Operational" status.



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If modules that were not configured on the EtherCAT master are added to the EtherCAT device, the EtherCAT slave will enter the "Operational" status without data exchange taking place with the EtherCAT master.

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## 9.5 PROFINET IO-Device

### Chapter overview

- ▶ Commissioning 106
- ▶ Basic setting and options 108
- ▶ Process data transfer 109
- ▶ Parameter data transfer 110
- ▶ Monitoring 111
- ▶ Diagnostics 111



PROFINET® (Process Field Network) is a real-time capable network based on Ethernet.

- PROFINET® is a registered trademark and patented technology licensed by the PROFIBUS & PROFINET International (PI) user organization.
- Detailed information on PROFINET can be found on the web page of the user organization: [www.profibus.com](http://www.profibus.com)
- PROFINET transmits, between the IO-Devices and a IO-Controller (PLC), parameter data, configuration data, diagnostic data, alarm messages, and process data.
- The data is transmitted as a function of its time-critical behavior via corresponding communication channels.
- The device is implemented as a PROFINET IO-Device in a PROFINET RT network.
- The PROFINET connections are realized as standard RJ45 sockets.

### Preconditions

- In [0x231F:005](#) the network selection is set to "PROFINET".
- The required GSDML device description files for PROFINET are installed in the engineering tool for configuring the network.



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Device description files for Lenze products can be found on the Internet:  
[www.Lenze.com](http://www.Lenze.com) → Downloads → Product-related Application Knowledge Base articles

---

### PROFINET connection

- The controller is connected as an PROFINET IO-Device to an IO controller via the RJ45 sockets **X396** (IN) and **X397** (OUT).
- An Ethernet cable CAT 5/5e, 2-pair with AWG22 (American Wire Gauge) or 4-pair with AWG22/24 is suitable for the connection.

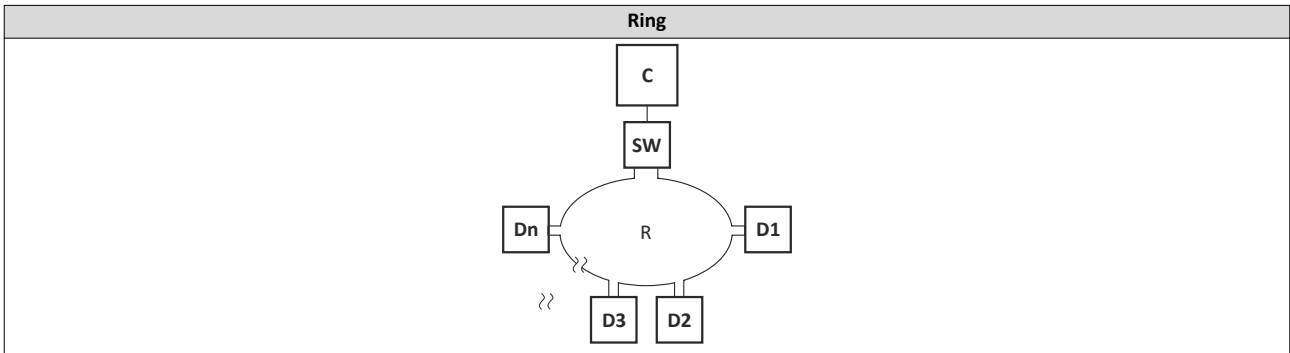


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More information about connections can be found on the Internet:  
[www.profibus.com](http://www.profibus.com) → PROFINET Cabling and Interconnection Technology

---

| Line | Tree |
|------|------|
|      |      |



|    |                               |
|----|-------------------------------|
| SW | Switch SCALANCE (MRP capable) |
| R  | Redundant domain              |

| Bus-related information |  |                                    |  |
|-------------------------|--|------------------------------------|--|
| Name                    |  | PROFINET RT                        |  |
| Communication medium    |  | Ethernet 100 Mbps/s, full duplex   |  |
| Application             |  | Connection as a PROFINET-IO-Device |  |
| Status display          |  | 2 LEDs (BUS RDY, BUS ERR)          |  |
| Connection designation  |  | X396 (IN)<br>X397 (OUT)            |  |



| Technical data                        |    |                                                                                                                                                                                                                                                                                                                                                                        |                                                        |
|---------------------------------------|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| Communication profile                 |    | PROFINET                                                                                                                                                                                                                                                                                                                                                               |                                                        |
| PNO identification number             |    | 0x0106                                                                                                                                                                                                                                                                                                                                                                 |                                                        |
| Device identification (Device ID)     |    | Device-dependent:<br>• Controller c430: 0xC430<br>• Controller c520: 0xC520<br>• Controller c550: 0xC550                                                                                                                                                                                                                                                               |                                                        |
| Network topology                      |    | Line, tree, ring                                                                                                                                                                                                                                                                                                                                                       |                                                        |
| Device                                |    |                                                                                                                                                                                                                                                                                                                                                                        |                                                        |
| Type                                  |    | IO device with real-time communication properties (RT)                                                                                                                                                                                                                                                                                                                 | Conformance Class B, NetloadClass III                  |
| Max. number                           |    | 255                                                                                                                                                                                                                                                                                                                                                                    | Per subnetwork                                         |
| Address                               |    | Station name                                                                                                                                                                                                                                                                                                                                                           |                                                        |
| Max. cable length                     | m  | Not limited                                                                                                                                                                                                                                                                                                                                                            | The decisive factor is the length between the devices. |
| Max. cable length between two devices | m  | 100                                                                                                                                                                                                                                                                                                                                                                    |                                                        |
| Process data                          |    | <ul style="list-style-type: none"> <li>Max. 244 PDOs: freely configurable, regardless of their direction (In, Out, In/Out)</li> <li>Max. 1440 input bytes and max. 1440 output bytes</li> <li>Scaling:<br/>bytes: 1, 2, 4, 8, 12, 16, 24, 32, 48, 64, 80, 96, 128, 160, 192, 224, 250<br/>Word: 1, 2, 4, 6, 8, 12, 16, 24, 32, 40, 48, 64, 80, 96, 112, 125</li> </ul> |                                                        |
| Cycle time                            | ms | 1, 2, 3, 4, ...                                                                                                                                                                                                                                                                                                                                                        |                                                        |
| Switching method                      |    | Cut-through                                                                                                                                                                                                                                                                                                                                                            |                                                        |
| Optional functions                    |    | <ul style="list-style-type: none"> <li>MRP (Media Redundancy Protocol)</li> <li>Diagnostics</li> <li>Acyclic services; parameter channel</li> <li>Support I&amp;M0..3</li> <li>Exchangeable disk storage</li> </ul>                                                                                                                                                    |                                                        |
| Other data                            |    | Additional TCP/IP channel                                                                                                                                                                                                                                                                                                                                              |                                                        |

| Communication time              |  |                                                       |                                                                     |
|---------------------------------|--|-------------------------------------------------------|---------------------------------------------------------------------|
| Communication time depending on |  | processing time in the controller                     | time between the start of a request and the arrival of the response |
|                                 |  | telegram runtime (transmission rate, telegram length) |                                                                     |
|                                 |  | nesting depth of the network                          |                                                                     |
|                                 |  | bus load                                              |                                                                     |

| Processing time of process data                                                |    |         |                   |
|--------------------------------------------------------------------------------|----|---------|-------------------|
| Update cycle                                                                   | ms | 1       | In the controller |
| Processing time                                                                | ms | 0 ... 1 |                   |
| Runtime of the application task of the technology application used (tolerance) | ms | 1 ... x |                   |

# Configuring the network

PROFINET IO-Device

Commissioning

Restarting or stopping the communication



## 9.5.1 Commissioning

### 1. Importing IO devices into the control configuration:

1. Select the "Add device" command in the context menu of the target system (device, Lenze controller, ...) to extend the control configuration with the IO device.
2. Name the inserted IO device sensibly.



You can enter a name by clicking on the element. The names must only contain the characters "A ... Z", "a ... z", "0 ... 9" or "\_" and must not begin with a digit.

3. Execute the "Add device" command in the context menu of the IO device.
4. In the dialog box that appears, select the I/O modules to be used for the IO device and add it to the IO device by clicking the "Add device" button.
5. Set the IP address, subnet mask, gateway address and the station name of the IO device in the PROFINET parameters (Fieldbus section).

### 2. Load the network configuration into the master:

1. Log off: Menu command Online → Log off or <Ctrl>+<F8>.
2. Compile: Menu command "Build → Compile" or <F11>.
3. Log in: Menu command "Online → Log in" or <Alt>+<F8>.

The configuration, the parameter settings and the PLC program are loaded into the IO controller. Afterwards, all IO devices are initialized.



These steps must be carried out after every change within the »PLC Designer« project. An already existing configuration and an existing PLC program in the IO controller will be then overwritten.

### 9.5.1.1 Restarting or stopping the communication

The communication needs to be restarted after changes to the interface configuration (e. g. station address and IP configuration) so the changed settings become effective without switching the voltage.

► [Station name and IP configuration](#) 108

There are two options for restarting the communication:

- Set 0x2380 to 1 (restart with current values)
- Set 0x2380 to 2 (restart with the values saved last)

The following option can be used to stop communication:

- Set 0x2380 to 5 (stop network communication)

#### Parameter

| Address | Name / setting range / [default setting] | Information                                                                                                                                                  |
|---------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2380  | PROFINET communication                   | Restart / stop communication <ul style="list-style-type: none"><li>• When the device command has been executed successfully, the value 0 is shown.</li></ul> |
|         | 0 No action/no error                     | Only status feedback                                                                                                                                         |
|         | 1 Restart with current values            | Restart communication with the current values.                                                                                                               |
|         | 2 Restart with stored values             | Restart communication with the values of the PROFINET parameters that have been saved last (0x2381:001 ... 0x2381:009).                                      |
|         | 5 Stop network communication             | Stop communication                                                                                                                                           |
|         | 10 In progress                           | Only status feedback                                                                                                                                         |
|         | 11 Action cancelled                      |                                                                                                                                                              |
|         | 12 Fault                                 |                                                                                                                                                              |



## 9.5.1.2 Settings in the Siemens »TIA Portal«



Here, commissioning with the Siemens »TIA Portal« is described. Please note that in the default setting of the Siemens »TIA Portal« changes of network parameters carried out by a Lenze engineering tool (e. g. »PLC Designer«) may be overwritten.

1. Go to the device configuration and open the **net view** to drag the controller from the catalog to the net view of the PROFINET.
2. Assign the controller to the associated IO-Controller.
3. Mark the controller and change to the **device view**.
4. Set the IP address and the station name ("PROFINET device name") in **Properties**.

See: ▶ [Station name and IP configuration](#) 108



In order that the controller can be identified via Ethernet when the IO controller is switched off, it is necessary that the station name and the IP configuration are saved in the device with mains failure protection via the separate entry with the Lenze engineering tool. ▶ [0x2022:003](#)

See: ▶ [Saving the parameter settings](#) 42

5. Below the device name and the name of the device description file, the device view shows the pre-assignment of the output and input process data words.  
In Slot 1, pre-assigned process data words can be changed.
6. Save the project in the engineering tool.
7. Load the configuration into the IO-Controller.
8. Set the IO-Controller to **RUN**.

## 9.5.1.3 Device description file

The device description file must be installed in the engineering tool used for configuring the network (e. g. Siemens »TIA Portal«).



Device description files for Lenze products can be found on the Internet:  
[www.Lenze.com](http://www.Lenze.com) → Downloads → Product-related Application Knowledge Base articles

The name of the device description file is as follows:

"GSDML-V<x>.<zz>-Lenze-C<NNN>PN<Version>-<yyyy><mm><dd>.xml".

| Wildcard | Information                                                     |
|----------|-----------------------------------------------------------------|
| x        | Main version of the GSDML scheme used                           |
| zz       | One-digit or two-digit subversion of the GSDML scheme used      |
| NNN      | Specification of the device designation                         |
| Version  | First version of the software that can be used with this GSDML. |
| yyyy     | Year of publication                                             |
| in (mm)  | Month of publication                                            |
| dd       | Day of publication                                              |

## Define the user data length

The configuration is supported by 250 process data bytes (up to 244 slots and 1440 bytes of max. IO data per direction).

Example of selecting the device description file:

- Mixed\_In\_Out\_Byte\_0008 8 process data bytes (In and Out direction)

# Configuring the network

PROFINET IO-Device  
Basic setting and options  
Station name and IP configuration



## 9.5.2 Basic setting and options

### 9.5.2.1 Station name and IP configuration

The station name and the IP configuration can be assigned by the IO-Controller. These settings enable the IO-Controller to identify the devices in the network and manage the data exchange.

The station name and the IP configuration can also be assigned by the »Engineering Tool«.

- The station name of the IO device must be entered with permissible characters according to the PROFINET specification. ▶ [0x2381:004](#)
- Display of the currently used station name: ▶ [0x2382:004](#)
- The IP configuration comprises the assignments of:
  - IP address ▶ [0x2381:001](#)
  - Subnet mask ▶ [0x2381:002](#)
  - Gateway address ▶ [0x2381:003](#)
- Display of the actual IP configuration: ▶ [0x2382:001 ... 0x2382:003](#)



Save the station name and the IP configuration in the IO Device with line voltage failure protection so the IO Device can be identified via PROFINET if the IO controller is switched off. [0x2022:003](#)

▶ [Saving the parameter settings](#) [42](#)



An invalid station name or the assignment of invalid combinations of the IP address, subnet mask, and gateway address can have the consequence that no connection to PROFINET can be established.

In case of impermissible settings, the red LED "bus ERR" is blinking and the error message "PROFINET: Stack initialization error [0x8192]" is output.

▶ [Status LEDs](#) [111](#)

### Parameter

| Address    | Name / setting range / [default setting]                                   | Information                                                                                                                                                                                                                                                                                                                                                                                    |
|------------|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2381:001 | PROFINET settings: IP address<br>0.0.0.0 ... [0.0.0.0] ... 255.255.255.255 | Set IP address <ul style="list-style-type: none"><li>• A changed value will only be effective after the PROFINET communication is restarted (<a href="#">0x2380</a> = 1).</li></ul>                                                                                                                                                                                                            |
| 0x2381:002 | PROFINET settings: Subnet<br>0.0.0.0 ... [0.0.0.0] ... 255.255.255.255     | Set subnet mask <ul style="list-style-type: none"><li>• A changed value will only be effective after the PROFINET communication is restarted (<a href="#">0x2380</a> = 1).</li></ul>                                                                                                                                                                                                           |
| 0x2381:003 | PROFINET settings: Gateway<br>0.0.0.0 ... [0.0.0.0] ... 255.255.255.255    | Set gateway address <ul style="list-style-type: none"><li>• A changed value will only be effective after the PROFINET communication is restarted (<a href="#">0x2380</a> = 1).</li><li>• The gateway address is valid if the network address of the IP address is identical to the gateway address. In this case, no gateway functionality is used.</li><li>• DHCP is not supported.</li></ul> |
| 0x2381:004 | PROFINET settings: Station name<br>["0"]                                   | Set station name <ul style="list-style-type: none"><li>• A changed value will only be effective after the PROFINET communication is restarted (<a href="#">0x2380</a> = 1).</li></ul>                                                                                                                                                                                                          |
| 0x2381:005 | PROFINET settings: I&M1 System designation<br>["0"]                        | Input/output of the I&M1 system designation <ul style="list-style-type: none"><li>• The default setting is an empty string.</li></ul>                                                                                                                                                                                                                                                          |
| 0x2381:006 | PROFINET settings: I&M1 Installation site<br>["0"]                         | Input/output of the I&M1 location identification code <ul style="list-style-type: none"><li>• The default setting is an empty string.</li></ul>                                                                                                                                                                                                                                                |
| 0x2381:007 | PROFINET settings: I&M2 Installation date<br>["0"]                         | Input/output of the I&M2 date of installation <ul style="list-style-type: none"><li>• The default setting is an empty string.</li></ul>                                                                                                                                                                                                                                                        |
| 0x2381:008 | PROFINET settings: I&M3 additional information<br>["0"]                    | Input/output of the I&M3 additional information <ul style="list-style-type: none"><li>• The default setting is an empty string.</li></ul>                                                                                                                                                                                                                                                      |



## 9.5.2.2 Suppress diagnostic messages to the IO controller

► **0x285A:001** serves to set which error response in the device suppresses the alarm message to the IO-Controller.

### Parameter

| Address    | Name / setting range / [default setting]                           | Information                                                                                                                                                                                                                                                                      |
|------------|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x285A:001 | Diagnostic configuration: Alarm suppression<br>0 ... [0] ... 65535 | Bit coded selection of error responses which suppress the alarm message to the IO controller. <ul style="list-style-type: none"><li>• Bit x = 1 = suppress alarm message.</li><li>• In the default setting "0", an alarm message is displayed for all error responses.</li></ul> |
|            | Bit 0 Information                                                  |                                                                                                                                                                                                                                                                                  |
|            | Bit 1 Warning                                                      |                                                                                                                                                                                                                                                                                  |
|            | Bit 2 Warning locked                                               |                                                                                                                                                                                                                                                                                  |
|            | Bit 3 Trouble                                                      |                                                                                                                                                                                                                                                                                  |
|            | Bit 4 Fault > Application quick stop > Quick stop                  |                                                                                                                                                                                                                                                                                  |

## 9.5.3 Process data transfer

Process data serve to control the device.

- The process data is transferred cyclically between the IO-Controller and the IO-Devices participating in PROFINET.
- The process data can be directly accessed via the IO Controller. The data in the PLC, for instance, are directly stored in the IO area.
- The maximum length of the process data is 1 ... 1440 bytes per direction.
- The maximum number of PDO slots is 244 per direction with a maximum of 250 bytes within the slot.
- The process data is transmitted 1 : 1 according to its sequence.

Example for 64 PDO slots:

- $1440 - ((64 \text{ slots} * 2 \text{ bytes}) + 4 \text{ bytes}) = 1308 \text{ bytes of user data}$

Example for 244 slots:

- $1440 - ((244 \text{ slots} * 2 \text{ bytes}) + 4 \text{ bytes}) = 948 \text{ bytes of user data}$



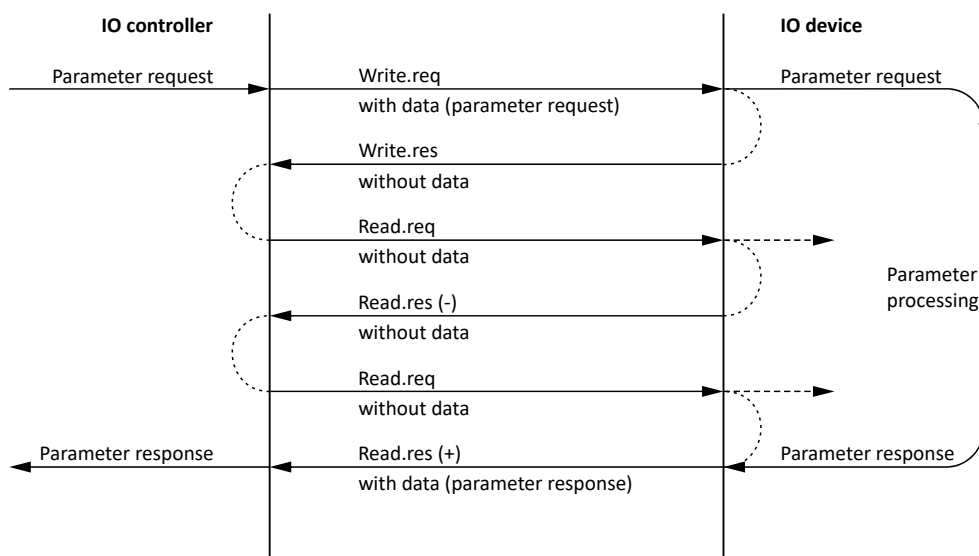
## 9.5.4 Parameter data transfer

Data communication with PROFINET is characterised by the simultaneous operation of cyclic and acyclic services in the network. As an optional extension, the parameter data transfer belongs to the acyclic services, which provides access to all device parameters.

- The access to the device data depends on the PROFIdrive profile.
- There is always only one parameter request in process (no pipelining).
- No spontaneous messages are transferred.
- There are only acyclic parameter requests.

In principle, a IO-Controller can always be used to request parameters from the IO-Device if the IO-Device is in the DATA\_EXCHANGE state.

### Transmission directions for acyclic data transfer



1. A "Write.req" is used to transmit the data set (DB47) as parameter request to the IO-Device.
2. "Write.res" is used to confirm to IO-Controller that the message was received.
3. The IO-Controller uses "Read.req" to request the response of the IO-Device.
4. The IO-Device responds with a "Read.res (-)" if processing is not yet completed.
5. After parameter processing, the parameter request is completed by using "Read.res (+)" to transmit the parameter response to the IO-Controller.

### Telegram structure

| Destr   | ScrAddr | VLAN    | Type<br>0x0800 | RPC      | NDR      | Read/Write Block | Data             | FCS     |
|---------|---------|---------|----------------|----------|----------|------------------|------------------|---------|
| 6 bytes | 6 bytes | 4 bytes | 4 bytes        | 80 bytes | 64 bytes | 64 bytes         | 0 .... 240 bytes | 4 bytes |

The initiator specifies the access to the "DB47" data set in the "Read/Write Block" field. The data written to this index or read from it contains a header and the parameter request or the parameter response. The read data or the data to be written is contained in the "Data" field.



## Assignment of the user data depending on the data type

Depending on the data type used, the user data is assigned as follows:

| Data type | Length  | User data assignment |          |           |          |          |
|-----------|---------|----------------------|----------|-----------|----------|----------|
|           |         | Byte 1               | Byte 2   | Byte 3    | Byte 4   | Byte ... |
| String    | x bytes | Data (x bytes)       |          |           |          |          |
| U8        | 1 byte  | Data                 | 0x00     |           |          |          |
| U16       | 2 bytes | High byte            | Low byte |           |          |          |
|           |         | Data                 | Data     |           |          |          |
| U32       | 4 bytes | High word            |          | Low word  |          |          |
|           |         | High byte            | Low byte | High byte | Low byte |          |
|           |         | Data                 | Data     | Data      | Data     |          |

## 9.5.5 Monitoring

The parameters for setting network monitoring functions are described below.

## 9.5.6 Diagnostics

### 9.5.6.1 Status LEDs

Notes on the connection status to the IO-Controller can be obtained via the LEDs "BUS RDY" and "BUS ERR". In addition, the LEDs "L/A" at the RJ45 sockets indicate the connection status to the network.

| "BUS RDY" LED (green)                                                                                  | State         | Meaning                              |
|--------------------------------------------------------------------------------------------------------|---------------|--------------------------------------|
| Off                                                                                                    | Not connected | No connection to the IO-Controller   |
| <br>Blinking (1 Hz) | Connected     | IO-Controller in STOP                |
| <br>On              | Data exchange | IO-Controller in RUN (DATA_EXCHANGE) |

| "BUS ERR" LED (red)                                                                                    | State                            | Meaning                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Off                                                                                                    | No fault                         | No fault                                                                                                                                          |
| <br>Blinking (1 Hz) | IO-Device identifies (localises) | The PROFINET function "node flashing test" is triggered by IO-Controller. The flickering LED serves to identify (locate) an accessible IO-Device. |
| <br>Blinking fast   | Impermissible settings           | Impermissible settings: Stack, station name or IP parameters are invalid.                                                                         |
| <br>On              | Fault                            | Communication error (e. g. Ethernet cable removed)                                                                                                |

| LED "L" (Link, green)                                                                     | Status        | Meaning                                           |
|-------------------------------------------------------------------------------------------|---------------|---------------------------------------------------|
| Off                                                                                       | Not connected | No connection to the network                      |
| <br>On | Connected     | A physical connection to the network is available |

| LED "A" (Activity, yellow)                                                                            | Status  | Meaning                           |
|-------------------------------------------------------------------------------------------------------|---------|-----------------------------------|
| <br>On or flickers | Traffic | Data is exchanged via the network |

### 9.5.6.2 PROFINET IO-Device diagnostics

The following parameters show information on the network.

#### Parameter

| Address    | Name / setting range / [default setting]            | Information                       |
|------------|-----------------------------------------------------|-----------------------------------|
| 0x2382:001 | Active PROFINET settings: IP address<br>• Read only | Display of the active IP address. |

# Configuring the network

PROFINET IO-Device

Diagnostics

PROFINET IO-Device diagnostics



| Address    | Name / setting range / [default setting]              | Information                                                                                                                                                                                                                                                                                                    |
|------------|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2382:002 | Active PROFINET settings: Subnet<br>• Read only       | Display of the active subnet mask.                                                                                                                                                                                                                                                                             |
| 0x2382:003 | Active PROFINET settings: Gateway<br>• Read only      | Display of the gateway address.                                                                                                                                                                                                                                                                                |
| 0x2382:004 | Active PROFINET settings: Station name<br>• Read only | Display of the active station name.                                                                                                                                                                                                                                                                            |
| 0x2382:005 | Active PROFINET settings: MAC Address<br>• Read only  | Display of the active MAC address.                                                                                                                                                                                                                                                                             |
| 0x2388     | PROFINET status<br>• Read only                        | Bit coded display of the current Bus status.                                                                                                                                                                                                                                                                   |
|            | Bit 0 Initialized                                     | The IP address is invalid. Valid IP addresses are defined according to RFC 3330.                                                                                                                                                                                                                               |
|            | Bit 1 Online                                          |                                                                                                                                                                                                                                                                                                                |
|            | Bit 2 Connected                                       |                                                                                                                                                                                                                                                                                                                |
|            | Bit 3 IP address error                                |                                                                                                                                                                                                                                                                                                                |
|            | Bit 4 Hardware fault                                  |                                                                                                                                                                                                                                                                                                                |
|            | Bit 5 Reserved                                        |                                                                                                                                                                                                                                                                                                                |
|            | Bit 6 Watchdog elapsed                                |                                                                                                                                                                                                                                                                                                                |
|            | Bit 7 Protocol error                                  |                                                                                                                                                                                                                                                                                                                |
|            | Bit 8 PROFINET stack ok                               |                                                                                                                                                                                                                                                                                                                |
|            | Bit 9 PROFINET stack not configured                   |                                                                                                                                                                                                                                                                                                                |
|            | Bit 10 Ethernet controller fault                      |                                                                                                                                                                                                                                                                                                                |
|            | Bit 11 UDP stack fault                                |                                                                                                                                                                                                                                                                                                                |
| 0x2389:001 | PROFINET error: Error 1<br>• Read only                | The parameter currently contains the error detected on the network.<br>• The error values may occur in combination with the error values from parameter <a href="#">0x2389:002</a> .                                                                                                                           |
|            | 0 No error                                            |                                                                                                                                                                                                                                                                                                                |
|            | 2 Unit ID unknown                                     |                                                                                                                                                                                                                                                                                                                |
|            | 3 Max. units exceeded                                 |                                                                                                                                                                                                                                                                                                                |
|            | 4 Invalid size                                        |                                                                                                                                                                                                                                                                                                                |
|            | 5 Unit type unknown                                   |                                                                                                                                                                                                                                                                                                                |
|            | 6 Runtime plug error                                  |                                                                                                                                                                                                                                                                                                                |
|            | 7 Invalid argument                                    |                                                                                                                                                                                                                                                                                                                |
|            | 8 Service pending                                     |                                                                                                                                                                                                                                                                                                                |
|            | 9 Stack not ready                                     |                                                                                                                                                                                                                                                                                                                |
|            | 10 Command unknown                                    |                                                                                                                                                                                                                                                                                                                |
|            | 11 Invalid address descriptor                         |                                                                                                                                                                                                                                                                                                                |
| 0x2389:002 | PROFINET error: Error 2<br>• Read only                | The parameter currently contains the error detected on the network.<br>• The error values may occur in combination with the error values from parameter <a href="#">0x2389:001</a> .                                                                                                                           |
|            | Bit 7 IP address error                                | The IP address is invalid. Valid IP addresses are defined according to RFC 3330.                                                                                                                                                                                                                               |
|            | Bit 8 Station name problem                            | The station name must be assigned according to the PROFINET specification.                                                                                                                                                                                                                                     |
|            | Bit 9 DataExch left                                   | PROFINET communication is continuously interrupted in the "Data_Exchange" state, e. g. by cable break.<br>• PROFINET communication changes to the "No_Data_Exchange" state.<br>• When the watchdog monitoring time specified by the IO Controller has elapsed, the response set in is triggered in the device. |
|            | Bit 10 Stack boot error                               |                                                                                                                                                                                                                                                                                                                |
|            | Bit 11 Stack online error                             |                                                                                                                                                                                                                                                                                                                |
|            | Bit 12 Stack state error                              |                                                                                                                                                                                                                                                                                                                |
|            | Bit 13 Stack revision error                           |                                                                                                                                                                                                                                                                                                                |
|            | Bit 14 Initialization problem                         | The stack cannot be initiated with the user specifications. A reason might be, e. g., a station name that does not correspond to the PROFINET specification.                                                                                                                                                   |
|            | Bit 15 Stack init error                               |                                                                                                                                                                                                                                                                                                                |



## 9.6 Monitoring

The parameters for setting network monitoring functions are described below.

### Parameter

| Address    | Name / setting range / [default setting]  | Information                                                                                                                                                                                                                                                                                                                                                                              |
|------------|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2859:001 | Network monitoring: Watchdog elapsed      | Selection of the response to a permanent interruption of the communication to the IO controller.<br><br>Associated event ID:<br>• <a href="#">822313360</a>   <a href="#">0x31038190</a> - Network - Watchdog time-out                                                                                                                                                                   |
|            | 0 No response                             |                                                                                                                                                                                                                                                                                                                                                                                          |
|            | 1 Trouble                                 |                                                                                                                                                                                                                                                                                                                                                                                          |
|            | 2 <b>Warning</b>                          |                                                                                                                                                                                                                                                                                                                                                                                          |
| 0x2859:002 | Network monitoring: Data exchange exited  | Selection of the reaction when leaving the "Data Exchange" state.<br><br>Associated event ID:<br>• <a href="#">822313361</a>   <a href="#">0x31038191</a> - Network - Disruption of cyclic data exchange                                                                                                                                                                                 |
|            | 0 No response                             |                                                                                                                                                                                                                                                                                                                                                                                          |
|            | 1 Trouble                                 |                                                                                                                                                                                                                                                                                                                                                                                          |
|            | 2 Warning                                 |                                                                                                                                                                                                                                                                                                                                                                                          |
| 0x2859:003 | Network monitoring: Invalid configuration | Selection of the response triggered by the reception of invalid configuration data.<br><br>Associated event ID:<br>• <a href="#">822313607</a>   <a href="#">0x31038287</a> - Network - Invalid configuration                                                                                                                                                                            |
|            | 0 No response                             |                                                                                                                                                                                                                                                                                                                                                                                          |
|            | 1 Trouble                                 |                                                                                                                                                                                                                                                                                                                                                                                          |
|            | 2 <b>Warning</b>                          |                                                                                                                                                                                                                                                                                                                                                                                          |
| 0x2859:004 | Network monitoring: Initialisation error  | Selection of the response triggered by the occurrence of an error during the initialization of the network component.<br><br>Associated event ID:<br>• <a href="#">822313362</a>   <a href="#">0x31038192</a> - Network - Initialization error                                                                                                                                           |
|            | 0 No response                             |                                                                                                                                                                                                                                                                                                                                                                                          |
|            | 1 Trouble                                 |                                                                                                                                                                                                                                                                                                                                                                                          |
|            | 2 <b>Warning</b>                          |                                                                                                                                                                                                                                                                                                                                                                                          |
| 0x2859:005 | Network monitoring: Invalid process data  | Selection of the response triggered by the reception of invalid process data.<br>Process data marked as invalid (IOPS is "BAD") are received by the IO Controller. Typically in case of<br>• a PLC in STOP state,<br>• alarms,<br>• acyclic demand data.<br><br>Associated event ID:<br>• <a href="#">822313363</a>   <a href="#">0x31038193</a> - Network - Invalid cyclic process data |
|            | 0 No response                             |                                                                                                                                                                                                                                                                                                                                                                                          |
|            | 1 Trouble                                 |                                                                                                                                                                                                                                                                                                                                                                                          |
|            | 2 <b>Warning</b>                          |                                                                                                                                                                                                                                                                                                                                                                                          |



## 10 Configuring the firewall

The firewall integrated in the controller can be used to restrict communication with the surrounding network.



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The firewall is deactivated by default!

You can activate and configure the firewall using the "PLC Designer".  
(Device tab → Settings → Communication → Firewall)

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## Parameter

| Address    | Name / setting range / [default setting]                           | Information                                                                                                                                                                                             |
|------------|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x5901:001 | Security setting HAProxy: Certificate fingerprint<br>• Read only   | Display of the fingerprint (digital fingerprint) of the certificate for http/wss communication.                                                                                                         |
| 0x5901:002 | Security setting HAProxy: HTTPS redirect<br>• Read only            | Display whether the visualization content of "EASY UI Designer" is redirected from HTTP to HTTPS or whether this setting is deactivated.                                                                |
|            | 0 For EASY UI disabled                                             | No redirection from HTTP to HTTPS. HTTP and HTTPS requests for visualization content ("EASY UI Designer") are answered directly.                                                                        |
|            | 1 For EASY UI enabled                                              | HTTP requests for visualization content ("EASY UI Designer") are redirected. The website visitor is requested to use an HTTPS connection.                                                               |
|            | 2 For EASY UI changing                                             | Status feedback that the redirection from HTTP to HTTPS for visualization content has been changed.                                                                                                     |
|            | 3 HAProxy not active - No access                                   | Status feedback that the redirection from HTTP to HTTPS for visualization content has not been changed because the HAProxy is not active.                                                               |
|            | 255 Not valid                                                      |                                                                                                                                                                                                         |
| 0x5910:001 | Firewall: Activation                                               |                                                                                                                                                                                                         |
|            | 0 Deactivated                                                      |                                                                                                                                                                                                         |
|            | 1 Activated                                                        |                                                                                                                                                                                                         |
| 0x5910:002 | Firewall: IP range 1 start<br>0 ... [0] ... 4294967295             | Setting of IP range 1 for permitted client IP addresses. The IP range defined here can be selected in the firewall settings for the various ports.                                                      |
| 0x5910:003 | Firewall: IP range 1 end<br>0 ... [0] ... 4294967295               | Setting of IP range 1 for permitted client IP addresses. The IP range defined here can be selected in the firewall settings for the various ports. End of IP range 1 for permitted client IP addresses. |
| 0x5910:004 | Firewall: IP range 2 start<br>0 ... [0] ... 4294967295             | Setting of IP range 2 for permitted client IP addresses. The IP range defined here can be selected in the firewall settings for the various ports.                                                      |
| 0x5910:005 | Firewall: IP range 2 end<br>0 ... [0] ... 4294967295               | Setting of IP range 2 for permitted client IP addresses. The IP range defined here can be selected in the firewall settings for the various ports. End of IP range 2 for permitted client IP addresses. |
| 0x5910:006 | Firewall: IP range 3 start<br>0 ... [0] ... 4294967295             | Setting of IP range 3 for permitted client IP addresses. The IP range defined here can be selected in the firewall settings for the various ports.                                                      |
| 0x5910:007 | Firewall: IP range 3 end<br>0 ... [0] ... 4294967295               | Setting of IP range 3 for permitted client IP addresses. The IP range defined here can be selected in the firewall settings for the various ports. End of IP range 3 for permitted client IP addresses. |
| 0x5910:008 | Firewall: IP range 4 start<br>0 ... [0] ... 4294967295             | Setting of IP range 4 for permitted client IP addresses. The IP range defined here can be selected in the firewall settings for the various ports.                                                      |
| 0x5910:009 | Firewall: IP range 4 end<br>0 ... [0] ... 4294967295               | Setting of IP range 4 for permitted client IP addresses. The IP range defined here can be selected in the firewall settings for the various ports. End of IP range 4 for permitted client IP addresses. |
| 0x5911:001 | Well-known ports: Secure Shell (SSH): Network<br>0 ... [0] ... 255 | Network setting for the firewall to the "Secure Shell (SSH)" port.<br>• SSH enables a secure, authenticated and encrypted connection between two computers via an insecure network.                     |
|            | Bit 0 Engineering port                                             | Setting for diagnostic interface X16 for a connection to the "EASY Starter". The "EASY Starter" can be used as a diagnostic tool and for commissioning.                                                 |
|            | Bit 1 Fieldbus slave                                               |                                                                                                                                                                                                         |
|            | Bit 2 Dual network                                                 |                                                                                                                                                                                                         |
| 0x5911:002 | Well-known ports: Secure Shell (SSH): Client IP range              | Client IP range for the firewall to the "Secure Shell (SSH)" port.                                                                                                                                      |
|            | 0 Any                                                              | All client IP addresses are permitted.                                                                                                                                                                  |
|            | 1 IP range 1                                                       | Only clients in the IP range 1 (0x5910:002 ... 0x5910:003) are permitted.                                                                                                                               |
|            | 2 IP range 2                                                       | Only clients in the IP range 2 (0x5910:004 ... 0x5910:005) are permitted.                                                                                                                               |
|            | 3 IP range 3                                                       | Only clients in the IP range 3 (0x5910:006 ... 0x5910:007) are permitted.                                                                                                                               |
|            | 4 IP range 4                                                       | Only clients in the IP range 4 (0x5910:008 ... 0x5910:009) are permitted.                                                                                                                               |
| 0x5911:003 | Well-known ports: Secure Shell (SSH): Activation                   | Action for the firewall to the "Secure Shell (SSH)" port.                                                                                                                                               |
|            | 0 Drop                                                             | Reject the connection, do NOT notify the sender.                                                                                                                                                        |
|            | 1 Reject                                                           | Reject the connection, notify the sender.                                                                                                                                                               |
|            | 2 Allow                                                            | Allow connection.                                                                                                                                                                                       |



| Address    | Name / setting range / [default setting]                                                   |                  | Information                                                                                                                                                                                                                                                                                                             |
|------------|--------------------------------------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x5911:031 | Well-known ports: Network Time Protocol (NTP): Network<br>0 ... [0] ... 255                |                  | Network setting for the firewall for the "Network Time Protocol (NTP)" port.<br>• NTP functions as a time stamp during transmission and synchronizes the times of different systems down to the nanosecond.                                                                                                             |
|            | Bit 0                                                                                      | Engineering port | Setting for diagnostic interface X16 for a connection to the "EASY Starter". The "EASY Starter" can be used as a diagnostic tool and for commissioning.                                                                                                                                                                 |
|            | Bit 1                                                                                      | Fieldbus slave   |                                                                                                                                                                                                                                                                                                                         |
|            | Bit 2                                                                                      | Dual network     |                                                                                                                                                                                                                                                                                                                         |
| 0x5911:032 | Well-known ports: Network Time Protocol (NTP): Client IP range                             |                  | Client IP range for the firewall to the "Network Time Protocol (NTP)" port.                                                                                                                                                                                                                                             |
|            | 0                                                                                          | Any              | All client IP addresses are permitted.                                                                                                                                                                                                                                                                                  |
|            | 1                                                                                          | IP range 1       | Only clients in the IP range 1 (0x5910:002 ... 0x5910:003) are permitted.                                                                                                                                                                                                                                               |
|            | 2                                                                                          | IP range 2       | Only clients in the IP range 2 (0x5910:004 ... 0x5910:005) are permitted.                                                                                                                                                                                                                                               |
|            | 3                                                                                          | IP range 3       | Only clients in the IP range 3 (0x5910:006 ... 0x5910:007) are permitted.                                                                                                                                                                                                                                               |
|            | 4                                                                                          | IP range 4       | Only clients in the IP range 4 (0x5910:008 ... 0x5910:009) are permitted.                                                                                                                                                                                                                                               |
| 0x5911:033 | Well-known ports: Network Time Protocol (NTP): Activation                                  |                  | Action for the firewall for the "Network Time Protocol (NTP)" port.                                                                                                                                                                                                                                                     |
|            | 0                                                                                          | Drop             | Reject the connection, do NOT notify the sender.                                                                                                                                                                                                                                                                        |
|            | 1                                                                                          | Reject           | Reject the connection, notify the sender.                                                                                                                                                                                                                                                                               |
|            | 2                                                                                          | Allow            | Allow connection.                                                                                                                                                                                                                                                                                                       |
| 0x5911:051 | Well-known ports: Hypertext Transfer Protocol Secure (HTTPS): Network<br>0 ... [0] ... 255 |                  | Network setting for the firewall for the "Hypertext Transfer Protocol Secure (HTTPS)" port.<br>• HTTPS is used to establish confidentiality and integrity in communication between the web server and web browser (client) on the World Wide Web. This is achieved through encryption and authentication, among others. |
|            | Bit 0                                                                                      | Engineering port | Setting for diagnostic interface X16 for a connection to the "EASY Starter". The "EASY Starter" can be used as a diagnostic tool and for commissioning.                                                                                                                                                                 |
|            | Bit 1                                                                                      | Fieldbus slave   |                                                                                                                                                                                                                                                                                                                         |
|            | Bit 2                                                                                      | Dual network     |                                                                                                                                                                                                                                                                                                                         |
| 0x5911:052 | Well-known ports: Hypertext Transfer Protocol Secure (HTTPS): Client IP range              |                  | Client IP range for the firewall to the "Hypertext Transfer Protocol Secure (HTTPS)" port.                                                                                                                                                                                                                              |
|            | 0                                                                                          | Any              | All client IP addresses are permitted.                                                                                                                                                                                                                                                                                  |
|            | 1                                                                                          | IP range 1       | Only clients in the IP range 1 (0x5910:002 ... 0x5910:003) are permitted.                                                                                                                                                                                                                                               |
|            | 2                                                                                          | IP range 2       | Only clients in the IP range 2 (0x5910:004 ... 0x5910:005) are permitted.                                                                                                                                                                                                                                               |
|            | 3                                                                                          | IP range 3       | Only clients in the IP range 3 (0x5910:006 ... 0x5910:007) are permitted.                                                                                                                                                                                                                                               |
|            | 4                                                                                          | IP range 4       | Only clients in the IP range 4 (0x5910:008 ... 0x5910:009) are permitted.                                                                                                                                                                                                                                               |
| 0x5911:053 | Well-known ports: Hypertext Transfer Protocol Secure (HTTPS): Activation                   |                  | Action for the firewall for the "Hypertext Transfer Protocol Secure (HTTPS)" port.                                                                                                                                                                                                                                      |
|            | 0                                                                                          | Drop             | Reject the connection, do NOT notify the sender.                                                                                                                                                                                                                                                                        |
|            | 1                                                                                          | Reject           | Reject the connection, notify the sender.                                                                                                                                                                                                                                                                               |
|            | 2                                                                                          | Allow            | Allow connection.                                                                                                                                                                                                                                                                                                       |
| 0x5912:001 | Registered ports: PLC Designer TCP gateway search: Network<br>0 ... [0] ... 255            |                  | Network setting for the firewall for the "PLC Designer TCP gateway search" port.                                                                                                                                                                                                                                        |
|            | Bit 0                                                                                      | Engineering port | Setting for diagnostic interface X16 for a connection to the "EASY Starter". The "EASY Starter" can be used as a diagnostic tool and for commissioning.                                                                                                                                                                 |
|            | Bit 1                                                                                      | Fieldbus slave   |                                                                                                                                                                                                                                                                                                                         |
|            | Bit 2                                                                                      | Dual network     |                                                                                                                                                                                                                                                                                                                         |
| 0x5912:002 | Registered ports: PLC Designer TCP gateway search: Client IP range                         |                  | Client IP range for the firewall to the port "PLC Designer TCP gateway search".                                                                                                                                                                                                                                         |
|            | 0                                                                                          | Any              | All client IP addresses are permitted.                                                                                                                                                                                                                                                                                  |
|            | 1                                                                                          | IP range 1       | Only clients in the IP range 1 (0x5910:002 ... 0x5910:003) are permitted.                                                                                                                                                                                                                                               |
|            | 2                                                                                          | IP range 2       | Only clients in the IP range 2 (0x5910:004 ... 0x5910:005) are permitted.                                                                                                                                                                                                                                               |
|            | 3                                                                                          | IP range 3       | Only clients in the IP range 3 (0x5910:006 ... 0x5910:007) are permitted.                                                                                                                                                                                                                                               |
|            | 4                                                                                          | IP range 4       | Only clients in the IP range 4 (0x5910:008 ... 0x5910:009) are permitted.                                                                                                                                                                                                                                               |



# Configuring the firewall

| Address    | Name / setting range / [default setting]                                             | Information                                                                                                                                                                                                                                                                              |
|------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x5912:003 | Registered ports: PLC Designer TCP gateway search: Activation                        | Action for the firewall for the port "PLC Designer TCP gateway search".                                                                                                                                                                                                                  |
|            | 0 Drop                                                                               | Reject the connection, do NOT notify the sender.                                                                                                                                                                                                                                         |
|            | 1 Reject                                                                             | Reject the connection, notify the sender.                                                                                                                                                                                                                                                |
|            | 2 Allow                                                                              | Allow connection.                                                                                                                                                                                                                                                                        |
| 0x5912:011 | Registered ports: PLC Designer UDP communication: Network<br>0 ... [0] ... 255       | Network setting for the firewall for the "PLC Designer UDP communication" port.<br><ul style="list-style-type: none"> <li>The User Datagram Protocol (UDP) is a minimal, connectionless network protocol that belongs to the transport layer of the Internet protocol family.</li> </ul> |
|            | Bit 0 Engineering port                                                               | Setting for diagnostic interface X16 for a connection to the "EASY Starter". The "EASY Starter" can be used as a diagnostic tool and for commissioning.                                                                                                                                  |
|            | Bit 1 Fieldbus slave                                                                 |                                                                                                                                                                                                                                                                                          |
|            | Bit 2 Dual network                                                                   |                                                                                                                                                                                                                                                                                          |
| 0x5912:012 | Registered ports: PLC Designer UDP communication: Client IP range                    | Client IP range for the firewall to the "PLC Designer UDP communication" port.                                                                                                                                                                                                           |
|            | 0 Any                                                                                | All client IP addresses are permitted.                                                                                                                                                                                                                                                   |
|            | 1 IP range 1                                                                         | Only clients in the IP range 1 (0x5910:002 ... 0x5910:003) are permitted.                                                                                                                                                                                                                |
|            | 2 IP range 2                                                                         | Only clients in the IP range 2 (0x5910:004 ... 0x5910:005) are permitted.                                                                                                                                                                                                                |
|            | 3 IP range 3                                                                         | Only clients in the IP range 3 (0x5910:006 ... 0x5910:007) are permitted.                                                                                                                                                                                                                |
|            | 4 IP range 4                                                                         | Only clients in the IP range 4 (0x5910:008 ... 0x5910:009) are permitted.                                                                                                                                                                                                                |
| 0x5912:013 | Registered ports: PLC Designer UDP communication: Activation                         | Action for the firewall for the "PLC Designer UDP communication" port.                                                                                                                                                                                                                   |
|            | 0 Drop                                                                               | Reject the connection, do NOT notify the sender.                                                                                                                                                                                                                                         |
|            | 1 Reject                                                                             | Reject the connection, notify the sender.                                                                                                                                                                                                                                                |
|            | 2 Allow                                                                              | Allow connection.                                                                                                                                                                                                                                                                        |
| 0x5912:031 | Registered ports: Lenze specific device-search (ESDCP): Network<br>0 ... [0] ... 255 | Network setting for the firewall for the port "Lenze-specific device search (ESDCP)".                                                                                                                                                                                                    |
|            | Bit 0 Engineering port                                                               | Setting for diagnostic interface X16 for a connection to the "EASY Starter". The "EASY Starter" can be used as a diagnostic tool and for commissioning.                                                                                                                                  |
|            | Bit 1 Fieldbus slave                                                                 |                                                                                                                                                                                                                                                                                          |
|            | Bit 2 Dual network                                                                   |                                                                                                                                                                                                                                                                                          |
| 0x5912:032 | Registered ports: Lenze specific device-search (ESDCP): Client IP range              | Client IP range for the firewall for the port "Lenze-specific device search (ESDCP)".                                                                                                                                                                                                    |
|            | 0 Any                                                                                | All client IP addresses are permitted.                                                                                                                                                                                                                                                   |
|            | 1 IP range 1                                                                         | Only clients in the IP range 1 (0x5910:002 ... 0x5910:003) are permitted.                                                                                                                                                                                                                |
|            | 2 IP range 2                                                                         | Only clients in the IP range 2 (0x5910:004 ... 0x5910:005) are permitted.                                                                                                                                                                                                                |
|            | 3 IP range 3                                                                         | Only clients in the IP range 3 (0x5910:006 ... 0x5910:007) are permitted.                                                                                                                                                                                                                |
|            | 4 IP range 4                                                                         | Only clients in the IP range 4 (0x5910:008 ... 0x5910:009) are permitted.                                                                                                                                                                                                                |
| 0x5912:033 | Registered ports: Lenze specific device-search (ESDCP): Activation                   | Action for the firewall for the port "Lenze-specific device search (ESDCP)".                                                                                                                                                                                                             |
|            | 0 Drop                                                                               | Reject the connection, do NOT notify the sender.                                                                                                                                                                                                                                         |
|            | 1 Reject                                                                             | Reject the connection, notify the sender.                                                                                                                                                                                                                                                |
|            | 2 Allow                                                                              | Allow connection.                                                                                                                                                                                                                                                                        |
| 0x5912:041 | Registered ports: OPC UA server: Network<br>0 ... [0] ... 255                        | Network setting for the firewall to the "OPC UA Server" port.<br><ul style="list-style-type: none"> <li>OPC UA (Open Platform Communications Unified Architecture) is a collection of standards for communication and data exchange in the field of industrial automation.</li> </ul>    |
|            | Bit 0 Engineering port                                                               | Setting for diagnostic interface X16 for a connection to the "EASY Starter". The "EASY Starter" can be used as a diagnostic tool and for commissioning.                                                                                                                                  |
|            | Bit 1 Fieldbus slave                                                                 |                                                                                                                                                                                                                                                                                          |
|            | Bit 2 Dual network                                                                   |                                                                                                                                                                                                                                                                                          |

# Configuring the firewall



| Address    | Name / setting range / [default setting]                                        | Information                                                                                                                                             |
|------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x5912:042 | Registered ports: OPC UA server: Client IP range                                | Client IP range for the firewall to the "OPC UA Server" port.                                                                                           |
|            | <b>0 Any</b>                                                                    | All client IP addresses are permitted.                                                                                                                  |
|            | <b>1</b> IP range 1                                                             | Only clients in the IP range 1 (0x5910:002 ... 0x5910:003) are permitted.                                                                               |
|            | <b>2</b> IP range 2                                                             | Only clients in the IP range 2 (0x5910:004 ... 0x5910:005) are permitted.                                                                               |
|            | <b>3</b> IP range 3                                                             | Only clients in the IP range 3 (0x5910:006 ... 0x5910:007) are permitted.                                                                               |
|            | <b>4</b> IP range 4                                                             | Only clients in the IP range 4 (0x5910:008 ... 0x5910:009) are permitted.                                                                               |
| 0x5912:043 | Registered ports: OPC UA server: Activation                                     | Action for the firewall to the "OPC UA Server" port.                                                                                                    |
|            | <b>0 Drop</b>                                                                   | Reject the connection, do NOT notify the sender.                                                                                                        |
|            | <b>1</b> Reject                                                                 | Reject the connection, notify the sender.                                                                                                               |
|            | <b>2</b> Allow                                                                  | Allow connection.                                                                                                                                       |
| 0x5912:051 | Registered ports: EtherCAT master diagnostic tool: Network<br>0 ... [0] ... 255 | Network setting for the firewall to the "EtherCAT master diagnostics tool" port.                                                                        |
|            | Bit 0 Engineering port                                                          | Setting for diagnostic interface X16 for a connection to the "EASY Starter". The "EASY Starter" can be used as a diagnostic tool and for commissioning. |
|            | Bit 1 Fieldbus slave                                                            |                                                                                                                                                         |
|            | Bit 2 Dual network                                                              |                                                                                                                                                         |
| 0x5912:052 | Registered ports: EtherCAT master diagnostic tool: Client IP range              | Client IP range for the firewall to the "EtherCAT master diagnostics tool" port.                                                                        |
|            | <b>0 Any</b>                                                                    | All client IP addresses are permitted.                                                                                                                  |
|            | <b>1</b> IP range 1                                                             | Only clients in the IP range 1 (0x5910:002 ... 0x5910:003) are permitted.                                                                               |
|            | <b>2</b> IP range 2                                                             | Only clients in the IP range 2 (0x5910:004 ... 0x5910:005) are permitted.                                                                               |
|            | <b>3</b> IP range 3                                                             | Only clients in the IP range 3 (0x5910:006 ... 0x5910:007) are permitted.                                                                               |
|            | <b>4</b> IP range 4                                                             | Only clients in the IP range 4 (0x5910:008 ... 0x5910:009) are permitted.                                                                               |
| 0x5912:053 | Registered ports: EtherCAT master diagnostic tool: Activation                   | Action for the firewall to the "EtherCAT master diagnostics tool" port.                                                                                 |
|            | <b>0 Drop</b>                                                                   | Reject the connection, do NOT notify the sender.                                                                                                        |
|            | <b>1</b> Reject                                                                 | Reject the connection, notify the sender.                                                                                                               |
|            | <b>2</b> Allow                                                                  | Allow connection.                                                                                                                                       |
| 0x5912:061 | Registered ports: UI designer RAW: Network<br>0 ... [0] ... 255                 | Network setting for the firewall for the "UI Designer RAW" port.                                                                                        |
|            | Bit 0 Engineering port                                                          | Setting for diagnostic interface X16 for a connection to the "EASY Starter". The "EASY Starter" can be used as a diagnostic tool and for commissioning. |
|            | Bit 1 Fieldbus slave                                                            |                                                                                                                                                         |
|            | Bit 2 Dual network                                                              |                                                                                                                                                         |
| 0x5912:062 | Registered ports: UI designer RAW: Client IP range                              | Client IP range for the firewall to the "UI Designer RAW" port.                                                                                         |
|            | <b>0 Any</b>                                                                    | All client IP addresses are permitted.                                                                                                                  |
|            | <b>1</b> IP range 1                                                             | Only clients in the IP range 1 (0x5910:002 ... 0x5910:003) are permitted.                                                                               |
|            | <b>2</b> IP range 2                                                             | Only clients in the IP range 2 (0x5910:004 ... 0x5910:005) are permitted.                                                                               |
|            | <b>3</b> IP range 3                                                             | Only clients in the IP range 3 (0x5910:006 ... 0x5910:007) are permitted.                                                                               |
|            | <b>4</b> IP range 4                                                             | Only clients in the IP range 4 (0x5910:008 ... 0x5910:009) are permitted.                                                                               |
| 0x5912:063 | Registered ports: UI designer RAW: Activation                                   | Action for the firewall for the "UI Designer RAW" port.                                                                                                 |
|            | <b>0 Drop</b>                                                                   | Reject the connection, do NOT notify the sender.                                                                                                        |
|            | <b>1</b> Reject                                                                 | Reject the connection, notify the sender.                                                                                                               |
|            | <b>2</b> Allow                                                                  | Allow connection.                                                                                                                                       |
| 0x5912:071 | Registered ports: UI designer secure RAW: Network<br>0 ... [0] ... 255          | Network setting for the firewall for the "UI Designer secure-RAW" port.                                                                                 |
|            | Bit 0 Engineering port                                                          | Setting for diagnostic interface X16 for a connection to the "EASY Starter". The "EASY Starter" can be used as a diagnostic tool and for commissioning. |
|            | Bit 1 Fieldbus slave                                                            |                                                                                                                                                         |
|            | Bit 2 Dual network                                                              |                                                                                                                                                         |



# Configuring the firewall

| Address    | Name / setting range / [default setting]                                                  | Information                                                                                                                                             |
|------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x5912:072 | Registered ports: UI designer secure RAW: Client IP range                                 | Client IP range for the firewall to the "UI Designer secure-RAW" port.                                                                                  |
|            | <b>0 Any</b>                                                                              | All client IP addresses are permitted.                                                                                                                  |
|            | <b>1</b> IP range 1                                                                       | Only clients in the IP range 1 (0x5910:002 ... 0x5910:003) are permitted.                                                                               |
|            | <b>2</b> IP range 2                                                                       | Only clients in the IP range 2 (0x5910:004 ... 0x5910:005) are permitted.                                                                               |
|            | <b>3</b> IP range 3                                                                       | Only clients in the IP range 3 (0x5910:006 ... 0x5910:007) are permitted.                                                                               |
|            | <b>4</b> IP range 4                                                                       | Only clients in the IP range 4 (0x5910:008 ... 0x5910:009) are permitted.                                                                               |
| 0x5912:073 | Registered ports: UI designer secure RAW: Activation                                      | Action for the firewall for the "UI Designer secure-RAW" port.                                                                                          |
|            | <b>0 Drop</b>                                                                             | Reject the connection, do NOT notify the sender.                                                                                                        |
|            | <b>1</b> Reject                                                                           | Reject the connection, notify the sender.                                                                                                               |
|            | <b>2</b> Allow                                                                            | Allow connection.                                                                                                                                       |
| 0x5912:091 | Registered ports: PLC Designer gateway: Network 0 ... [0] ... 255                         | Network setting for the firewall for the "PLC Designer Gateway" port.                                                                                   |
|            | Bit 0 Engineering port                                                                    | Setting for diagnostic interface X16 for a connection to the "EASY Starter". The "EASY Starter" can be used as a diagnostic tool and for commissioning. |
|            | Bit 1 Fieldbus slave                                                                      |                                                                                                                                                         |
|            | Bit 2 Dual network                                                                        |                                                                                                                                                         |
| 0x5912:092 | Registered ports: PLC Designer gateway: Client IP range                                   | Client IP range for the firewall to the "PLC Designer Gateway" port.                                                                                    |
|            | <b>0 Any</b>                                                                              | All client IP addresses are permitted.                                                                                                                  |
|            | <b>1</b> IP range 1                                                                       | Only clients in the IP range 1 (0x5910:002 ... 0x5910:003) are permitted.                                                                               |
|            | <b>2</b> IP range 2                                                                       | Only clients in the IP range 2 (0x5910:004 ... 0x5910:005) are permitted.                                                                               |
|            | <b>3</b> IP range 3                                                                       | Only clients in the IP range 3 (0x5910:006 ... 0x5910:007) are permitted.                                                                               |
|            | <b>4</b> IP range 4                                                                       | Only clients in the IP range 4 (0x5910:008 ... 0x5910:009) are permitted.                                                                               |
| 0x5912:093 | Registered ports: PLC Designer gateway: Activation                                        | Action for the firewall for the "PLC Designer Gateway" port.                                                                                            |
|            | <b>0 Drop</b>                                                                             | Reject the connection, do NOT notify the sender.                                                                                                        |
|            | <b>1</b> Reject                                                                           | Reject the connection, notify the sender.                                                                                                               |
|            | <b>2</b> Allow                                                                            | Allow connection.                                                                                                                                       |
| 0x5912:101 | Registered ports: Lenze specific engineering access (SFTP/SCP): Network 0 ... [0] ... 255 | Network setting for the firewall for the port "Lenze-specific engineering access (SFTP/SCP)".                                                           |
|            | Bit 0 Engineering port                                                                    | Setting for diagnostic interface X16 for a connection to the "EASY Starter". The "EASY Starter" can be used as a diagnostic tool and for commissioning. |
|            | Bit 1 Fieldbus slave                                                                      |                                                                                                                                                         |
|            | Bit 2 Dual network                                                                        |                                                                                                                                                         |
| 0x5912:102 | Registered ports: Lenze specific engineering access (SFTP/SCP): Client IP range           | Client IP range for the firewall to the port "Lenze-specific engineering access (SFTP/SCP)".                                                            |
|            | <b>0 Any</b>                                                                              | All client IP addresses are permitted.                                                                                                                  |
|            | <b>1</b> IP range 1                                                                       | Only clients in the IP range 1 (0x5910:002 ... 0x5910:003) are permitted.                                                                               |
|            | <b>2</b> IP range 2                                                                       | Only clients in the IP range 2 (0x5910:004 ... 0x5910:005) are permitted.                                                                               |
|            | <b>3</b> IP range 3                                                                       | Only clients in the IP range 3 (0x5910:006 ... 0x5910:007) are permitted.                                                                               |
|            | <b>4</b> IP range 4                                                                       | Only clients in the IP range 4 (0x5910:008 ... 0x5910:009) are permitted.                                                                               |
| 0x5912:103 | Registered ports: Lenze specific engineering access (SFTP/SCP): Activation                | Action for the firewall for the port "Lenze-specific engineering access (SFTP/SCP)".                                                                    |
|            | <b>0 Drop</b>                                                                             | Reject the connection, do NOT notify the sender.                                                                                                        |
|            | <b>1</b> Reject                                                                           | Reject the connection, notify the sender.                                                                                                               |
|            | <b>2</b> Allow                                                                            | Allow connection.                                                                                                                                       |
| 0x5912:131 | Registered ports: SFTP/SCP: Network 0 ... [0] ... 255                                     | Network setting for the firewall for the "SFTP/SCP" port.                                                                                               |
|            | Bit 0 Engineering port                                                                    | Setting for diagnostic interface X16 for a connection to the "EASY Starter". The "EASY Starter" can be used as a diagnostic tool and for commissioning. |
|            | Bit 1 Fieldbus slave                                                                      |                                                                                                                                                         |
|            | Bit 2 Dual network                                                                        |                                                                                                                                                         |

# Configuring the firewall



| Address    | Name / setting range / [default setting]                                    |                  | Information                                                                                                                                             |
|------------|-----------------------------------------------------------------------------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x5912:132 | Registered ports: SFTP/SCP: Client IP range                                 |                  | Client IP range for the firewall to the "SFTP/SCP" port.                                                                                                |
|            | <b>0 Any</b>                                                                |                  | All client IP addresses are permitted.                                                                                                                  |
|            | 1 IP range 1                                                                |                  | Only clients in the IP range 1 (0x5910:002 ... 0x5910:003) are permitted.                                                                               |
|            | 2 IP range 2                                                                |                  | Only clients in the IP range 2 (0x5910:004 ... 0x5910:005) are permitted.                                                                               |
|            | 3 IP range 3                                                                |                  | Only clients in the IP range 3 (0x5910:006 ... 0x5910:007) are permitted.                                                                               |
|            | 4 IP range 4                                                                |                  | Only clients in the IP range 4 (0x5910:008 ... 0x5910:009) are permitted.                                                                               |
| 0x5912:133 | Registered ports: SFTP/SCP: Activation                                      |                  | Action for the firewall for the "SFTP/SCP" port.                                                                                                        |
|            | <b>0 Drop</b>                                                               |                  | Reject the connection, do NOT notify the sender.                                                                                                        |
|            | 1 Reject                                                                    |                  | Reject the connection, notify the sender.                                                                                                               |
|            | 2 Allow                                                                     |                  | Allow connection.                                                                                                                                       |
| 0x5912:151 | Registered ports: OPC UA PubSub (UADP): Network 0 ... [0] ... 255           |                  | Network setting for the firewall for the "OPC UA PubSub (UADP)" port.                                                                                   |
|            | Bit 0                                                                       | Engineering port | Setting for diagnostic interface X16 for a connection to the "EASY Starter". The "EASY Starter" can be used as a diagnostic tool and for commissioning. |
|            | Bit 1                                                                       | Fieldbus slave   |                                                                                                                                                         |
|            | Bit 2                                                                       | Dual network     |                                                                                                                                                         |
| 0x5912:152 | Registered ports: OPC UA PubSub (UADP): Client IP Range                     |                  | Client IP range for the firewall to the "OPC UA PubSub (UADP)" port.                                                                                    |
|            | <b>0 Any</b>                                                                |                  | All client IP addresses are permitted.                                                                                                                  |
|            | 1 IP range 1                                                                |                  | Only clients in the IP range 1 (0x5910:002 ... 0x5910:003) are permitted.                                                                               |
|            | 2 IP range 2                                                                |                  | Only clients in the IP range 2 (0x5910:004 ... 0x5910:005) are permitted.                                                                               |
|            | 3 IP range 3                                                                |                  | Only clients in the IP range 3 (0x5910:006 ... 0x5910:007) are permitted.                                                                               |
|            | 4 IP range 4                                                                |                  | Only clients in the IP range 4 (0x5910:008 ... 0x5910:009) are permitted.                                                                               |
| 0x5912:153 | Registered ports: OPC UA PubSub (UADP): Activation<br>• Read only           |                  | Action for the firewall for the "OPC UA PubSub (UADP)" port.                                                                                            |
|            | 0 Drop                                                                      |                  | Reject the connection, do NOT notify the sender.                                                                                                        |
|            | 1 Reject                                                                    |                  | Reject the connection, notify the sender.                                                                                                               |
|            | 2 Allow                                                                     |                  | Allow connection.                                                                                                                                       |
| 0x5913:001 | Application ports: Application port 1: Network 0 ... [0] ... 255            |                  | Network setting for firewall to application port 1.                                                                                                     |
|            | Bit 0                                                                       | Engineering port | Setting for diagnostic interface X16 for a connection to the "EASY Starter". The "EASY Starter" can be used as a diagnostic tool and for commissioning. |
|            | Bit 1                                                                       | Fieldbus slave   |                                                                                                                                                         |
|            | Bit 2                                                                       | Dual network     |                                                                                                                                                         |
| 0x5913:002 | Application ports: Application port 1: Client IP range                      |                  | Client IP range for the firewall to application port 1.                                                                                                 |
|            | <b>0 Any</b>                                                                |                  | All client IP addresses are permitted.                                                                                                                  |
|            | 1 IP range 1                                                                |                  | Only clients in the IP range 1 (0x5910:002 ... 0x5910:003) are permitted.                                                                               |
|            | 2 IP range 2                                                                |                  | Only clients in the IP range 2 (0x5910:004 ... 0x5910:005) are permitted.                                                                               |
|            | 3 IP range 3                                                                |                  | Only clients in the IP range 3 (0x5910:006 ... 0x5910:007) are permitted.                                                                               |
|            | 4 IP range 4                                                                |                  | Only clients in the IP range 4 (0x5910:008 ... 0x5910:009) are permitted.                                                                               |
| 0x5913:003 | Application ports: Application port 1: Activation                           |                  | Action for the firewall to application port 1.                                                                                                          |
|            | <b>0 Drop</b>                                                               |                  | Reject the connection, do NOT notify the sender.                                                                                                        |
|            | 1 Reject                                                                    |                  | Reject the connection, notify the sender.                                                                                                               |
|            | 2 Allow                                                                     |                  | Allow connection.                                                                                                                                       |
| 0x5913:007 | Application ports: Application port 1: Protocol type                        |                  | Permitted protocols for the firewall to application port 1.                                                                                             |
|            | <b>0 None</b>                                                               |                  | TCP and UDP protocols are blocked.                                                                                                                      |
|            | 1 TCP                                                                       |                  | Only TCP protocols are allowed, UDP protocols are blocked.                                                                                              |
|            | 2 UDP                                                                       |                  | Only UDP protocols are allowed, TCP protocols are blocked.                                                                                              |
|            | 3 TCP & UDP                                                                 |                  | TCP and UDP protocols are permitted.                                                                                                                    |
| 0x5913:008 | Application ports: Application port 1: Port range start 0 ... [0] ... 65535 |                  | Start of the port range used for application port 1.                                                                                                    |
| 0x5913:009 | Application ports: Application port 1: Port range end 0 ... [0] ... 65535   |                  | End of the port range used for application port 1.                                                                                                      |
| 0x5913:010 | Application ports: Application port 1: Protocol name ["0"]                  |                  | Freely selectable name as a guide for programmers for application port 1. This name is for information purposes only and has no function.               |



# Configuring the firewall

| Address    | Name / setting range / [default setting]                                    | Information                                                                                                                                             |
|------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x5913:011 | Application ports: Application port 2: Network 0 ... [0] ... 255            | Network setting for the firewall to application port 2.                                                                                                 |
|            | Bit 0 Engineering port                                                      | Setting for diagnostic interface X16 for a connection to the "EASY Starter". The "EASY Starter" can be used as a diagnostic tool and for commissioning. |
|            | Bit 1 Fieldbus slave                                                        |                                                                                                                                                         |
|            | Bit 2 Dual network                                                          |                                                                                                                                                         |
| 0x5913:012 | Application ports: Application port 2: Client IP range                      | Client IP range for the firewall to application port 2.                                                                                                 |
|            | 0 Any                                                                       | All client IP addresses are permitted.                                                                                                                  |
|            | 1 IP range 1                                                                | Only clients in the IP range 1 (0x5910:002 ... 0x5910:003) are permitted.                                                                               |
|            | 2 IP range 2                                                                | Only clients in the IP range 2 (0x5910:004 ... 0x5910:005) are permitted.                                                                               |
|            | 3 IP range 3                                                                | Only clients in the IP range 3 (0x5910:006 ... 0x5910:007) are permitted.                                                                               |
|            | 4 IP range 4                                                                | Only clients in the IP range 4 (0x5910:008 ... 0x5910:009) are permitted.                                                                               |
| 0x5913:013 | Application ports: Application port 2: Activation                           | Action for the firewall to application port 2.                                                                                                          |
|            | 0 Drop                                                                      | Reject the connection, do NOT notify the sender.                                                                                                        |
|            | 1 Reject                                                                    | Reject the connection, notify the sender.                                                                                                               |
|            | 2 Allow                                                                     | Allow connection.                                                                                                                                       |
| 0x5913:017 | Application ports: Application port 2: Protocol type                        | Permitted protocols for the firewall to application port 2.                                                                                             |
|            | 0 None                                                                      | TCP and UDP protocols are blocked.                                                                                                                      |
|            | 1 TCP                                                                       | Only TCP protocols are allowed, UDP protocols are blocked.                                                                                              |
|            | 2 UDP                                                                       | Only UDP protocols are allowed, TCP protocols are blocked.                                                                                              |
|            | 3 TCP & UDP                                                                 | TCP and UDP protocols are permitted.                                                                                                                    |
| 0x5913:018 | Application ports: Application port 2: Port range start 0 ... [0] ... 65535 | Start of the port range used for application port 2.                                                                                                    |
| 0x5913:019 | Application ports: Application port 2: Port range end 0 ... [0] ... 65535   | End of the port range used for application port 2.                                                                                                      |
| 0x5913:020 | Application ports: Application port 2: Protocol name ["0"]                  | Freely selectable name as a guide for programmers for application port 2. This name is for information purposes only and has no function.               |
| 0x5913:021 | Application ports: Application port 3: Network 0 ... [0] ... 255            | Network setting for the firewall to application port 3.                                                                                                 |
|            | Bit 0 Engineering port                                                      | Setting for diagnostic interface X16 for a connection to the "EASY Starter". The "EASY Starter" can be used as a diagnostic tool and for commissioning. |
|            | Bit 1 Fieldbus slave                                                        |                                                                                                                                                         |
|            | Bit 2 Dual network                                                          |                                                                                                                                                         |
| 0x5913:022 | Application ports: Application port 3: Client IP range                      | Client IP range for the firewall to application port 3.                                                                                                 |
|            | 0 Any                                                                       | All client IP addresses are permitted.                                                                                                                  |
|            | 1 IP range 1                                                                | Only clients in the IP range 1 (0x5910:002 ... 0x5910:003) are permitted.                                                                               |
|            | 2 IP range 2                                                                | Only clients in the IP range 2 (0x5910:004 ... 0x5910:005) are permitted.                                                                               |
|            | 3 IP range 3                                                                | Only clients in the IP range 3 (0x5910:006 ... 0x5910:007) are permitted.                                                                               |
|            | 4 IP range 4                                                                | Only clients in the IP range 4 (0x5910:008 ... 0x5910:009) are permitted.                                                                               |
| 0x5913:023 | Application ports: Application port 3: Activation                           | Action for the firewall to application port 3.                                                                                                          |
|            | 0 Drop                                                                      | Reject the connection, do NOT notify the sender.                                                                                                        |
|            | 1 Reject                                                                    | Reject the connection, notify the sender.                                                                                                               |
|            | 2 Allow                                                                     | Allow connection.                                                                                                                                       |
| 0x5913:027 | Application ports: Application port 3: Protocol type                        | Permitted protocols for the firewall to application port 3.                                                                                             |
|            | 0 None                                                                      | TCP and UDP protocols are blocked.                                                                                                                      |
|            | 1 TCP                                                                       | Only TCP protocols are allowed, UDP protocols are blocked.                                                                                              |
|            | 2 UDP                                                                       | Only UDP protocols are allowed, TCP protocols are blocked.                                                                                              |
|            | 3 TCP & UDP                                                                 | TCP and UDP protocols are permitted.                                                                                                                    |
| 0x5913:028 | Application ports: Application port 3: Port range start 0 ... [0] ... 65535 | Start of the port range used for application port 3.                                                                                                    |
| 0x5913:029 | Application ports: Application port 3: Port range end 0 ... [0] ... 65535   | End of the port range used for application port 3.                                                                                                      |
| 0x5913:030 | Application ports: Application port 3: Protocol name ["0"]                  | Freely selectable name as a guide for programmers for application port 3. This name is for information purposes only and has no function.               |



| Address    | Name / setting range / [default setting]                                       | Information                                                                                                                                             |
|------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x5913:031 | Application ports: Application port 4: Network<br>0 ... [0] ... 255            | Network setting for the firewall to application port 4.                                                                                                 |
|            | Bit 0 Engineering port                                                         | Setting for diagnostic interface X16 for a connection to the "EASY Starter". The "EASY Starter" can be used as a diagnostic tool and for commissioning. |
|            | Bit 1 Fieldbus slave                                                           |                                                                                                                                                         |
|            | Bit 2 Dual network                                                             |                                                                                                                                                         |
| 0x5913:032 | Application ports: Application port 4: Client IP range                         | Client IP range for the firewall to application port 4.                                                                                                 |
|            | 0 Any                                                                          | All client IP addresses are permitted.                                                                                                                  |
|            | 1 IP range 1                                                                   | Only clients in the IP range 1 (0x5910:002 ... 0x5910:003) are permitted.                                                                               |
|            | 2 IP range 2                                                                   | Only clients in the IP range 2 (0x5910:004 ... 0x5910:005) are permitted.                                                                               |
|            | 3 IP range 3                                                                   | Only clients in the IP range 3 (0x5910:006 ... 0x5910:007) are permitted.                                                                               |
|            | 4 IP range 4                                                                   | Only clients in the IP range 4 (0x5910:008 ... 0x5910:009) are permitted.                                                                               |
| 0x5913:033 | Application ports: Application port 4: Activation                              | Action for the firewall to application port 4.                                                                                                          |
|            | 0 Drop                                                                         | Reject the connection, do NOT notify the sender.                                                                                                        |
|            | 1 Reject                                                                       | Reject the connection, notify the sender.                                                                                                               |
|            | 2 Allow                                                                        | Allow connection.                                                                                                                                       |
| 0x5913:037 | Application ports: Application port 4: Protocol type                           | Permitted protocols for the firewall to application port 4.                                                                                             |
|            | 0 None                                                                         | TCP and UDP protocols are blocked.                                                                                                                      |
|            | 1 TCP                                                                          | Only TCP protocols are allowed, UDP protocols are blocked.                                                                                              |
|            | 2 UDP                                                                          | Only UDP protocols are allowed, TCP protocols are blocked.                                                                                              |
|            | 3 TCP & UDP                                                                    | TCP and UDP protocols are permitted.                                                                                                                    |
| 0x5913:038 | Application ports: Application port 4: Port range start<br>0 ... [0] ... 65535 | Start of the port range used for application port 4.                                                                                                    |
| 0x5913:039 | Application ports: Application port 4: Port range end<br>0 ... [0] ... 65535   | End of the port range used for application port 4.                                                                                                      |
| 0x5913:040 | Application ports: Application port 4: Protocol name<br>["0"]                  | Freely selectable name as a guide for programmers for application port 4. This name is for information purposes only and has no function.               |



## 11 Configuring OPC UA

OPC UA (Open Platform Communications Unified Architecture) is a globally recognized communication framework that is standardized by the IEC 62541 series of standards. It is currently the most promising standard for the implementation of Industry 4.0 communication, in which machine data can be exchanged regardless of manufacturer and platform.

OPC UA is represented as a standard by the OPC Foundation: [opcfoundation.org](https://opcfoundation.org)

The following OPC UA functions/services are integrated in the controller:

- ▶ OPC UA server 124
- ▶ OPC UA client 130
- ▶ OPC UA PubSub 131

# Configuring OPC UA

OPC UA server  
Basic setting



## 11.1 OPC UA server

The integrated OPC UA server can be used to publish PLC variables via OPC UA in accordance with IEC 61131. For example, visualization connections or MES, SCADA or cloud connections that require easy access to PLC variables can be implemented. It is also possible to map the PLC variables to user-specific information models that can be derived from Companion Specifications. In addition to variables, OPC UA methods and events can also be mapped to the PLC application.

### 11.1.1 Basic setting

#### Parameter

| Address    | Name / setting range / [default setting]                                                 | Information                                              |
|------------|------------------------------------------------------------------------------------------|----------------------------------------------------------|
| 0x2470:001 | OPC UA server control: Restart server                                                    | Restart OPC UA server.                                   |
|            | <b>0 No action/no error</b>                                                              | Only status feedback                                     |
|            | 1 Restart with current values                                                            | Execute device command                                   |
|            | 10 In process                                                                            | Only status feedback                                     |
|            | 11 Action cancelled                                                                      |                                                          |
|            | 12 Fault                                                                                 |                                                          |
| 0x2471:013 | OPC UA server settings: Min. publishing intervall<br>100 ... [ <b>100</b> ] ... 10000 ms | Minimum possible publishing interval for notifications.  |
| 0x2471:014 | OPC UA server settings: Min. sample intervall<br>100 ... [ <b>100</b> ] ... 10000 ms     | Minimum possible sampling interval of monitored items.   |
| 0x2471:051 | OPC UA server settings: PLCopen model array expansion                                    |                                                          |
|            | 0 Disabled                                                                               |                                                          |
|            | <b>1 Enabled</b>                                                                         |                                                          |
| 0x2471:103 | OPC UA server settings: Max. number of external sessions<br>0 ... [ <b>1</b> ] ... 3     | Maximum permitted number of external client connections. |



# Configuring OPC UA

OPC UA server  
Diagnostics  
Active OPC UA server settings

| Address    | Name / setting range / [default setting]                                                   | Information |
|------------|--------------------------------------------------------------------------------------------|-------------|
| 0x2471:055 | OPC UA server settings: Public filesystem                                                  |             |
|            | <b>0 Disabled</b>                                                                          |             |
|            | 1 Enabled                                                                                  |             |
| 0x2471:129 | OPC UA server settings: Provisioning mode                                                  |             |
|            | <b>0 Deactivated</b>                                                                       |             |
|            | 1 Activated (automatic)                                                                    |             |
|            | 2 Activated (forced)                                                                       |             |
| 0x2471:130 | OPC UA server settings: Accept untrusted client certificates                               |             |
|            | <b>0 Deactivated</b>                                                                       |             |
|            | 1 Activated                                                                                |             |
| 0x2471:131 | OPC UA server settings: Product name<br>["Lenze Controller OPC UA Server"]                 |             |
| 0x2471:132 | OPC UA server settings: Product URI<br>["Lenze:Controller:OPCUAServer"]                    |             |
| 0x2471:133 | OPC UA server settings: Application name<br>["Lenze Controller OPC UA Server@[hostname]"]  |             |
| 0x2471:134 | OPC UA server settings: Application URI<br>["urn:[hostname]:Lenze:Controller:OPCUAServer"] |             |
| 0x2471:135 | OPC UA server settings: Server Endpoint IP<br>0 ... [0] ... 65535                          |             |
| 0x2471:141 | OPC UA server settings: Certificate country<br>["DE"]                                      |             |
| 0x2471:142 | OPC UA server settings: Certificate domain component<br>["lenze.com"]                      |             |
| 0x2471:143 | OPC UA server settings: Certificate locality<br>["Aerzen"]                                 |             |
| 0x2471:144 | OPC UA server settings: Certificate organization<br>["Lenze"]                              |             |
| 0x2471:145 | OPC UA server settings: Certificate organization unit<br>["Controls"]                      |             |
| 0x2471:146 | OPC UA server settings: Certificate state<br>["Niedersachsen"]                             |             |
| 0x2471:147 | OPC UA server settings: Certificate alternative IPs<br>["0"]                               |             |
| 0x2471:150 | OPC UA server settings: GDS client mode                                                    |             |
|            | <b>0 Disabled</b>                                                                          |             |
|            | 1 Enabled (registration)                                                                   |             |
|            | 2 Enabled (registration + pull)                                                            |             |
| 0x2471:156 | OPC UA server settings: GDS endpoint URL<br>["0"]                                          |             |
| 0x2471:157 | OPC UA server settings: GDS user<br>["0"]                                                  |             |
| 0x2471:158 | OPC UA server settings: GDS password<br>["0"]                                              |             |
| 0x2471:159 | OPC UA server settings: GDS hostname check                                                 |             |
|            | <b>0 Disabled</b>                                                                          |             |
|            | 1 Enabled                                                                                  |             |

## 11.1.2 Diagnostics

### 11.1.2.1 Active OPC UA server settings

#### Parameter

| Address    | Name / setting range / [default setting]                                   | Information                                              |
|------------|----------------------------------------------------------------------------|----------------------------------------------------------|
| 0x2472:011 | Active OPC UA server settings: Max. number of subscriptions<br>• Read only | Display of the maximum possible number of subscriptions. |

# Configuring OPC UA

OPC UA server

Diagnostics

Active OPC UA server settings



| Address    | Name / setting range / [default setting]                                       | Information                                                                            |
|------------|--------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 0x2472:012 | Active OPC UA server settings: Max. number of monitored items<br>• Read only   | Display of the maximum possible number of monitored items.                             |
| 0x2472:013 | Active OPC UA server settings: Min. publishing intervall<br>• Read only        | Display of the minimum possible publishing interval for notifications.                 |
| 0x2472:014 | Active OPC UA server settings: Min. sample intervall<br>• Read only            | Display of the minimum possible sampling interval of monitored items.                  |
| 0x2472:051 | Active OPC UA server settings: PLCopen model array expansion<br>• Read only    |                                                                                        |
|            | 0 Disabled                                                                     |                                                                                        |
|            | 1 Enabled                                                                      |                                                                                        |
| 0x2472:055 | Active OPC UA server settings: Public filesystem<br>• Read only                | Indicates whether the public file system is activated in the OPC UA information model. |
|            | 0 Disabled                                                                     |                                                                                        |
|            | 1 Enabled                                                                      |                                                                                        |
| 0x2472:103 | Active OPC UA server settings: Max. number of external sessions<br>• Read only | Display of the maximum permitted number of external client connections.                |



# Configuring OPC UA

OPC UA server  
Diagnostics  
OPC UA server diagnostics

| Address    | Name / setting range / [default setting]                            | Information |
|------------|---------------------------------------------------------------------|-------------|
| 0x2472:129 | Active OPC UA server settings: Provisioning mode                    |             |
|            | • Read only                                                         |             |
|            | 0 Deactivated                                                       |             |
|            | 1 Activated (automatic)                                             |             |
| 0x2472:130 | Active OPC UA server settings: Accept untrusted client certificates |             |
|            | • Read only                                                         |             |
|            | 0 Deactivated                                                       |             |
| 0x2472:131 | Active OPC UA server settings: Product name                         |             |
|            | • Read only                                                         |             |
| 0x2472:132 | Active OPC UA server settings: Product URI                          |             |
|            | • Read only                                                         |             |
| 0x2472:133 | Active OPC UA server settings: Application name                     |             |
|            | • Read only                                                         |             |
| 0x2472:134 | Active OPC UA server settings: Application URI                      |             |
|            | • Read only                                                         |             |
| 0x2472:135 | Active OPC UA server settings: Server Endpoint IP                   |             |
|            | • Read only                                                         |             |
| 0x2472:141 | Active OPC UA server settings: Certificate country                  |             |
|            | • Read only                                                         |             |
| 0x2472:142 | Active OPC UA server settings: Certificate domain component         |             |
|            | • Read only                                                         |             |
| 0x2472:143 | Active OPC UA server settings: Certificate locality                 |             |
|            | • Read only                                                         |             |
| 0x2472:144 | Active OPC UA server settings: Certificate organization             |             |
|            | • Read only                                                         |             |
| 0x2472:145 | Active OPC UA server settings: Certificate organization unit        |             |
|            | • Read only                                                         |             |
| 0x2472:146 | Active OPC UA server settings: Certificate state                    |             |
|            | • Read only                                                         |             |
| 0x2472:147 | Active OPC UA server settings: Certificate alternative IPs          |             |
|            | • Read only                                                         |             |
| 0x2472:150 | Active OPC UA server settings: GDS client mode                      |             |
|            | • Read only                                                         |             |
|            | 0 Disabled                                                          |             |
|            | 1 Enabled (registration)                                            |             |
|            | 2 Enabled (registration + pull)                                     |             |

## 11.1.2.2 OPC UA server diagnostics

### Parameter

| Address    | Name / setting range / [default setting] | Information                                                                                  |
|------------|------------------------------------------|----------------------------------------------------------------------------------------------|
| 0x2473:001 | OPC UA server diagnosis: State           | Display of the current status of the OPC UA server according to OPC UA specification Part 5. |
|            | • Read only                              |                                                                                              |
|            | 0 Running                                |                                                                                              |
|            | 1 Failed                                 |                                                                                              |
|            | 2 No configuration                       |                                                                                              |
|            | 3 Suspended                              |                                                                                              |
|            | 4 Shutdown                               |                                                                                              |
|            | 5 Test                                   |                                                                                              |
|            | 6 Communication fault                    |                                                                                              |
|            | 7 Unknown                                |                                                                                              |

# Configuring OPC UA

OPC UA server  
Diagnostics  
OPC UA server diagnostics



| Address    | Name / setting range / [default setting]                                        | Information                                                                                        |
|------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| 0x2473:002 | OPC UA server diagnosis: Error<br>• Read only                                   | Display of the current error status of the OPC UA server, which leads to a functional restriction. |
| 0x2473:011 | OPC UA server diagnosis: Used number of subscriptions<br>• Read only            | Display of the number of subscriptions currently in use.                                           |
| 0x2473:012 | OPC UA server diagnosis: Used number of monitored items<br>• Read only          | Display of the currently used number of monitored items.                                           |
| 0x2473:052 | OPC UA server diagnosis: PLCOpen model resource utilization<br>• Read only: x % | Display of the current resource utilization of the PLCOpen information model.                      |
| 0x2473:053 | OPC UA server diagnosis: User model resource utilization<br>• Read only: x %    | Display of the current resource utilization of the user-specific information model.                |
| 0x2473:101 | OPC UA server diagnosis: Used number of engineering sessions<br>• Read only     | Display of the number of Lenze Engineering Client sessions currently in use.                       |
| 0x2473:102 | OPC UA server diagnosis: Used number of system sessions<br>• Read only          | Display of the number of Lenze System Client sessions currently in use.                            |
| 0x2473:103 | OPC UA server diagnosis: Used number of external sessions<br>• Read only        | Display of the number of external client sessions currently in use.                                |
| 0x2473:130 | OPC UA server diagnosis: Client of external session 1<br>• Read only            |                                                                                                    |
| 0x2473:131 | OPC UA server diagnosis: Client of external session 2<br>• Read only            |                                                                                                    |
| 0x2473:132 | OPC UA server diagnosis: Client of external session 3<br>• Read only            |                                                                                                    |
| 0x2473:133 | OPC UA server diagnosis: Client of external session 4<br>• Read only            |                                                                                                    |
| 0x2473:134 | OPC UA server diagnosis: Client of external session 5<br>• Read only            |                                                                                                    |
| 0x2473:135 | OPC UA server diagnosis: Client of external session 6<br>• Read only            |                                                                                                    |
| 0x2473:136 | OPC UA server diagnosis: Client of external session 7<br>• Read only            |                                                                                                    |
| 0x2473:137 | OPC UA server diagnosis: Client of external session 8<br>• Read only            |                                                                                                    |
| 0x2473:138 | OPC UA server diagnosis: Client of external session 9<br>• Read only            |                                                                                                    |
| 0x2473:139 | OPC UA server diagnosis: Client of external session 10<br>• Read only           |                                                                                                    |
| 0x2473:140 | OPC UA server diagnosis: Client of external session 11<br>• Read only           |                                                                                                    |
| 0x2473:141 | OPC UA server diagnosis: Client of external session 12<br>• Read only           |                                                                                                    |



# Configuring OPC UA

OPC UA server  
Diagnostics  
OPC UA server diagnostics

| Address    | Name / setting range / [default setting]                              | Information |
|------------|-----------------------------------------------------------------------|-------------|
| 0x2473:190 | OPC UA server diagnosis: GDS client state<br>• Read only              |             |
|            | 0 Disabled                                                            |             |
|            | 1 Disconnected                                                        |             |
|            | 2 Connecting                                                          |             |
|            | 3 Register application                                                |             |
|            | 4 Get certificate status                                              |             |
|            | 5 Start signing request                                               |             |
|            | 6 Finish signing request                                              |             |
|            | 7 Update trustlist                                                    |             |
|            | 8 Disconnecting                                                       |             |
|            | 9 Reconnecting                                                        |             |
| 0x2473:191 | OPC UA server diagnosis: GDS client registration state<br>• Read only |             |
|            | 0 Unregistered                                                        |             |
|            | 1 Registered                                                          |             |
|            | 2 Registration failed                                                 |             |
| 0x2473:192 | OPC UA server diagnosis: GDS certificates state<br>• Read only        |             |
|            | 0 Idle                                                                |             |
|            | 1 Updated                                                             |             |
|            | 2 Update failed                                                       |             |
| 0x2473:193 | OPC UA server diagnosis: GDS certificates update<br>• Read only: x ms |             |
| 0x2473:194 | OPC UA server diagnosis: GDS trust list state<br>• Read only          |             |
|            | 0 Idle                                                                |             |
|            | 1 Updated                                                             |             |
|            | 2 Update failed                                                       |             |
| 0x2473:195 | OPC UA server diagnosis: GDS trust list update<br>• Read only: x ms   |             |



## 11.2 OPC UA client

To establish a connection from the PLC application to external instances via OPC UA, the IEC library "L\_IOCP\_OPUCUAClient" provides an OPC UA client according to PLCopen. This allows applications such as control to control or control to any external data source to be solved.

To implement the use cases, the client provides the following services and functions, among others:

- Secured communication
- Reading and writing of data
- Calling server methods

### 11.2.1 Basic setting

#### Parameter

| Address    | Name / setting range / [default setting]           | Information |
|------------|----------------------------------------------------|-------------|
| 0x2477:100 | OPC UA client settings: Client 1 user<br>["0"]     |             |
| 0x2477:101 | OPC UA client settings: Client 1 password<br>["0"] |             |
| 0x2477:102 | OPC UA client settings: Client 2 user<br>["0"]     |             |
| 0x2477:103 | OPC UA client settings: Client 2 password<br>["0"] |             |
| 0x2477:104 | OPC UA client settings: Client 3 user<br>["0"]     |             |
| 0x2477:105 | OPC UA client settings: Client 3 password<br>["0"] |             |
| 0x2477:106 | OPC UA client settings: Client 4 user<br>["0"]     |             |
| 0x2477:107 | OPC UA client settings: Client 4 password<br>["0"] |             |
| 0x2477:108 | OPC UA client settings: Client 5 user<br>["0"]     |             |
| 0x2477:109 | OPC UA client settings: Client 5 password<br>["0"] |             |
| 0x2477:110 | OPC UA client settings: Client 6 user<br>["0"]     |             |
| 0x2477:111 | OPC UA client settings: Client 6 password<br>["0"] |             |



## 11.3 OPC UA PubSub

The "OPC UA PubSub" functionality is available for communication from controller to controller or from controller to several receivers. This makes it possible to communicate PLC data cyclically without a dedicated connection.

### 11.3.1 Basic setting

#### Parameter

| Address    | Name / setting range / [default setting]                                          | Information                           |
|------------|-----------------------------------------------------------------------------------|---------------------------------------|
| 0x247B:001 | OPC UA PubSub control: Activation                                                 | Activate or deactivate OPC UA PubSub. |
|            | <b>0 Disabled</b>                                                                 |                                       |
|            | 1 Enabled                                                                         |                                       |
| 0x247B:002 | OPC UA PubSub control: Restart PubSub                                             | Restart OPC UA PubSub..               |
|            | <b>0 No action/no error</b>                                                       | Only status feedback                  |
|            | 1 Restart with current values                                                     | Execute device command                |
|            | 10 In process                                                                     | Only status feedback                  |
|            | 11 Action cancelled                                                               |                                       |
|            | 12 Fault                                                                          |                                       |
| 0x247C:001 | OPC UA PubSub settings: PubSub config mode                                        |                                       |
|            | <b>0 Static</b>                                                                   |                                       |
|            | 1 Dynamic                                                                         |                                       |
|            | 2 Dynamic persistent                                                              |                                       |
| 0x247C:013 | OPC UA PubSub settings: Min. publishing intervall<br>50 ... <b>[50]</b> ... 10000 |                                       |
| 0x247C:130 | OPC UA PubSub settings: SKS server activation                                     |                                       |
|            | <b>0 Disabled</b>                                                                 |                                       |
|            | 1 Enabled                                                                         |                                       |
| 0x247C:150 | OPC UA PubSub settings: SKS client mode                                           |                                       |
|            | <b>0 Disabled</b>                                                                 |                                       |
|            | 1 Pull enabled                                                                    |                                       |
| 0x247C:156 | OPC UA PubSub settings: SKS endpoint URL<br>["0"]                                 |                                       |
| 0x247C:157 | OPC UA PubSub settings: SKS user<br>["0"]                                         |                                       |
| 0x247C:158 | OPC UA PubSub settings: SKS password<br>["0"]                                     |                                       |
| 0x247C:159 | OPC UA PubSub settings: SKS hostname check                                        |                                       |
|            | <b>0 Disabled</b>                                                                 |                                       |
|            | 1 Enabled                                                                         |                                       |



## 11.3.2 Diagnostics

### Parameter

| Address    | Name / setting range / [default setting]                                | Information |
|------------|-------------------------------------------------------------------------|-------------|
| 0x247D:001 | Active OPC UA PubSub settings: PubSub config mode<br>• Read only        |             |
|            | 0 Static                                                                |             |
|            | 1 Dynamic                                                               |             |
|            | 2 Dynamic persistent                                                    |             |
| 0x247D:013 | Active OPC UA PubSub settings: Min. publishing intervall<br>• Read only |             |
| 0x247D:130 | Active OPC UA PubSub settings: SKS server activation<br>• Read only     |             |
|            | 0 Disabled                                                              |             |
|            | 1 Enabled                                                               |             |
| 0x247D:150 | Active OPC UA PubSub settings: SKS client mode<br>• Read only           |             |
|            | 0 Disabled                                                              |             |
|            | 1 Pull enabled                                                          |             |
| 0x247E:001 | OPC UA PubSub diagnosis: PubSub state<br>• Read only                    |             |
|            | 0 Disabled                                                              |             |
|            | 1 Enabled                                                               |             |
|            | 2 Running                                                               |             |
|            | 3 Error                                                                 |             |
|            | 4 No license                                                            |             |
|            | 5 Unknown                                                               |             |
|            | 6 Partially running                                                     |             |
| 0x247E:002 | OPC UA PubSub diagnosis: Configured connections<br>• Read only          |             |
| 0x247E:003 | OPC UA PubSub diagnosis: Configured publisher<br>• Read only            |             |
| 0x247E:004 | OPC UA PubSub diagnosis: Configured subscriber<br>• Read only           |             |
| 0x247E:050 | OPC UA PubSub diagnosis: SKS client state<br>• Read only                |             |
|            | 0 Disabled                                                              |             |
|            | 1 Disconnected                                                          |             |
|            | 2 Connecting                                                            |             |
|            | 3 Get security keys                                                     |             |
|            | 4 Disconnecting                                                         |             |
|            | 5 Reconnecting                                                          |             |
| 0x247E:051 | OPC UA PubSub diagnosis: SKS Keys State<br>• Read only                  |             |
|            | 0 Idle                                                                  |             |
|            | 1 Updated                                                               |             |
|            | 2 Update failed                                                         |             |



## 12 Device functions

### 12.1 Device identification

The controller consists of various partial components. The current versions are visible in a set of parameters.

#### Parameter

| Address    | Name / setting range / [default setting]                           | Information                                                                         |
|------------|--------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 0x2000:001 | Device data: Product code<br>• Read only                           | Product ID of the controller<br>Example: "C43AE50S00A010004S".                      |
| 0x2000:002 | Device data: Serial number<br>• Read only                          | Serial number of the controller<br>Example: "0000000000000000XYZYZ"                 |
| 0x2000:003 | Device data: Production date<br>• Read only                        | The date of manufacture and the time of the device, e.g.:<br>"2019-08-01 00:00:00Z" |
| 0x2000:004 | Device data: CU firmware version<br>• Read only                    | Firmware version of the controller<br>Example: "01.00.01.00".                       |
| 0x2000:006 | Device data: CU bootloader version<br>• Read only                  | Boot loader version of the controller                                               |
| 0x2000:015 | Device data: Communication firmware revision number<br>• Read only | Firmware version of the network option.                                             |
| 0x2000:020 | Device data: CPU name<br>• Read only                               | Version of the hardware driver                                                      |
| 0x2000:030 | Device data: CU operating system version<br>• Read only            | Version of the operating system                                                     |
| 0x2002:006 | Device module: CU serial number<br>• Read only                     | Serial number of the CPU module<br>Parameter not available in this device.          |
| 0x2002:020 | Device module: Driver version<br>• Read only                       | CPU type identification                                                             |



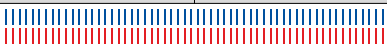
## 12.2 Optical device identification

For applications including several controllers it may be difficult to locate a device that has been connected online. The "Optical device identification" function serves to locate the controller by means of blinking LEDs.

### Details

In order to start the visual tracking, set [0x2021:001](#) = "Start [1]".

After the start, both LEDs "RDY" and "ERR" on the front of the controller synchronously blink very fast.

| "RDY" LED (blue)                                                                                                                                   | "ERR" LED (red) | Status/meaning                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------|
|  <p>Both LEDs are blinking in a very rapidly synchronous mode</p> |                 | "Visual tracking" function is active. |

The blinking rate can be set in [0x2021:002](#).

### Parameter

| Address    | Name / setting range / [default setting]                    | Information                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2021:001 | Optical tracking: Start detection                           | <p>1 = start optical device identification.</p> <ul style="list-style-type: none"> <li>After the start, the two LEDs "RDY" and "ERR" on the front of the controller are blinking with a blinking frequency of 20 Hz for the blinking duration set in <a href="#">0x2021:002</a>. The setting is then automatically reset to "0" again.</li> <li>If the function is reactivated within the blinking time set, the time is extended correspondingly.</li> <li>A manual reset to "0" makes it possible to stop the function prematurely.</li> </ul> |
|            | 0 Stop                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | 1 Start                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 0x2021:002 | Optical tracking: Blinking duration<br>0 ... [5] ... 3600 s | Setting of the blinking duration for the visual tracking.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |



## 12.3 Switch-off behavior

The controller has internal buffer capacitors to save data during the shutdown process. This memory function is initiated automatically if a voltage failure is detected.



Certain circuit sections, e.g. backplane bus supply and USB, are switched off directly in the event of voltage failure in order to maintain voltage for the internal saving process for a constant amount of time.

### 12.3.1 Retain variables and persistent variables

#### Retain variables

The controller automatically saves retain variables in the event of voltage failure. In this way, they remain available when operation resumes. Retain variables are reinitialized when devices are reset or a new PLC program is downloaded. The values are preserved in the event of an online change.

#### Example

The values of a drive system which can no longer be read out from the machine due to a voltage failure should be persistent. These values should also be persistent if the corresponding value only changes through the influence of the PLC.

| Variable                          | Use case                                                                                 | Storage      |
|-----------------------------------|------------------------------------------------------------------------------------------|--------------|
| Thermal sensor                    | Changes, requires a sensor system.                                                       | Not required |
| Position value                    | Available via absolute value encoder.                                                    | Not required |
| Number of parts in buffer storage | Should be persistent so the value is not lost in the event of a reset or program change. | Persistent   |
| Position of a conveyor line       | Position should remain stored. Homing takes place.                                       | Retain       |

#### Example code

```
VAR RETAIN
remvar1: INT; (* 1. Remanent variable*)
END_VAR
```

#### Persistent variables

Persistent variables also remain stored in the event of a stop, restart, online change, or PLC program download.

Persistent variables are saved when the device is switched off. Persistent variables are reinitialized by executing "RESET origin".

How to create persistent variables:

Precondition

- Access to »PLC Designer«
1. Right-click on Application.
  2. Select New object.
  3. Click on Persistent variables.

#### Example code

```
VAR_GLOBAL PERSISTENT RETAIN
uiPerRetain : ARRAY[0..1000] OF UINT; (* Declaration of persistent variable*)
END_VAR
```



### 12.4 Controller restart/software reset

You can perform a restart or a software reset using the reset button.

- Restart: This action reboots the controller (warm start) as an alternative to switching the voltage.
- Software reset: This action performs a complete reinstallation of the Lenze software. The last active software version is reinstalled as an alternative to a restore.

Position of the reset button: [► Features](#) 17

How to carry out a restart:

1. Keep the reset key pressed for approx. 1 s.  
The LEDs are off.

After the restart, the "RUN" LED lights up green or green/yellow.

How to perform a software reset:

1. Switch off controller.
2. Press and hold the reset button.
3. Switch on controller.  
The "RDY" LED is blinking blue/yellow quickly.
4. When the "ERR" LED flashes red/yellow quickly after approx. 15 s, release the reset button again.

A complete reinstallation of the controller firmware is carried out (takes approx. 5 minutes).

Do not switch off the device during reinstallation!

After successful reinstallation, the "RUN" LED lights up green or green/yellow.



Depending on the state of the device functions, no retain data is saved when the device is reset via the reset key.

#### Relevant parameters of other functions

| Address                    | Name                                      | Default setting | Setting range  |
|----------------------------|-------------------------------------------|-----------------|----------------|
| <a href="#">0x2022:001</a> | Device commands: Load default settings    | Off / ready [0] | Selection list |
| <a href="#">0x2022:039</a> | Device commands: Load TA default settings | Off / ready [0] | Selection list |

#### Related topics

[► Reset parameters to default](#) 42



### 12.5 Back up and restore data

The PLC runtime system (firmware) and the project data on the SD card can be backed up on a USB stick and restored from it for the same controller type (e. g. c430, c520 or c550) if required.

#### General information on the storage media used

Internal memory:

- The Lenze controller is equipped with a non-volatile memory containing the PLC runtime system (firmware).
- The PLC runtime system (firmware) can be backed up on a USB stick with the device command "Backup".

SD card:

- The SD card is used to store project data in the Lenze controller.
- The entire SD card is backed up, except for the "firmware" and "License" directories. The remaining project data on the SD card must not exceed the maximum memory size of 165 MB.
- The device command "Backup" is used to save not only the firmware but also the project data on the USB stick.

USB stick:

- The USB stick is the central storage medium for data backups.
- With the device command "Restore" and a previously created data backup, firmware and project data can be restored from the USB stick.
- If necessary, the controller's firmware can also be updated via USB stick ► [Update firmware](#)  143
- Further information: ► [Mount USB stick](#)  138

# Device functions

Back up and restore data  
Mount USB stick



## 12.5.1 Mount USB stick

The USB stick is the central storage medium for data backups and can also be used to update the controller's firmware if required.



- Only use suitable USB sticks for the controller!  
Due to their shape, some USB sticks may not be able to be inserted deep enough into the USB socket of the controller. This can cause problems that do not always suggest the USB stick as the cause.
- To protect against malicious code, the behavior of the USB flash drive, in particular the mounting of the USB flash drive, must be restricted. From V1.13 of the controller firmware, an inserted USB stick is not mounted by default so that no malicious code can be executed on the controller in this way. The mounting of the USB stick must be activated via a setting in [0x5902:001](#).
- If the device command "Reset origin" ([0x2022:049](#)) is executed, the parameter settings are deleted, including the setting in [0x5902:001](#) for mounting the USB stick.



### Controller in delivery state:

For controllers in the delivery state, the mounting of a USB stick is initially active to enable initial commissioning. This status is indicated by a flashing pattern. ▶ [Status LEDs](#) [151](#)

The delivery state is exited after the following actions have been carried out:

- Firmware update
- Restore data
- Device replacement
- Boot project on SD card

After exiting the delivery state, the behavior is specified by the [0x5902:001](#) parameter.

### Directory structure of the USB stick:

| Directory                      | Information                                                                                                                                                                                                                                                                                                             |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <USB-Stick>\firmware           | The "firmware" directory is reserved for data backups.                                                                                                                                                                                                                                                                  |
| <USB-Stick>\firmware\active\   | This subdirectory contains the firmware of the controller after a data backup. <ul style="list-style-type: none"><li>• The "active" subdirectory may contain max. one firmware file.</li><li>• This subdirectory is also used for updating the firmware ▶ <a href="#">Update firmware</a> <a href="#">143</a></li></ul> |
| <USB-Stick>\firmware\archive_\ | This subdirectory is used for archiving older firmware versions and data backups.                                                                                                                                                                                                                                       |

### Structure of the file names

| File          | Syntax                                      | Example                                      |
|---------------|---------------------------------------------|----------------------------------------------|
| Firmware file | <Controller family>_<Version>_<Type>.tar    | c5xx_v_1.4.0.1342_firmware.tar               |
| Data backup   | <Type>_<Controller>_<Version>_<Date>_<Time> | backup_c550_v1_4_0_1359_20201208_0815.tar.gz |

### Parameter

| Address    | Name / setting range / [default setting]  | Information                                                                                                                                                                                                                                                 |
|------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x5902:001 | Security device settings: Mount USB stick | Activate mounting of the USB flash drive. <ul style="list-style-type: none"><li>• From V1.13 of the controller firmware, an inserted USB stick is not mounted by default so that no malicious code can be executed on the controller in this way.</li></ul> |
|            | 0 Deactivated                             |                                                                                                                                                                                                                                                             |
|            | 1 Activated                               |                                                                                                                                                                                                                                                             |

### Related topics

▶ [Back up and restore data](#) [137](#)

▶ [Update firmware](#) [143](#)



## 12.5.2 Back up data

This function saves the PLC runtime system (firmware) of the controller and additionally the project data on the SD card to a USB stick.



- Only use suitable USB sticks for the controller!  
Due to their shape, some USB sticks may not be able to be inserted deep enough into the USB socket of the controller. This can cause problems that do not always suggest the USB stick as the cause.
- Do not switch off the device during data backup and do not remove the USB stick from the device!  
Observe the status display of the yellow LED "STA". ▶ [Status LEDs](#) 151
- The device command "Parameter backup" ([0x2022:040](#)) automatically causes an inserted USB stick to be mounted, regardless of the setting in [0x5902:001](#).

### Preconditions

- USB stick with at least 365 MB free memory
- The entire SD card is backed up, except for the "firmware" and "License" directories. The remaining project data on the SD card must not exceed the maximum memory size of 165 MB.

How to save PLC runtime system (firmware) and project data on a USB stick:

1. Insert the USB stick into the USB port of the controller (**X61**).
2. Execute the "Parameter backup" device command, e.g. with "PLC Designer": Set [0x2022:040](#) to "1: On / Start".

The data backup progress is shown in [0x2022:040](#). After the process is completed, the status "0: Off / Ready" is displayed in [0x2022:040](#).

3. Remove the USB stick.

PLC runtime system (firmware) and project data are now saved on the USB stick.

# Device functions

Back up and restore data

Back up data



## Parameter

| Address    | Name / setting range / [default setting]                                                                                                                      | Information                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2022:040 | Device commands: backup <ul style="list-style-type: none"> <li>Settings can only be changed if the PLC application is not in the "Running" status.</li> </ul> | <ul style="list-style-type: none"> <li>Setting can only be changed if application status (displayed in <a href="#">0x5810:001</a>) is not equal to "1: Running".</li> <li>When the device command has been executed successfully, the value 0 is shown.</li> <li>Do not switch off the power supply and do not remove the USB stick and SD card from the controller while the data backup is running!</li> </ul> |
|            | <b>0 Off / ready</b>                                                                                                                                          | Only status feedback                                                                                                                                                                                                                                                                                                                                                                                             |
|            | <b>1 On / start</b>                                                                                                                                           | Execute device command                                                                                                                                                                                                                                                                                                                                                                                           |
|            | <b>2 In progress</b>                                                                                                                                          | Only status feedback                                                                                                                                                                                                                                                                                                                                                                                             |
|            | <b>3 Action cancelled</b>                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>4 No access</b>                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>5 No access (Device disabled)</b>                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>20 20%</b>                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>40 40%</b>                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>60 60%</b>                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>80 80%</b>                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>100 100%</b>                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>101 No SD card connected</b>                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>102 SD card is write protected</b>                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>103 SD card is full</b>                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>104 USB stick not mounted</b>                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>105 Backup file on USB stick wrong, double or in the wrong path</b>                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>106 USB stick is full</b>                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>107 Device no memory space left</b>                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>108 Firmware size too large</b>                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>109 User data size too large</b>                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>110 Up/Downgrade successful - remove USB stick and restart the device</b>                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>111 Application is still running - stop application first</b>                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>112 Other device command active - wait for end of execution</b>                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|            | <b>113 Error - see Logbook for details</b>                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                  |



## 12.5.3 Restore data

This function allows you to restore the PLC runtime system (firmware) and the project data. Data recovery can be carried out either by power switching the controller or via a device parameter.



- You can also restore an older data backup. To do this, copy the corresponding data backup on the USB stick from the "firmware\archive\_\_" to "firmware\active" directory. However, the directory "firmware\active" may only contain one file at a time.
- Only use suitable USB sticks for the controller!  
Due to their shape, some USB sticks may not be able to be inserted deep enough into the USB socket of the controller. This can cause problems that do not always suggest the USB stick as the cause.
- Do not switch off the device during data backup and do not remove the USB stick from the device!  
Observe the status display of the yellow LED "STA". ▶ [Status LEDs](#) 151

### Data recovery by power switching

#### Preconditions

- USB stick with valid data backup from the same type of controller.
- Parameter [0x5902:001](#) must be set to "Activated [1]".
  - With this setting, the USB stick is only mounted once at the next restart.
  - If the device command "Save user data" ([0x2022:003](#)) is also executed, the USB stick is backed up permanently (over several boot processes).

How to carry out a data recovery by power switching:

1. Insert the USB stick into the USB port of the controller (**X61**).
2. Restart the controller by power switching to start the restore process.
3. Remove the USB stick when the charging process is complete.
4. Restart controller.

Data recovery by power switching is complete.

### Data recovery using device parameters

With this procedure, the inserted USB stick is mounted automatically, regardless of the setting in [0x5902:001](#).

#### Preconditions

- USB stick with valid data backup from the same type of controller.

How to perform data recovery using device parameters:

1. Insert the USB stick into the USB port of the controller (**X61**).
2. Execute the "Restore" device command, e.g. with »PLC Designer«: Set [0x2022:043](#) to "1: On / Start".

The selected data backup is loaded into the controller regardless of the version. The data recovery progress is shown in [0x2022:043](#). When the update is complete, the status "0: off / ready" is shown in [0x2022:043](#).

3. Remove the USB stick when the charging process is complete.
4. Restart controller.

Data recovery using device parameters is complete.

# Device functions

Back up and restore data

Restore data



## Parameter

| Address    | Name / setting range / [default setting]                                                                                                                                                                                                                                               | Information                                                                                                                                                                                                                                                                                                                                                                                           |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2022:043 | Device commands: Device command: Restore <ul style="list-style-type: none"> <li>Settings can only be changed if the PLC application is not in the "Running" status.</li> <li>For further possible settings, see parameter <a href="#">0x2022:040</a>. <a href="#">□ 140</a></li> </ul> | <ul style="list-style-type: none"> <li>Setting can only be changed if application status (displayed in <a href="#">0x5810:001</a>) is not equal to "1: Running".</li> <li>When the device command has been executed successfully, the value 0 is shown.</li> <li>Do not switch off the supply voltage or remove the SD card from the controller while the data recovery is being executed!</li> </ul> |
|            | <b>0 Off / ready</b>                                                                                                                                                                                                                                                                   | Only status feedback                                                                                                                                                                                                                                                                                                                                                                                  |
|            | 101 No SD card connected                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                       |
|            | 102 SD card is write protected                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                       |
|            | 103 SD card is full                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                       |
|            | 104 USB stick not mounted                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                       |
|            | 105 Backup file on USB stick wrong, double or in the wrong path                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                       |
|            | 106 USB stick is full                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                       |
|            | 107 Device no memory space left                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                       |
|            | 108 Firmware size too large                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                       |
|            | 109 User data size too large                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                       |
|            | 110 Up/Downgrade successful - remove USB stick and restart the device                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                       |
|            | 111 Application is still running - stop application first                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                       |
|            | 112 Other device command active - wait for end of execution                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                       |
|            | 113 Error - see Logbook for details                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                       |



## 12.6 Update firmware

This function enables the PLC runtime system (firmware) to be updated. The update can be carried out either by power switching the controller or using a device parameter.



- Only use suitable USB sticks for the controller!  
Due to their shape, some USB sticks may not be able to be inserted deep enough into the USB socket of the controller. This can cause problems that do not always suggest the USB stick as the cause.
- Do not switch off the device during update and do not remove the USB stick from the device! Observe the status display of the yellow LED "STA". ▶ [Status LEDs](#) 151

### Preconditions

- Installed Lenze »EASY Package Manager«
- Installed Lenze »EASY Starter - Firmware loader«
- USB stick with valid firmware

### General notes

- It is possible to update to a higher or lower version.
- Details of the update are entered in the logbook.
- Firmware updates are indicated by the status LEDs on the controller:

| "STA" LED (yellow/green) | Meaning                                                       |
|--------------------------|---------------------------------------------------------------|
|                          | Process (Backup / Restore / Upgrade / Downgrade) is running.  |
|                          | Process (Backup / Restore / Upgrade / Downgrade) is complete. |

### General procedure

1. Prepare USB stick.
2. Insert USB stick into the controller.
3. Restart the controller by power switching or execute "Start Up/Downgrade" device command.

### Prepare USB stick

How to prepare the USB stick:

1. If the firmware to be installed is not yet available on the engineering PC: Select and install firmware in the "EASY Package Manager".
2. Copy the firmware to be installed to the USB stick with the "EASY Starter - Firmware loader".

The firmware is automatically stored in the directory "<USB-Stick>\firmware\active".

### Updating the firmware by power switching

#### Preconditions

- Parameter [0x5902:001](#) must be set to "Activated [1]".
  - With this setting, the USB stick is only mounted once at the next restart.
  - If the device command "Save user data" ([0x2022:003](#)) is also executed, the USB stick is backed up permanently (over several boot processes).

How to update the firmware by power switching:

1. Insert the prepared USB stick into the USB port of the controller (**X61**).
2. Restart the controller by power switching.  
The selected firmware is loaded into the controller regardless of the version.
3. Remove the USB stick.
4. Finally, restart the controller by power switching.

The installation of the firmware via power switching is complete.



### Updating the firmware via device parameters

With this procedure, the inserted USB stick is mounted automatically, regardless of the setting in [0x5902:001](#).

How to update the firmware using power switching:

1. Insert the prepared USB stick into the USB port of the controller (**X61**).
2. Execute the "Start Up/Downgrade" device command, e.g. with »PLC Designer«: Set [0x2022:047](#) to "1: On / Start".

The selected firmware is loaded into the controller regardless of the version. The progress of loading is displayed in [0x2022:047](#). After the process is completed, the status "0: Off / Ready" is displayed in [0x2022:047](#).

3. Remove the USB stick.
4. Finally, restart the controller by power switching.

The installation of the firmware using device parameters is complete.

### Parameter

| Address    | Name / setting range / [default setting]                                                                                                                                  | Information                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2022:047 | Device commands: Start Up/Downgrade <ul style="list-style-type: none"> <li>Settings can only be changed if the PLC application is not in the "Running" status.</li> </ul> | <ul style="list-style-type: none"> <li>Setting can only be changed if application status (displayed in <a href="#">0x5810:001</a>) is not equal to "1: Running".</li> <li>When the device command has been executed successfully, the value 0 is shown.</li> <li>Do not switch off the power supply and do not remove the USB stick and SD card from the controller while the firmware is being updated!</li> </ul> |
|            | <b>0 Off / ready</b>                                                                                                                                                      | Only status feedback                                                                                                                                                                                                                                                                                                                                                                                                |
|            | <b>1 On / start</b>                                                                                                                                                       | Execute device command                                                                                                                                                                                                                                                                                                                                                                                              |
|            | <b>2 In progress</b>                                                                                                                                                      | Only status feedback                                                                                                                                                                                                                                                                                                                                                                                                |
|            | <b>3 Action cancelled</b>                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>4 Action cancelled</b>                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>5 No access (Device disabled)</b>                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>20 20%</b>                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>40 40%</b>                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>60 60%</b>                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>80 80%</b>                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>100 100%</b>                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>101 No SD card connected</b>                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>102 SD card is write protected</b>                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>103 SD card is full</b>                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>104 USB stick not mounted</b>                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>105 Backup file on USB stick wrong, double or in the wrong path</b>                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>106 USB stick is full</b>                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>107 Device no memory space left</b>                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>108 Firmware size too large</b>                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>109 User data size too large</b>                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>110 Up/Downgrade successful - remove USB stick and restart the device</b>                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>111 Application is still running - stop application first</b>                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>112 Other device command active - wait for end of execution</b>                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|            | <b>113 Error - see Logbook for details</b>                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                     |



## 12.7 SysLog client

"SysLog" is a standard for message logging. It enables a separation between the software that generates messages, the system that stores them and the software that reports and analyzes them. The aim here is to record the security logs on the device, save the data records on the device and send them to the operator's SysLog server via a SysLog client. This functionality is also required by the IEC 62443-4-2 safety standard.

The SysLog server is not the focus here and is not implemented on the devices. It is part of the system operator's infrastructure.

### Parameter

| Address    | Name / setting range / [default setting]                            |               | Information                                                                                                                |
|------------|---------------------------------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------|
| 0x5914:001 | SysLog client: Activation                                           |               |                                                                                                                            |
|            | 0                                                                   | Deactivated   |                                                                                                                            |
|            | 1                                                                   | Activated     |                                                                                                                            |
| 0x5914:002 | SysLog client: SysLog server IP address<br>0 ... [0] ... 4294967295 |               |                                                                                                                            |
| 0x5914:003 | SysLog client: SysLog server port<br>0 ... [514] ... 65535          |               |                                                                                                                            |
| 0x5914:004 | SysLog client: Protocol type                                        |               |                                                                                                                            |
|            | 0                                                                   | UDP           | UDP is normally used when logging takes place within a local network.                                                      |
|            | 1                                                                   | TCP           | TCP is normally used when logging is performed on an external SysLog server.                                               |
| 0x5914:005 | SysLog client: Message encryption                                   |               |                                                                                                                            |
|            | 0                                                                   | Not encrypted |                                                                                                                            |
|            | 1                                                                   | TLS encrypted |                                                                                                                            |
| 0x5914:006 | SysLog client: Message severities<br>0 ... [15] ... 255             |               | Filtering of SysLog messages according to severity. The names of the severity levels are specified by the SysLog standard. |
|            | Bit 0                                                               | emerg         | Severity "Emergencies": System is not usable                                                                               |
|            | Bit 1                                                               | alert         | Severity "Alert": Immediate action required                                                                                |
|            | Bit 2                                                               | crit          | Severity "Critical": Messages with critical conditions                                                                     |
|            | Bit 3                                                               | err           | Severity "Error": Error messages                                                                                           |
|            | Bit 4                                                               | warning       | Severity "Warning": Warning messages<br>• Deactivated by default (bit = 0)                                                 |
|            | Bit 5                                                               | notice        | Notification" severity level": Normal messages with significant condition<br>• Deactivated by default (bit = 0)            |
|            | Bit 6                                                               | info          | Severity "Information": Purely informative messages<br>• Deactivated by default (bit = 0)                                  |
|            | Bit 7                                                               | debug         | Severity "Debug": Debugging messages<br>• Deactivated by default (bit = 0)                                                 |



### 13 Replace controller

A defective controller can only be replaced by a device of the same product type. The replacement device must have the same features, such as optionally integrated communication cards and connections.



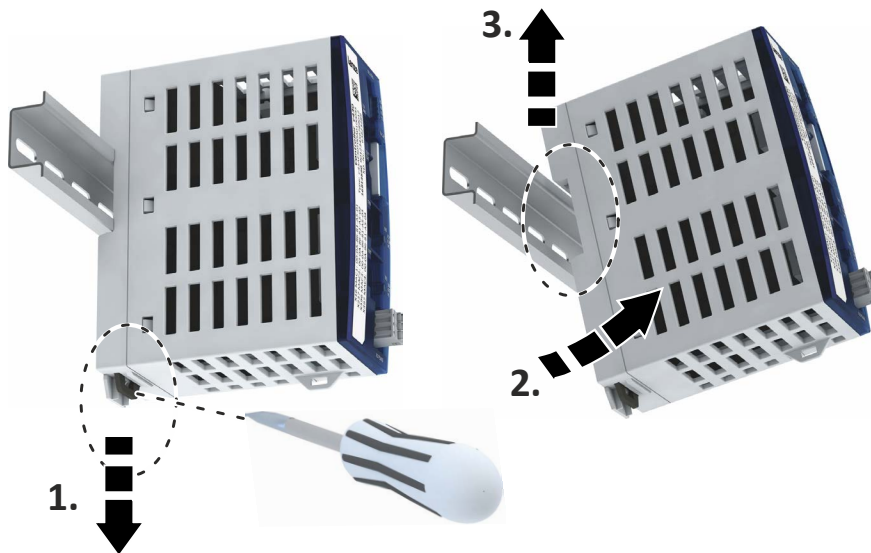
## 13.1 Dismount controller

How to dismount the connected controller:

Condition

- The power supply of the entire system and the controller is switched off.
- Supply connections, bus connections and all other connections on the controller have been removed.

1. Dismount controller.



2. Remove the SD card from the card slot.

Controller is dismounted.



### 13.2 Install new controller

The current firmware version of the controller is also stored on the SD card used. If the SD card is inserted into a new device, the firmware version from the SD card is imported into the device automatically. This function ensures that the controller firmware and the boot project continue to match.

How to connect a new Controller:

1. Insert the SD card of the previously removed controller into the new one.
2. Mount the new Controller.
3. If an I/O system 1000 (EPM-Sxxx) is connected to the controller:
  - a) Mount and connect the electronic modules of the I/O system 1000 (EPM-Sxxx).
4. Connect supply connections, bus connections and all other connections to the Controller.
5. Switch on voltage supply.  
The controller is mounted.
6. The controller starts the automatic firmware update if required:
  - a) The data of the SD card of the defective controller, such as an executable boot project and a visualization, is reused in the replacement device.
  - b) The firmware update can be detected by the status LEDs of the controller. Details on the update are entered in the logbook. [▶ Logbook](#)  152



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A voltage failure during the update should be avoided.

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## 13.3 Reuse retain data

The retain data is stored automatically on the SD card. This data can then continue to be used if the device is replaced.



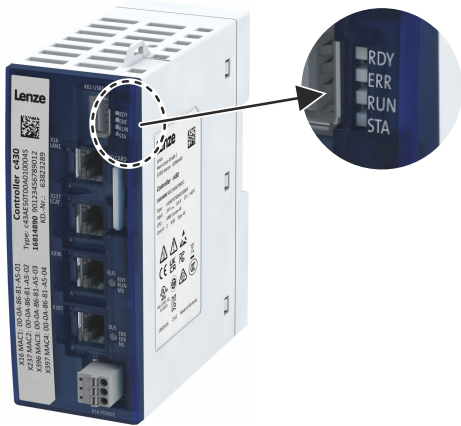
### **14      Diagnostics and fault elimination**

This section contains information on error handling, drive diagnostics and fault analysis.



## 14.1 Status LEDs

LEDs on the front of the device indicate the current operating status. Depending on the running software application, different control modes of the LEDs are possible.



| LED "RDY" (blue/<br>yellow) | Meaning                                                                                                                                 |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Off                         | Device is switched off.                                                                                                                 |
|                             | Device starts in delivery status. An inserted USB stick is mounted automatically. ▶ <a href="#">Mount USB stick</a> <a href="#">138</a> |
| ■ ■ ■ ■                     | Device starts.                                                                                                                          |
| ■■■■■■■■■■                  | Device is ready for operation.                                                                                                          |
| ■■■■■■■■■■                  | Value has fallen below the voltage                                                                                                      |
| ■ ■ ■ ■ ■ ■ ■ ■             | System time must be set. ▶ <a href="#">Time</a> <a href="#">49</a>                                                                      |
| ■ ■ ■ ■ ■ ■ ■ ■             | Reset key was pressed during the boot process.                                                                                          |

| LED "ERR" (red/<br>yellow) | Status         | Meaning                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Off                        | NO REACTION    | There are no active error responses in the device.                                                                                                                                                                                                                                                                                                                                                                                                                        |
| ■ ■ ■ ■ ■ ■ ■ ■            | WARNING        | The device indicates a warning. The function of the device differs from the expected behavior.<br><b>Note!</b><br>If the "RDY" LED is blinking at the same time, a hardware error of the device has occurred.                                                                                                                                                                                                                                                             |
| ■ ■ ■ ■ ■ ■ ■ ■            | TROUBLE        | The device indicates a fault. The function of the device is impaired.                                                                                                                                                                                                                                                                                                                                                                                                     |
| ■■■■■■■■■■                 | ERROR          | The device indicates an error.<br><ul style="list-style-type: none"> <li>The "ERR" LED remains active, regardless of whether the error is permanent or temporary.</li> <li>The application continues to run regardless of the status of the "ERR" LED.<br/>Exception: If an "exception" occurs, the application is stopped immediately.</li> <li>Events with "Error" severity can be reset via <a href="#">0x2841</a> if the error condition no longer exists.</li> </ul> |
| ■ ■ ■ ■ ■ ■ ■ ■            | Software reset | Software reset started. The reset button can be released.                                                                                                                                                                                                                                                                                                                                                                                                                 |

| "RUN" LED (yellow/<br>green) | Meaning                      |
|------------------------------|------------------------------|
| ■ ■ ■ ■ ■ ■ ■ ■              | PLC project is being loaded. |
| ■■■■■■■■■■                   | PLC project is stopped.      |
| ■■■■■■■■■■                   | PLC project is started.      |

| "STA" LED (yellow/<br>green) | Meaning                                                     |
|------------------------------|-------------------------------------------------------------|
| ■ ■ ■ ■ ■ ■ ■ ■              | Process (Backup / Restore / Upgrade / Downgrade) running.   |
| ■■■■■■■■■■                   | Process (Backup / Restore / Upgrade / Downgrade) completed. |



## 14.2 Logbook

The devices are equipped with a logbook function which records system events and error messages. The entries in the logbook make it easier to diagnose the automation system.

The following information is processed by the logbook:

- Error messages and events of the application are displayed.
- Error messages and events of the application are saved on the SD card.

The logbook of the controller can be accessed via the »PLC-Designer«.

The event currently active in the controller can also be retrieved via the event monitor. [► PLC diagnostics](#) 154

### Structure of a logbook entry

A logbook entry consists of the following information:

- Ascending numbering of the logbook entry
- Date / time of the logbook entry
- Application triggering the logbook entry
- Severity of the event in four categories
  - Information
  - Warning
  - Fault
  - Error
- Area as the event origin of the triggered error message.

### Logbook entry "unknown event"

If the entry "unknown event" is displayed in the logbook, this may have the following causes:

| Cause                                                 | Remedy                                                   |
|-------------------------------------------------------|----------------------------------------------------------|
| Incorrect description of the error in the application | Check application                                        |
| Old project runs on newer firmware                    | Update project to the firmware version of the controller |
| Missing error description in the device descriptions  | Contact the manufacturer                                 |

### Parameter

| Address    | Name / setting range / [default setting] | Information                                                                                                                                                                                                                                                                                                                            |
|------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2022:015 | Device commands: Delete logbook          | All entries in the logbook are deleted. <ul style="list-style-type: none"> <li>• When the device command has been executed successfully, the value 0 is shown.</li> <li>• Do not switch off the supply voltage or remove the SD card from the controller while the device command is being executed.</li> </ul>                        |
|            | 0 Off / ready                            | Only status feedback                                                                                                                                                                                                                                                                                                                   |
|            | 1 On / start                             | Execute device command                                                                                                                                                                                                                                                                                                                 |
|            | 2 In progress                            | Only status feedback                                                                                                                                                                                                                                                                                                                   |
|            | 3 Action cancelled                       |                                                                                                                                                                                                                                                                                                                                        |
|            | 4 No access                              |                                                                                                                                                                                                                                                                                                                                        |
|            | 5 No access (Device disabled)            |                                                                                                                                                                                                                                                                                                                                        |
| 0x2022:036 | Device commands: Export Logbook          | Exports the logbook for the upload into the engineering tools. <ul style="list-style-type: none"> <li>• When the device command has been executed successfully, the value 0 is shown.</li> <li>• Do not switch off the supply voltage or remove the SD card from the controller while the device command is being executed.</li> </ul> |
|            | 0 Off / ready                            | Only status feedback                                                                                                                                                                                                                                                                                                                   |
|            | 1 On / start                             | Execute device command                                                                                                                                                                                                                                                                                                                 |
|            | 2 In progress                            | Only status feedback                                                                                                                                                                                                                                                                                                                   |
|            | 3 Action cancelled                       |                                                                                                                                                                                                                                                                                                                                        |
|            | 4 No access                              |                                                                                                                                                                                                                                                                                                                                        |
|            | 5 No access (Device disabled)            |                                                                                                                                                                                                                                                                                                                                        |



| Address    | Name / setting range / [default setting] | Information                                                                                                                                                                                                                                                                                                                                                                                    |
|------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2022:037 | Device commands: Delete Logfiles         | Deletion of log files on the device that were exported in an earlier step via <a href="#">0x2022:036</a> (Export Logbook). <ul style="list-style-type: none"> <li>When the device command has been executed successfully, the value 0 is shown.</li> <li>Do not switch off the supply voltage or remove the SD card from the controller while the device command is being executed.</li> </ul> |
|            | <b>0</b> Off / ready                     | Only status feedback                                                                                                                                                                                                                                                                                                                                                                           |
|            | <b>1</b> On / start                      | Execute device command                                                                                                                                                                                                                                                                                                                                                                         |
|            | <b>2</b> In progress                     | Only status feedback                                                                                                                                                                                                                                                                                                                                                                           |
|            | <b>3</b> Action cancelled                |                                                                                                                                                                                                                                                                                                                                                                                                |
|            | <b>4</b> No access                       |                                                                                                                                                                                                                                                                                                                                                                                                |
|            | <b>5</b> No access (Device disabled)     |                                                                                                                                                                                                                                                                                                                                                                                                |



## 14.3 Diagnostic parameters

### 14.3.1 PLC diagnostics

The following information may be retrieved for diagnostic purposes:

- Information on the event currently active in the controller (event monitor)
- Status of the SD card
- Available application credit / required application credit
- Dual use license
- Temperature of the control card and CPU
- Status of the application

#### Parameter

| Address    | Name / setting range / [default setting]                         | Information                                                    |
|------------|------------------------------------------------------------------|----------------------------------------------------------------|
| 0x2010:001 | Device event monitor: EreignisortEvent location<br>• Read only   | Display of the event location for the currently pending event. |
|            | 0 No error                                                       |                                                                |
|            | 1 Functional safety                                              |                                                                |
|            | 4 Basic settings                                                 |                                                                |
|            | 5 Communication                                                  |                                                                |
|            | 6 Kinematics                                                     |                                                                |
|            | 7 Motion                                                         |                                                                |
|            | 8 Technology application                                         |                                                                |
|            | 9 Process control                                                |                                                                |
| 0x2010:002 | Device event monitor: Severity<br>• Read only                    | Display of the severity level for the currently active event.  |
|            | 0 No response                                                    |                                                                |
|            | 1 Fault > CiA402                                                 |                                                                |
|            | 2 Warning                                                        |                                                                |
|            | 3 Fault                                                          |                                                                |
|            | 11 Information                                                   |                                                                |
|            | 13 Warning locked                                                |                                                                |
|            | 15 Trouble > only logbook entry                                  |                                                                |
|            | 16 Trouble                                                       |                                                                |
|            | 18 Fault > only logbook entry                                    |                                                                |
|            | 19 Fault > Application quick stop > Quick stop                   |                                                                |
|            | 20 Fault > inverter quick stop > quick stop                      |                                                                |
|            | 21 Fault > inverter quick stop > inverter disabled               |                                                                |
|            | 23 Fault > inverter disabled                                     |                                                                |
| 0x2010:003 | Device event monitor: Event status<br>• Read only                | Display of the event status for the currently pending event.   |
|            | 0 No event active                                                |                                                                |
|            | 1 Reset possible                                                 |                                                                |
|            | 2 Reset not possible                                             |                                                                |
| 0x2010:005 | Device event monitor: Number of current event<br>• Read only     | Display of the event ID for the currently pending event.       |
| 0x2010:006 | Device event monitor: Time stamp of current event<br>• Read only | Display of the time stamp for the current upcoming event.      |
| 0x2010:007 | Device event monitor: Event CRC<br>• Read only                   |                                                                |
| 0x2012:001 | Device information: SD card status<br>• Read only                | Display whether an SD card is inserted.                        |
|            | 0 No SD card connected                                           |                                                                |
|            | 1 SD card connected                                              |                                                                |



# Diagnostics and fault elimination

Diagnostic parameters  
PLC diagnostics

| Address    | Name / setting range / [default setting]                            | Information                                                                                                   |
|------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| 0x2012:002 | Device information: Application Credit available<br>• Read only     | Display of the application credit available on the SD card                                                    |
| 0x2012:003 | Device information: Dual use licence<br>• Read only                 | Display whether a dual-use license is available.                                                              |
|            | 0 Not available                                                     |                                                                                                               |
|            | 1 Available                                                         |                                                                                                               |
| 0x2012:004 | Device information: SD card total memory<br>• Read only             | Display of the total memory capacity of the SD card in kilobytes.                                             |
| 0x2012:005 | Device information: SD card free memory<br>• Read only              | Display of the currently free memory on the SD card in kilobytes.                                             |
| 0x2012:006 | Device information: SD card used memory<br>• Read only: x kB        | Display of the currently occupied memory on the SD card in kilobytes.                                         |
| 0x2012:007 | Device information: License information<br>• Read only              | Display of license information (format: "x.x.x") with the following meaning:<br>• 0.0.0: No license available |
| 0x2013:001 | Application information: Active application<br>• Read only          | Display of the active application.                                                                            |
|            | 0 CiA 402                                                           |                                                                                                               |
|            | 1 TA CiA402 advanced                                                |                                                                                                               |
|            | 10 TA Speed Control                                                 |                                                                                                               |
|            | 20 TA Table Positioning                                             |                                                                                                               |
|            | 40 TA Electronic Gearbox                                            |                                                                                                               |
|            | 41 TA Sync and Correction                                           |                                                                                                               |
|            | 50 TA Winder Dancer                                                 |                                                                                                               |
|            | 51 TA Winder Tension                                                |                                                                                                               |
|            | 100 TA User                                                         |                                                                                                               |
| 0x2013:002 | Application information: Application Credit required<br>• Read only | Display of the application credit required for the loaded application.                                        |
| 0x2539:002 | Hardware-Diagnose: Control board temperature<br>• Read only: x °C   | Interior temperature of the device.                                                                           |
| 0x2539:003 | Hardware-Diagnose: CPU temperature<br>• Read only: x °C             | Processor temperature of the device.                                                                          |
| 0x5810:001 | Application diagnostics: Application state<br>• Read only           |                                                                                                               |
|            | 0 Unknown/application missing                                       |                                                                                                               |
|            | 1 Running                                                           |                                                                                                               |
|            | 2 Stopped                                                           |                                                                                                               |
|            | 3 Stopped at breakpoint                                             |                                                                                                               |
| 0x5810:002 | Application diagnostics: Used memory size<br>• Read only: x kB      | Display of the memory used by the application in kilobytes.                                                   |



## 14.3.2 Network diagnostics

Display information on the network option.



When switching on, the controller checks whether the parameter settings saved on the SD card match the device hardware and firmware. In the event of an incompatibility, a corresponding error message is displayed.

### Parameter

| Address    | Name / setting range / [default setting]                 | Information                                                        |
|------------|----------------------------------------------------------|--------------------------------------------------------------------|
| 0x231F:001 | Communication module ID: Active module ID<br>• Read only | Display of the network options currently configured in the device. |
|            | 48 No network                                            |                                                                    |
|            | 65 AS-Interface                                          |                                                                    |
|            | 67 CANopen                                               |                                                                    |
|            | 71 EtherNet/IP                                           |                                                                    |
|            | 72 BACnet                                                |                                                                    |
|            | 78 POWERLINK                                             |                                                                    |
|            | 80 PROFIBUS                                              |                                                                    |
|            | 82 PROFINET                                              | ► PROFINET IO-Device <a href="#">103</a>                           |
|            | 84 EtherCAT                                              | ► EtherCAT slave <a href="#">95</a>                                |
|            | 86 Modbus TCP/IP                                         |                                                                    |
|            | 87 Modbus                                                |                                                                    |

### Related topics

- [EtherCAT master diagnostics](#) [106](#)
- [EtherCAT device diagnostics](#) [101](#)
- [PROFINET IO-Device diagnostics](#) [111](#)

## 14.3.3 Service life diagnostics

Display of the current operating and switch-on time of the controller.

### Parameter

| Address    | Name / setting range / [default setting]             | Information                                                                                                                                                                                                                                                     |
|------------|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0x2D81:001 | Life-diagnosis: Operating time<br>• Read only: x s   | Display of how long the device has been powered in total, regardless of the state of the soft PLC (RUN/STOP).<br>• The counter cannot be reset.<br>• The seconds are not updated.<br>• Representation: d:h:m:00                                                 |
| 0x2D81:002 | Life-diagnosis: Power-on time<br>• Read only: x s    | Display of how long the device has been supplied with voltage since it was last switched on, regardless of the status of the soft PLC (RUN/STOP).<br>• The counter starts again at 00:00:00:00 when the power is next switched on.<br>• Representation: d:h:m:s |
| 0x2D81:004 | Life-diagnosis: Main switching cycles<br>• Read only | Display of the number of switching cycles of the mains voltage.                                                                                                                                                                                                 |



## 14.4 PLC core dump

A core dump is a file that records the state of an application at a particular point in its execution. A core dump file is created automatically when an exception error or crash has occurred in the PLC application. The core dump file can then be used to debug the crash without accessing the controller. When this file is loaded into the "PLC Designer", the content of all variables of the application is displayed. In addition, further details about the crash, such as the callstack, are available. All information is retrieved from the core dump file only.

For a PLC application, the core dump file contains the following information:

- Memory content
- Callstack
- Stack
- PLC log

Core dump files have the extension ".core" (e.g. "application.core") and are stored on the controller in the directory "/tmp/user\_data".



## 14.5 Event handling

### 14.5.1 Severity

When certain events occur, the controller reacts depending on the severity level defined for the event.

#### Severity "No response"

The event is completely ignored (does not affect the running process).

#### Severity "Information"

The event is completely ignored (does not affect the running process). However, logging takes place in the [Logbook](#). [152](#)

#### Severity "Warning"

The event does not severely affect the process and may be also ignored in consideration of safety aspects.

#### Severity "Error"

- The red "ERR" LED on the controller is permanently on.
- A running application continues to run.
- **Exception:** If an "exception" occurs, the application is stopped immediately. (Application status [0x5810:001](#) = "Stopped")

#### Severity "Fault"

The function of the device is impaired. For example, a loaded boot application cannot be set to the "RUN" state.

### 14.5.2 Event reset

Events with "Error" severity can be reset.

#### Parameter

| Address | Name / setting range / [default setting] | Information     |
|---------|------------------------------------------|-----------------|
| 0x2841  | Reset error<br>0 ... [0] ... 1           | 1 = reset error |



## 14.6 Events, causes and remedies

### 14.6.1 Event ID overview

| Event ID             | Event                                                                                                                  | Severity    |
|----------------------|------------------------------------------------------------------------------------------------------------------------|-------------|
| 671155580 0x2801057C | SD card was removed during runtime                                                                                     | Fault       |
| 671159298 0x28011402 | Opening the parameter description failed                                                                               | Fault       |
| 671159299 0x28011403 | Opening the parameter set failed                                                                                       | Fault       |
| 671159300 0x28011404 | Loading parameter set is failed                                                                                        | Fault       |
| 671162931 0x28012233 | CRC in "IdenCom.ini" file is incorrect                                                                                 | Fault       |
| 671162932 0x28012234 | Action not allowed when PLC is running                                                                                 | Fault       |
| 671162933 0x28012235 | Unsupported Fieldbus system                                                                                            | Fault       |
| 671162934 0x28012236 | Network module changed (Change active after restart)                                                                   | Information |
| 671421185 0x28051301 | Boot application - More Application Credit required                                                                    | Trouble     |
| 671421186 0x28051302 | Application requires dual-use license                                                                                  | Trouble     |
| 671421187 0x28051303 | Powercaps not fully charged                                                                                            | Trouble     |
| 671421188 0x28051304 | SD card is write protected - Running application is prevented                                                          | Trouble     |
| 671444993 0x28057001 | Application Credit - Application Credit exceeded                                                                       | Fault       |
| 671444994 0x28057002 | Application Credit - Configuration exceeded                                                                            | Fault       |
| 671444995 0x28057003 | Application Credit - Information of maximum used Application Credit was corrupted                                      | Fault       |
| 671444996 0x28057004 | Application Credit - Available Application Credit has been exceeded during the last power cycle                        | Fault       |
| 671444997 0x28057005 | Application Credit - License Manager monitoring activated (bootproject active)                                         | Information |
| 671444998 0x28057006 | Application Credit - License Manager monitoring deactivated (NO bootproject active)                                    | Information |
| 671444999 0x28057007 | Application Credit - Budget configuration was corrupted                                                                | Warning     |
| 671445000 0x28057008 | Application Credit - Budget configuration was created, total available Application Credit was assigned to FAST-Toolbox | Information |
| 671445001 0x28057009 | Application Credit - Configuration violation during the last power cycle                                               | Fault       |
| 671445002 0x2805700A | Application Credit - Start of the application is delayed due to insufficient Application Credit                        | Fault       |
| 671445003 0x2805700B | Application Credit - Usage higher than configured (additional Application Credit on SD-card available)                 | Warning     |
| 671445004 0x2805700C | Application Credit - Change of configuration was refused                                                               | Warning     |
| 671481857 0x28060001 | SD card is write protected                                                                                             | Fault       |
| 671481904 0x28060030 | PowerDown detected                                                                                                     | Information |
| 671482880 0x28060400 | PowerDown - Retain data not persistent                                                                                 | Fault       |
| 671547411 0x28070013 | Initialization of the real-time clock failed                                                                           | Fault       |
| 671547418 0x2807001A | Charge state of buffer capacitors Real-time clock is low                                                               | Warning     |
| 671612938 0x2808000A | Device starts without SD card                                                                                          | Fault       |
| 671678788 0x28090144 | Firmware is not compatible with this device                                                                            | Fault       |
| 671678814 0x2809015E | SD card is not from this device - abort backup                                                                         | Fault       |
| 671678815 0x2809015F | Backup is not compatible with this device - abort restore                                                              | Fault       |
| 671678816 0x28090160 | SD card is not from this device - abort Up/Downgrade                                                                   | Fault       |
| 671678817 0x28090161 | SD card not mounted                                                                                                    | Fault       |
| 671678818 0x28090162 | SD card is write protected                                                                                             | Fault       |
| 671678819 0x28090163 | SD card does not have enough free space                                                                                | Fault       |
| 671678820 0x28090164 | USB stick not mounted                                                                                                  | Fault       |
| 671678821 0x28090165 | USB stick does not have correct backup structure                                                                       | Fault       |
| 671678822 0x28090166 | USB stick does not have enough free space                                                                              | Fault       |
| 671678825 0x28090169 | SD card contains too much stored project data                                                                          | Fault       |
| 671678826 0x2809016A | Backup succeeded                                                                                                       | Information |
| 671678827 0x2809016B | Device command is blocked by a running PLC application                                                                 | Fault       |
| 671678830 0x2809016E | Firmware is not compatible with this hardware version                                                                  | Fault       |
| 671744011 0x280A000B | Too many I/Os for task cycle time (I/O module msg. 11)                                                                 | Fault       |
| 671744012 0x280A000C | Parameter access I/O modules is restricted (I/O module msg. 12)                                                        | Fault       |
| 671744032 0x280A0020 | Internal error (I/O module msg. 32)                                                                                    | Fault       |
| 671744033 0x280A0021 | Internal error (I/O module msg. 33)                                                                                    | Fault       |
| 671744099 0x280A0063 | Too many I/Os for task cycle time (I/O module msg. 99)                                                                 | Fault       |
| 671744100 0x280A0064 | Too many I/Os for task cycle time (I/O module msg. 100)                                                                | Fault       |

# Diagnostics and fault elimination

Events, causes and remedies  
Event ID overview



| Event ID  |            | Event                                                                                      | Severity    |
|-----------|------------|--------------------------------------------------------------------------------------------|-------------|
| 671744101 | 0x280A0065 | Too many I/Os for task cycle time (I/O module msg. 101)                                    | Fault       |
| 671744102 | 0x280A0066 | Too many I/Os for task cycle time (I/O module msg. 102)                                    | Fault       |
| 671744103 | 0x280A0067 | Too many I/Os for task cycle time (I/O module msg. 103)                                    | Fault       |
| 671744104 | 0x280A0068 | Timeout backplane bus communication (I/O module msg. 104)                                  | Fault       |
| 671744105 | 0x280A0069 | Timeout backplane bus communication (I/O module msg. 105)                                  | Fault       |
| 671744106 | 0x280A006A | Timeout backplane bus communication (I/O module msg. 106)                                  | Fault       |
| 671744107 | 0x280A006B | Timeout backplane bus communication (I/O module msg. 107)                                  | Fault       |
| 671744108 | 0x280A006C | Timeout backplane bus communication (I/O module msg. 108)                                  | Fault       |
| 671744109 | 0x280A006D | Timeout backplane bus communication (I/O module msg. 109)                                  | Fault       |
| 671744111 | 0x280A006F | Internal error (I/O module msg. 110)                                                       | Fault       |
| 671744112 | 0x280A0070 | Powerfail backplane bus detected (I/O module msg. 112)                                     | Fault       |
| 671744116 | 0x280A0074 | Timeout backplane bus communication (I/O module msg. 116)                                  | Fault       |
| 671744117 | 0x280A0075 | Timeout backplane bus communication (I/O module msg. 117)                                  | Fault       |
| 671744118 | 0x280A0076 | Timeout backplane bus communication (I/O module msg. 118)                                  | Fault       |
| 671744119 | 0x280A0077 | Timeout backplane bus communication (I/O module msg. 119)                                  | Fault       |
| 671744120 | 0x280A0078 | Timeout backplane bus communication (I/O module msg. 120)                                  | Fault       |
| 671744121 | 0x280A0079 | Timeout backplane bus communication (I/O module msg. 121)                                  | Fault       |
| 671744136 | 0x280A0088 | Configuration error I/O module topology (I/O module msg. 136)                              | Fault       |
| 671744137 | 0x280A0089 | Too many tasks for I/O module operation (I/O module msg. 137)                              | Fault       |
| 671744138 | 0x280A008A | Internal error (I/O module msg. 138)                                                       | Fault       |
| 671744139 | 0x280A008B | Internal error (I/O module msg. 139)                                                       | Fault       |
| 671744140 | 0x280A008C | Internal error (I/O module msg. 140)                                                       | Fault       |
| 671744181 | 0x280A00B5 | Internal error (I/O module msg. 181)                                                       | Fault       |
| 671744200 | 0x280A00C8 | Internal error (I/O module msg. 200)                                                       | Fault       |
| 671744220 | 0x280A00DC | Internal error (I/O module msg. 220)                                                       | Fault       |
| 671744221 | 0x280A00DD | Internal error (I/O module msg. 221)                                                       | Fault       |
| 671744222 | 0x280A00DE | I/O system driver could not be opened (I/O module msg. 222)                                | Fault       |
| 671809806 | 0x280B010e | Faulty system units                                                                        | Fault       |
| 671810816 | 0x280B0500 | PLC buffer overflow                                                                        | Warning     |
| 671813633 | 0x280B1001 | Application cannot be started                                                              | Fault       |
| 805307009 | 0x30000281 | Init cmd response error - Slave not present                                                | Fault       |
| 805307010 | 0x30000282 | Init cmd response error - Erron in AL Status                                               | Fault       |
| 805307011 | 0x30000283 | Init cmd response error - Mailbox Error                                                    | Fault       |
| 805307012 | 0x30000284 | Init cmd response error - PDI Watchdog expired                                             | Fault       |
| 805311432 | 0x300013C8 | CoE - SDO Abort 'Toggle bit not alternated (0x05030000)'                                   | Information |
| 805311433 | 0x300013C9 | CoE - SDO Abort 'SDO protocol time-out (0x05040000)'                                       | Warning     |
| 805311434 | 0x300013CA | CoE - SDO Abort 'Client/server command specifier not valid or unknown (0x05040001)'        | Information |
| 805311435 | 0x300013CB | CoE - SDO Abort 'Invalid block size (block mode only) (0x05040002)'                        | Information |
| 805311436 | 0x300013CC | CoE - SDO Abort 'Invalid sequence number (block mode only) (0x05040003)'                   | Information |
| 805311437 | 0x300013CD | CoE - SDO Abort 'CRC error (block mode only) (0x05040004)'                                 | Information |
| 805311438 | 0x300013CE | CoE - SDO Abort 'Out of memory (0x05040005)'                                               | Information |
| 805311439 | 0x300013CF | CoE - SDO Abort 'Unsupported access to an object (0x06010000)'                             | Information |
| 805311440 | 0x300013D0 | CoE - SDO Abort 'Attempt to read a write only object (0x06010001)'                         | Information |
| 805311441 | 0x300013D1 | CoE - SDO Abort 'Attempt to write a read only object (0x06010002)'                         | Information |
| 805311442 | 0x300013D2 | CoE - SDO-Abort 'Object does not exist in the object dictionary (0x06020000)'              | Information |
| 805311443 | 0x300013D3 | CoE - SDO Abort 'Object cannot be mapped to the PDO (0x06040041)'                          | Information |
| 805311444 | 0x300013D4 | CoE - SDO Abort 'Number and length of objects to be mapped exceed PDO length (0x06040042)' | Information |
| 805311445 | 0x300013D5 | CoE - SDO Abort 'General parameter incompatibility (0x06040043)'                           | Information |
| 805311446 | 0x300013D6 | CoE - SDO Abort 'General internal incompatibility in the device (0x06040047)'              | Information |
| 805311447 | 0x300013D7 | CoE - SDO Abort 'Access failed due to an hardware error (0x06060000)'                      | Information |
| 805311448 | 0x300013D8 | CoE - SDO Abort 'Data type or length of service parameters do not match (0x06070010)'      | Information |
| 805311449 | 0x300013D9 | CoE - SDO Abort 'Data type does not match, service parameter too high (0x06070012)'        | Information |
| 805311450 | 0x300013DA | CoE - SDO Abort 'Data type does not match, service parameter too low (0x06070013)'         | Information |
| 805311451 | 0x300013DB | CoE - SDO Abort 'Subindex does not exist (0x06090011)'                                     | Information |



# Diagnostics and fault elimination

Events, causes and remedies

Event ID overview

| Event ID  |            | Event                                                                                                       | Severity    |
|-----------|------------|-------------------------------------------------------------------------------------------------------------|-------------|
| 805311452 | 0x300013DC | CoE - SDO Abort 'Write access - Parameter value exceeds limits (0x06090030)'                                | Information |
| 805311453 | 0x300013DD | CoE - SDO Abort 'Write access - Parameter value too high (0x06090031)'                                      | Information |
| 805311454 | 0x300013DE | CoE - SDO Abort 'Write access - Parameter value too low (0x06090032)'                                       | Information |
| 805311455 | 0x300013DF | CoE - SDO Abort 'Maximum value less than minimum value (0x06090036)'                                        | Information |
| 805311456 | 0x300013E0 | CoE - SDO Abort 'General error (0x08000000)'                                                                | Information |
| 805311457 | 0x300013E1 | CoE - SDO Abort 'Data cannot be transferred/stored in application (0x08000020)'                             | Information |
| 805311458 | 0x300013E2 | CoE - SDO Abort 'Local control - Data cannot be transferred/stored in application (0x08000021)'             | Information |
| 805311459 | 0x300013E3 | CoE - SDO Abort 'Actual device state - Data cannot be transferred/stored in application (0x08000022)'       | Information |
| 805311460 | 0x300013E4 | CoE - SDO Abort 'Object dictionary - Dynamic generation fails or object dictionary is missing (0x08000023)' | Information |
| 805311461 | 0x300013E5 | CoE - SDO Abort 'Unknown abort code'                                                                        | Information |
| 805311462 | 0x300013E6 | CoE - Invalid parameter                                                                                     | Information |
| 805311463 | 0x300013E7 | CoE - CoE protocol not supported                                                                            | Information |
| 805311464 | 0x300013E8 | CoE - Unknown FoE error                                                                                     | Information |
| 805311465 | 0x300013E9 | CoE - FoE error 'Not found'                                                                                 | Information |
| 805311466 | 0x300013EA | CoE - FoE error 'Access denied'                                                                             | Information |
| 805311467 | 0x300013EB | CoE - FoE error 'Disk full'                                                                                 | Information |
| 805311468 | 0x300013EC | CoE - FoE error 'Illegal'                                                                                   | Information |
| 805311469 | 0x300013ED | CoE - FoE error 'Wrong packet number'                                                                       | Information |
| 805311470 | 0x300013EE | CoE - FoE error 'Already existing'                                                                          | Information |
| 805311471 | 0x300013EF | CoE - FoE error 'User missing'                                                                              | Information |
| 805311472 | 0x300013F0 | CoE - FoE error 'Only possible in bootstrap'                                                                | Information |
| 805311473 | 0x300013F1 | CoE - FoE error 'No bootstrap'                                                                              | Information |
| 805311474 | 0x300013F2 | CoE - FoE error 'No access rights'                                                                          | Information |
| 805311475 | 0x300013F3 | CoE - FoE error 'Program error'                                                                             | Information |
| 805311476 | 0x300013F4 | CoE - FoE error 'Invalid parameter'                                                                         | Information |
| 805311477 | 0x300013F5 | FoE error - Timeout                                                                                         | Fault       |
| 805311881 | 0x30001589 | EtherCAT - State change of master successful                                                                | Fault       |
| 805311882 | 0x3000158A | EtherCAT - Bus scan successful                                                                              | Fault       |
| 805311883 | 0x3000158B | EtherCAT - Bus scan error                                                                                   | Fault       |
| 805311892 | 0x30001594 | CoE - Emergency request                                                                                     | Information |
| 805311893 | 0x30001595 | Cyclic command WKC error                                                                                    | Fault       |
| 805311894 | 0x30001596 | Master init command WKC error                                                                               | Warning     |
| 805311895 | 0x30001597 | Slave init command WKC error                                                                                | Warning     |
| 805311896 | 0x30001598 | EoE receive WKC error                                                                                       | Warning     |
| 805311897 | 0x30001599 | CoE receive WKC error                                                                                       | Warning     |
| 805311898 | 0x3000159A | FoE receive WKC error                                                                                       | Fault       |
| 805311900 | 0x3000159C | EoE send WKC error                                                                                          | Warning     |
| 805311901 | 0x3000159D | CoE send WKC error                                                                                          | Warning     |
| 805311902 | 0x3000159E | FoE send WKC error                                                                                          | Warning     |
| 805311909 | 0x300015A5 | Init command response error - No response                                                                   | Warning     |
| 805311910 | 0x300015A6 | Init command response error - Validation error                                                              | Warning     |
| 805311911 | 0x300015A7 | Init command response error - Failed                                                                        | Warning     |
| 805311912 | 0x300015A8 | Master init command response error - No response                                                            | Warning     |
| 805311913 | 0x300015A9 | Master init command response error - Validation error                                                       | Warning     |
| 805311915 | 0x300015AB | Mailbox init command timeout                                                                                | Warning     |
| 805311916 | 0x300015AC | At least one EtherCAT slave not in 'Operational'                                                            | Warning     |
| 805311917 | 0x300015AD | EtherCAT cable connected                                                                                    | Information |
| 805311918 | 0x300015AE | EtherCAT cable not connected                                                                                | Information |
| 805311921 | 0x300015B1 | At least one slave is in state 'Error'                                                                      | Warning     |
| 805311922 | 0x300015B2 | Slave error                                                                                                 | Warning     |
| 805311923 | 0x300015B3 | Communication to device interrupted                                                                         | Warning     |
| 805311924 | 0x300015B4 | SDO abort                                                                                                   | Warning     |
| 805311925 | 0x300015B5 | DC slaves are 'in-sync'                                                                                     | Information |

# Diagnostics and fault elimination

Events, causes and remedies  
Event ID overview



| Event ID             | Event                                                                 | Severity    |
|----------------------|-----------------------------------------------------------------------|-------------|
| 805311926 0x300015B6 | DC slaves are 'out-of-sync'                                           | Warning     |
| 805312086 0x30001656 | Communication to device interrupted                                   | Information |
| 805312087 0x30001657 | Slave is not in expected status                                       | Warning     |
| 805312112 0x30001670 | Bus scan timeout                                                      | Warning     |
| 805312568 0x30001838 | Configuration error - Check of VendorID failed                        | Warning     |
| 805312569 0x30001839 | Configuration error - Check of ProductCode failed                     | Information |
| 805312570 0x3000183A | Configuration error - Check of Revision failed                        | Information |
| 805312571 0x3000183B | Configuration error - Check of VendorID failed                        | Information |
| 805312572 0x3000183C | Configuration error - Odd device at bus end                           | Information |
| 805312578 0x30001842 | Internal error counter resetted                                       | Information |
| 805312580 0x30001844 | All slaves 'Operational' again                                        | Information |
| 805312581 0x30001845 | Cyclic command WKC error                                              | Warning     |
| 805312582 0x30001846 | Frame response error                                                  | Warning     |
| 805312583 0x30001847 | Not all slaves are 'Operational'                                      | Information |
| 805312584 0x30001848 | Emergency message - Overflow, further messages blocked                | Warning     |
| 805312588 0x3000184C | New configuration loaded                                              | Information |
| 805312589 0x3000184D | New configuration loaded, no slaves defined                           | Information |
| 805312590 0x3000184E | Master - Start failed, configuration error                            | Information |
| 805312591 0x3000184F | New configuration loaded from slaves EEPROM                           | Information |
| 805312598 0x30001856 | Master - Start failed                                                 | Warning     |
| 805312599 0x30001857 | Master - Start failed, bus configuration error                        | Warning     |
| 805312600 0x30001858 | Master - Start failed, EtherCAT cable disconnected                    | Warning     |
| 805312601 0x30001859 | Master - Start failed, DC/DCM configuration                           | Warning     |
| 805312602 0x3000185A | Master - Start failed, cannot set slaves to 'Pre-Operational'         | Warning     |
| 805312608 0x30001860 | Master - Set 'Operational' failed                                     | Warning     |
| 805312610 0x30001862 | Master - Set 'Operational' failed, EtherCAT cable disconnected        | Warning     |
| 805312613 0x30001865 | Master - Set 'Operational' takes some time...                         | Warning     |
| 805312614 0x30001866 | Master - Set 'Operational' failed, time-out                           | Warning     |
| 805312615 0x30001867 | Master - Set 'Operational' failed, slave error                        | Warning     |
| 805312616 0x30001868 | Master - Set 'Operational' aborted by reset command                   | Warning     |
| 805312618 0x3000186A | Master - Stopping failed                                              | Warning     |
| 805312619 0x3000186B | Master - Stopping failed, cannot set Slaves 'Pre-Operational'         | Warning     |
| 805312628 0x30001874 | Master - Shutdown failed                                              | Warning     |
| 805312638 0x3000187E | Remote API Server - Start failed                                      | Warning     |
| 805312648 0x30001888 | Start Download Service                                                | Information |
| 805312649 0x30001889 | Download Service done                                                 | Information |
| 805312668 0x3000189C | MMC - Internal error                                                  | Warning     |
| 805312669 0x3000189D | MMC - 'Modular Machine Configuration' is active                       | Information |
| 805312670 0x3000189E | MMC - Service started                                                 | Information |
| 805312671 0x3000189F | MMC - Service stopped                                                 | Information |
| 805312672 0x300018A0 | MMC - Error in configuration files                                    | Warning     |
| 805312673 0x300018A1 | MMC - File does not exist                                             | Warning     |
| 805312674 0x300018A2 | MMC - Parsing error                                                   | Warning     |
| 805312675 0x300018A3 | MMC - parsing of file successful                                      | Warning     |
| 805312676 0x300018A4 | MMC - Devices not sorted in ascending order or devices missing        | Warning     |
| 805312677 0x300018A5 | MMC - Number of devices in device tree differs                        | Warning     |
| 805312678 0x300018A6 | MMC - Device type mismatch for Alias Address                          | Warning     |
| 805312679 0x300018A7 | MMC - Invalid Alias Address                                           | Warning     |
| 805312680 0x300018A8 | MMC - Duplicated Alias Address                                        | Warning     |
| 805312681 0x300018A9 | MMC - No configuration checks                                         | Information |
| 805312682 0x300018AA | MMC - Invalid configuration                                           | Warning     |
| 805312683 0x300018AB | MMC - Mandatory slave missing                                         | Warning     |
| 805312684 0x300018AC | MMC - Optional slave is present, but not allowed                      | Warning     |
| 805312685 0x300018AD | MMC - No valid service active                                         | Warning     |
| 805312686 0x300018AE | MMC - Address assignment error, less slaves connected than configured | Warning     |



# Diagnostics and fault elimination

Events, causes and remedies

Event ID overview

| Event ID  | Event                                                                                                   | Severity    |
|-----------|---------------------------------------------------------------------------------------------------------|-------------|
| 805312687 | 0x300018AF MMC - Address assignment error, more slaves connected than configured                        | Fault       |
| 805312688 | 0x300018B0 MMC - Address assignment error, invalid device                                               | Fault       |
| 805312689 | 0x300018B1 MMC - Address assignment successful                                                          | Information |
| 805312690 | 0x300018B2 MMC - Address assignment failed                                                              | Information |
| 805312691 | 0x300018B3 MMC - Address assignment done                                                                | Information |
| 805312692 | 0x300018B4 MMC - Address assignment error, writing address by CoE                                       | Warning     |
| 805312693 | 0x300018B5 MMC - Slave identification error                                                             | Warning     |
| 805312694 | 0x300018B6 MMC - Slave identification error, slave ident data failed                                    | Warning     |
| 805312695 | 0x300018B7 MMC - Service state cannot be changed, set bus to 'INIT' first                               | Information |
| 805312768 | 0x30001900 CoE - Emergency request                                                                      | Information |
| 805312769 | 0x30001901 Topology check results ignored                                                               | Warning     |
| 805312770 | 0x30001902 Simultaneous use of MMC and Hotconnect is not permitted                                      | Fault       |
| 805312771 | 0x30001903 Number of configured HC-Groups exceeds limit                                                 | Fault       |
| 805312772 | 0x30001904 Unexpected Identification Value                                                              | Fault       |
| 805312773 | 0x30001905 Slave missing                                                                                | Fault       |
| 805312774 | 0x30001906 Unexpected Slave                                                                             | Fault       |
| 805312775 | 0x30001907 Same Identification Value available multiple times                                           | Fault       |
| 805312776 | 0x30001908 Identification Value is incorrect                                                            | Fault       |
| 805312784 | 0x30001910 HC-Group - setting timeout                                                                   | Fault       |
| 805314560 | 0x30002000 BusCycleTask is 'out-of-sync'                                                                | Fault       |
| 822310534 | 0x31037686 Network - Configuration error                                                                | Fault       |
| 822313360 | 0x31038190 Network - Watchdog time-out                                                                  | Warning     |
| 822313361 | 0x31038191 Network - Disruption of cyclic data exchange                                                 | No response |
| 822313362 | 0x31038192 Network - Initialization error                                                               | Warning     |
| 822313363 | 0x31038193 Network - Invalid cyclic process data                                                        | Warning     |
| 822313607 | 0x31038287 Network - Invalid configuration                                                              | Warning     |
| 822313608 | 0x31038288 Network - Max. count of supported process data reached                                       | Fault       |
| 822313609 | 0x31038289 Network - Too few Application Credit for network operation                                   | Fault       |
| 827331073 | 0x31501201 Address space update failed                                                                  | Warning     |
| 827331074 | 0x31501202 Client user authentication failed                                                            | Warning     |
| 827331075 | 0x31501203 Client operation failed                                                                      | Warning     |
| 827331078 | 0x31501206 Client has been rejected because the certificate is not trusted                              | Warning     |
| 827331079 | 0x31501207 Needed element for mapping is missing or erroneous                                           | Warning     |
| 827331080 | 0x31501208 Namespace-ID for namespace-URI could not be found                                            | Warning     |
| 827331081 | 0x31501209 Node-ID for CSV name could not be found                                                      | Warning     |
| 827331088 | 0x31501210 Node-ID of element not valid                                                                 | Warning     |
| 827331089 | 0x31501211 Element is missing for mapping                                                               | Warning     |
| 827331090 | 0x31501212 CSV file could not be found                                                                  | Warning     |
| 827331091 | 0x31501213 CSV file is erroneous                                                                        | Warning     |
| 827331092 | 0x31501214 Name collision in CSV file                                                                   | Warning     |
| 827331093 | 0x31501215 The arguments of the node of the mapping file do not match the arguments of the nodeset file | Warning     |
| 827331094 | 0x31501216 The notifier for the node could not be found. Setting notifier to server node                | Warning     |
| 827331095 | 0x31501217 The method was called again, before the current execution was finalised                      | Warning     |
| 827331096 | 0x31501218 Out of memory                                                                                | Warning     |
| 827331105 | 0x31501221 GDS - Client could not connect                                                               | Warning     |
| 827331106 | 0x31501222 GDS - Client could not finish operation.                                                     | Warning     |
| 827331108 | 0x31501224 SKS - Pull client could not connect to SKS                                                   | Warning     |
| 827331109 | 0x31501225 SKS - Pull client could not retrieve valid keys                                              | Warning     |
| 827331110 | 0x31501226 Client failed to verify server certificate                                                   | Warning     |
| 827331329 | 0x31501301 Out of memory                                                                                | Fault       |
| 827331330 | 0x31501302 Failed to update address space                                                               | Fault       |
| 827331332 | 0x31501304 Nodeset file could not be found                                                              | Fault       |
| 827331333 | 0x31501305 Mapping file is erroneous                                                                    | Fault       |
| 827331334 | 0x31501306 Mapping file includes more nodesets than supported                                           | Fault       |

# Diagnostics and fault elimination

Events, causes and remedies

Event ID overview



| Event ID  |            | Event                                                                     | Severity    |
|-----------|------------|---------------------------------------------------------------------------|-------------|
| 827396609 | 0x31511201 | PubSub - PubSub module activation failed                                  | Warning     |
| 827396610 | 0x31511202 | PubSub - PubSub module activation failed because of missing credit points | Warning     |
| 827396613 | 0x31511205 | PubSub - The keyfile was deleted                                          | Warning     |
| 827396865 | 0x31511301 | PubSub - The configuration is invalid                                     | Fault       |
| 827396866 | 0x31511302 | PubSub - Data access has been denied for the user                         | Fault       |
| 827396867 | 0x31511303 | PubSub - The configuration size limit was exceeded                        | Fault       |
| 827396868 | 0x31511304 | PubSub - Configuration contains too many connections                      | Fault       |
| 827396869 | 0x31511305 | PubSub - Configuration contains too many WriterGroups                     | Fault       |
| 827396870 | 0x31511306 | PubSub - Configuration contains too many ReaderGroups                     | Fault       |
| 827396871 | 0x31511307 | PubSub - Configuration contains too many Writers                          | Fault       |
| 827396872 | 0x31511308 | PubSub - Configuration contains too many Readers                          | Fault       |
| 827396873 | 0x31511309 | PubSub - Configuration contains too many published DataSets               | Fault       |
| 827396880 | 0x31511310 | PubSub - Configuration contains too many subscribed DataSets              | Fault       |
| 827396881 | 0x31511311 | Internal error                                                            | Fault       |
| 827396882 | 0x31511312 | PubSub - The XML configuration could not be parsed                        | Fault       |
| 827396883 | 0x31511313 | PubSub - The keyfile is invalid                                           | Fault       |
| 827397121 | 0x31511401 | PubSub - The PubSub module was started and is running on connections      | Information |
| 827462149 | 0x31521205 | Session with handle disconnected because of external connection error     | Warning     |
| 827462150 | 0x31521206 | Session with handle disconnected because of connection error              | Warning     |
| 827462401 | 0x31521301 | Execution stopped due to Error                                            | Fault       |



## 14.6.2 Causes and remedies

671155580 | 0x2801057C SD card was removed during runtime

| Cause                                     | Remedy                                   | Severity/response |
|-------------------------------------------|------------------------------------------|-------------------|
| The SD card was removed during operation. | Insert the SD card back into the device. | Fault             |

671159298 | 0x28011402 Opening the parameter description failed

| Cause                                                                                               | Remedy                                                                                                                                                                                                                                                                                                         | Severity/response |
|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Parameter description is missing or faulty.<br>No or incorrect parameter description on the device. | Update boot project or device firmware. <ul style="list-style-type: none"><li>• Update boot project. This also updates the parameter set description.</li><li>• If updating the boot project does not fix the error, update the device firmware. The device parameters are also updated as a result.</li></ul> | Fault             |

671159299 | 0x28011403 Opening the parameter set failed

| Cause                                                                                      | Remedy                                                                                                                                                                                        | Severity/response |
|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Parameter set file is missing or faulty.<br>No or faulty parameter set file on the device. | Update boot project or restart device. <ul style="list-style-type: none"><li>• Update boot project. This also updates the parameter set.</li><li>• Restart the device if necessary.</li></ul> | Fault             |

671159300 | 0x28011404 Loading parameter set is failed

| Cause                                 | Remedy                                         | Severity/response |
|---------------------------------------|------------------------------------------------|-------------------|
| Loading the parameter set has failed. | Save the parameter set and restart the device. | Fault             |

671162931 | 0x28012233 CRC in "IdenCom.ini" file is incorrect

| Cause                                         | Remedy                                                               | Severity/response |
|-----------------------------------------------|----------------------------------------------------------------------|-------------------|
| Internal error in the fieldbus configuration. | Restart the device. If the error persists, contact the manufacturer. | Fault             |

671162932 | 0x28012234 Action not allowed when PLC is running

| Cause                                                                                                                              | Remedy                                                      | Severity/response |
|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|-------------------|
| The action must not be executed as the PLC application is running. (The status of the PLC application is displayed in 0x5810:001.) | Stop the PLC application and then perform the action again. | Fault             |

671162933 | 0x28012235 Unsupported Fieldbus system

| Cause                           | Remedy                            | Severity/response |
|---------------------------------|-----------------------------------|-------------------|
| Invalid fieldbus configuration. | Adapt the fieldbus configuration. | Fault             |

# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies



## 671162934 | 0x28012236 Network module changed (Change active after restart)

| Cause                                                                                                                                                                   | Remedy                                     | Severity/response |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-------------------|
| A change has been made to the network module through parameter settings or a changed parameter set. These changes only take effect after the device has been restarted. | For information only. No remedy necessary. | Information       |

## 671421185 | 0x28051301 Boot application - More Application Credit required

| Cause                                                                                       | Remedy                                            | Severity/response |
|---------------------------------------------------------------------------------------------|---------------------------------------------------|-------------------|
| The loaded application requires more "Application Credit" than is available on the SD card. | Use SD card with sufficient "Application Credit". | Trouble           |

## 671421186 | 0x28051302 Application requires dual-use license

| Cause                                                      | Remedy                              | Severity/response |
|------------------------------------------------------------|-------------------------------------|-------------------|
| The application requires a device with "dual use license". | Use device with "dual use license". | Trouble           |

## 671421187 | 0x28051303 Powercaps not fully charged

| Cause                                                                                       | Remedy                                                                                | Severity/response |
|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-------------------|
| As long as the buffer capacitors are not charged, the start of an application is prevented. | Take into account the charging time of the buffer capacitors during the boot process. | Trouble           |

## 671421188 | 0x28051304 SD card is write protected - Running application is prevented

| Cause                                                                                            | Remedy                                                           | Severity/response |
|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------|-------------------|
| Write protection is activated for the SD card. This makes it impossible to start an application. | Remove write protection from the SD card and restart the device. | Trouble           |

## 671444993 | 0x28057001 Application Credit - Application Credit exceeded

| Cause                                                            | Remedy                                         | Severity/response |
|------------------------------------------------------------------|------------------------------------------------|-------------------|
| The Application Credit configured for an area has been exceeded. | Analyze detailed error message in the logbook. | Fault             |

## 671444994 | 0x28057002 Application Credit - Configuration exceeded

| Cause                                                                                                   | Remedy                                                                                                                                                                                                                              | Severity/response |
|---------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| More Application Credit has been distributed to the individual areas than are available on the SD card. | <ul style="list-style-type: none"><li>• Check your available Application Credit.</li><li>• Check the configuration of the use of Application Credit.</li><li>• If necessary, use an SD card with more Application Credit.</li></ul> | Fault             |



# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies

## 671444995 | 0x28057003 Application Credit - Information of maximum used Application Credit was corrupted

| Cause                                                                                                                                                                                                                             | Remedy                                                                                                                                    | Severity/response |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| The license manager automatically saves the information on the maximum Application Credit used with the current PLC project in a fail-safe manner. This information is incorrect. There may have been an attempt at manipulation. | <ul style="list-style-type: none"> <li>Restart the device (the information is rewritten).</li> <li>Download PLC project again.</li> </ul> | Fault             |

## 671444996 | 0x28057004 Application Credit - Available Application Credit has been exceeded during the last power cycle

| Cause                                                                                                                                              | Remedy                                                                                                                                                                                                                                                | Severity/response |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| During the current boot cycle, it was detected that the available Application Credit was exceeded during the previous operation of the controller. | <ul style="list-style-type: none"> <li>Analyze detailed error message in the logbook.</li> <li>Adapt the PLC application so that fewer Application Credit is required.</li> <li>If necessary, use an SD card with more Application Credit.</li> </ul> | Fault             |

## 671444997 | 0x28057005 Application Credit - License Manager monitoring activated (bootproject active)

| Cause                                                                                                                                | Remedy                                     | Severity/response |
|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-------------------|
| Monitoring of the Application Credit used by the license manager has been activated, as there is a persistently stored boot project. | For information only. No remedy necessary. | Information       |

## 671444998 | 0x28057006 Application Credit - License Manager monitoring deactivated (NO bootproject active)

| Cause                                                                                                                                   | Remedy                                     | Severity/response |
|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-------------------|
| Monitoring of the Application Credit used by the license manager has been deactivated, as there is no persistently stored boot project. | For information only. No remedy necessary. | Information       |

## 671444999 | 0x28057007 Application Credit - Budget configuration was corrupted

| Cause                                                                                     | Remedy                                                           | Severity/response |
|-------------------------------------------------------------------------------------------|------------------------------------------------------------------|-------------------|
| The file that is used to split the Application Credit into individual areas is defective. | Download PLC project again and create boot project if necessary. | Warning           |

## 671445000 | 0x28057008 Application Credit - Budget configuration was created, total available Application Credit was assigned to FAST-Toolbox

| Cause                                                                                                                                                                                        | Remedy                                     | Severity/response |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-------------------|
| The file that is used to split the Application Credit into individual areas has been created. The FAST toolbox was assigned the amount of Application Credit specified in the logbook entry. | For information only. No remedy necessary. | Information       |

## 671445001 | 0x28057009 Application Credit - Configuration violation during the last power cycle

| Cause                                                                                                                                                                                                 | Remedy                                                                                                                                                                                                                            | Severity/response |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| During the current boot cycle, it was determined that more Application Credit was used during the previous operation of the controller than was distributed to the individual areas or was available. | <ul style="list-style-type: none"> <li>Change the distribution of the Application Credit to the individual areas so that it is no longer exceeded.</li> <li>If necessary, use an SD card with more Application Credit.</li> </ul> | Fault             |

# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies



671445002 | 0x2805700A **Application Credit - Start of the application is delayed due to insufficient Application Credit**

| Cause                                                                                                                                                              | Remedy                                                                                                                                                                                     | Severity/response |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| The start of the PLC application was delayed because there is not enough Application Credit on the SD card. The logbook entry shows which delay time is effective. | <ul style="list-style-type: none"><li>Adapt the PLC application so that fewer Application Credit is required.</li><li>If necessary, use an SD card with more Application Credit.</li></ul> | Fault             |

671445003 | 0x2805700B **Application Credit - Usage higher than configured (additional Application Credit on SD-card available)**

| Cause                                                                                                                                                                 | Remedy                                                                                                                                                                              | Severity/response |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| More Application Credit was used than was distributed to the individual areas. However, as there is additional Application Credit on the SD card, this could be used. | Change the distribution of the Application Credit to the individual areas so that it is no longer exceeded. The Application Credit available on the SD card is sufficient for this. | Warning           |

671445004 | 0x2805700C **Application Credit - Change of configuration was refused**

| Cause                                                                                                                                                                                                                        | Remedy                                                                                                      | Severity/response |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------|
| The license manager has rejected the newly downloaded distribution of the Application Credit for the individual areas, as at least one area already uses more Application Credit than is configured in the new distribution. | Change the distribution of the Application Credit to the individual areas so that it is no longer exceeded. | Warning           |

671481857 | 0x28060001 **SD card is write protected**

| Cause                                    | Remedy                                                                                                   | Severity/response |
|------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------|
| The inserted SD card is write-protected. | For the SD card, slide the lock switch to the "Unlock" position to remove the physical write protection. | Fault             |

671481904 | 0x28060030 **PowerDown detected**

| Cause                    | Remedy                                     | Severity/response |
|--------------------------|--------------------------------------------|-------------------|
| Device is shutting down. | For information only. No remedy necessary. | Information       |

671482880 | 0x28060400 **PowerDown - Retain data not persistent**

| Cause                                                                                                     | Remedy                                                                                                                                              | Severity/response |
|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| The soft PLC is working incorrectly or is not active. The retain data of the PLC may not have been saved. | <ul style="list-style-type: none"><li>Restart the device or update the firmware.</li><li>If the error persists, contact the manufacturer.</li></ul> | Fault             |

671547411 | 0x28070013 **Initialization of the real-time clock failed**

| Cause                                                              | Remedy                            | Severity/response |
|--------------------------------------------------------------------|-----------------------------------|-------------------|
| Error initializing the real-time function. Time may not be usable. | Restart device and check logbook. | Fault             |

671547418 | 0x2807001A **Charge state of buffer capacitors Real-time clock is low**

| Cause                                                       | Remedy                                                | Severity/response |
|-------------------------------------------------------------|-------------------------------------------------------|-------------------|
| Device was disconnected from the power supply for too long. | Supply the device with power and set the system time. | Warning           |



# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies

671612938 | 0x2808000A **Device starts without SD card**

| Cause                          | Remedy                          | Severity/response |
|--------------------------------|---------------------------------|-------------------|
| Device starts without SD card. | If appropriate, insert SD card. | Fault             |

671678788 | 0x28090144 **Firmware is not compatible with this device**

| Cause                                            | Remedy                                                                                                                                       | Severity/response |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| The selected firmware does not match the device. | Ensure that the selected firmware exactly matches the target device.<br>Example: A c550 controller can only be updated with a c550 firmware. | Fault             |

671678814 | 0x2809015E **SD card is not from this device - abort backup**

| Cause                                                                                                                                           | Remedy                                                                                                                                                                                                                                | Severity/response |
|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Internal reviews are performed prior to implementation. Result: The inserted SD card was not recognized by the device. The backup was canceled. | Start device with a new/empty SD card.<br>Note: If there is no new/empty SD card, you can also delete data from the existing SD card. However, do not delete the license data! (Directory "Licenses_do_not_delete" including content) | Fault             |

671678815 | 0x2809015F **Backup is not compatible with this device - abort restore**

| Cause                                         | Remedy                                                                                                                                                     | Severity/response |
|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| The present backup does not match the device. | Ensure that the backup at hand exactly matches the target device.<br>Example: A backup from the c550 controller can only be restored to a c550 controller. | Fault             |

671678816 | 0x28090160 **SD card is not from this device - abort Up/Downgrade**

| Cause                                                                                                                                                      | Remedy                                                                                                                                                                                                                                | Severity/response |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Internal reviews are performed prior to implementation. Result: The inserted SD card was not recognized by the device. The upgrade/downgrade was canceled. | Start device with a new/empty SD card.<br>Note: If there is no new/empty SD card, you can also delete data from the existing SD card. However, do not delete the license data! (Directory "Licenses_do_not_delete" including content) | Fault             |

671678817 | 0x28090161 **SD card not mounted**

| Cause                                                  | Remedy                                                                                                                                     | Severity/response |
|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| The inserted SD card was not recognized by the device. | <ul style="list-style-type: none"><li>• Check whether the SD card is inserted/engaged correctly.</li><li>• Test another SD card.</li></ul> | Fault             |

671678818 | 0x28090162 **SD card is write protected**

| Cause                                    | Remedy                                                                                                   | Severity/response |
|------------------------------------------|----------------------------------------------------------------------------------------------------------|-------------------|
| The inserted SD card is write-protected. | For the SD card, slide the lock switch to the "Unlock" position to remove the physical write protection. | Fault             |

# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies



671678819 | 0x28090163 **SD card does not have enough free space**

| Cause                                          | Remedy                                                                                  | Severity/response |
|------------------------------------------------|-----------------------------------------------------------------------------------------|-------------------|
| There is not enough free space on the SD card. | Remove unneeded data from the SD card until at least 200 MB of free space is available. | Fault             |

671678820 | 0x28090164 **USB stick not mounted**

| Cause                                                    | Remedy                                                                                                                                                      | Severity/response |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| The inserted USB stick was not recognized by the device. | <ul style="list-style-type: none"><li>• Check if the USB stick is inserted correctly.</li><li>• Only use USB sticks approved by the manufacturer.</li></ul> | Fault             |

671678821 | 0x28090165 **USB stick does not have correct backup structure**

| Cause                                                                                    | Remedy                                                                                                                                                                                                                                          | Severity/response |
|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Backup file on the USB stick does not exist, is duplicated or is in the wrong directory. | Check the content of the USB stick. To do this, copy the corresponding data backup on the USB stick from the "firmware\archive__" to "firmware\active" directory. However, the directory "firmware\active" may only contain one file at a time. | Fault             |

671678822 | 0x28090166 **USB stick does not have enough free space**

| Cause                                            | Remedy                                           | Severity/response |
|--------------------------------------------------|--------------------------------------------------|-------------------|
| There is not enough free space on the USB stick. | Use a USB stick with at least 365 MB free space. | Fault             |

671678825 | 0x28090169 **SD card contains too much stored project data**

| Cause                                                                                                                                  | Remedy                                                                                                                | Severity/response |
|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------|
| The SD card is used to store project data of the controller. The sum of the project data stored on the SD card is too large (>165 MB). | Remove unneeded project data from the SD card until the value falls below the maximum size for project data (165 MB). | Fault             |

671678826 | 0x2809016A **Backup succeeded**

| Cause                                | Remedy                                                   | Severity/response |
|--------------------------------------|----------------------------------------------------------|-------------------|
| The backup was created successfully. | Remove USB stick from controller and restart controller. | Information       |

671678827 | 0x2809016B **Device command is blocked by a running PLC application**

| Cause                                                           | Remedy                                                                                                                | Severity/response |
|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------|
| Device command/setting is blocked by a running PLC application. | Execute device command/setting if the status of the application (display in 0x5810:001) is not equal to "1: Running". | Fault             |

671678830 | 0x2809016E **Firmware is not compatible with this hardware version**

| Cause                                                                          | Remedy                                                                              | Severity/response |
|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------|
| The firmware is not released for this device. The hardware version is too low. | Select firmware version that is compatible with the hardware version of the device. | Fault             |



# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies

671744011 | 0x280A000B **Too many I/Os for task cycle time (I/O module msg. 11)**

| Cause                                                  | Remedy                    | Severity/response |
|--------------------------------------------------------|---------------------------|-------------------|
| Too many I/O modules for the selected task cycle time. | Increase task cycle time. | Fault             |

671744012 | 0x280A000C **Parameter access I/O modules is restricted (I/O module msg. 12)**

| Cause                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Remedy                                  | Severity/response |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-------------------|
| <p>The controller could not access all parameters of the I/O modules. Process data communication (PDO) is not restricted.</p> <p>a) When the controller is started, the task load is close to the cycle time and there are very many configurable I/O modules connected to the backplane bus of the controller.</p> <p>b) During operation the task load is close to the cycle time and at the same time the tabs of configurable I/O modules are displayed in the "PLC Designer".</p> | Increase cycle time of bus cycle tasks. | Fault             |

671744032 | 0x280A0020 **Internal error (I/O module msg. 32)**

| Cause          | Remedy                                                           | Severity/response |
|----------------|------------------------------------------------------------------|-------------------|
| Internal error | Restart device. If the error persists, contact the manufacturer. | Fault             |

671744033 | 0x280A0021 **Internal error (I/O module msg. 33)**

| Cause          | Remedy                                                           | Severity/response |
|----------------|------------------------------------------------------------------|-------------------|
| Internal error | Restart device. If the error persists, contact the manufacturer. | Fault             |

671744099 | 0x280A0063 **Too many I/Os for task cycle time (I/O module msg. 99)**

| Cause                                                                                                                                                                                                              | Remedy                            | Severity/response |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------------------|
| Error while creating the task assigned to the backplane bus. The number of I/O modules or the size of the process image cannot be processed by the controller. The error occurs when starting the PLC application. | Reduce the number of I/O modules. | Fault             |

# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies



671744100 | 0x280A0064 **Too many I/Os for task cycle time (I/O module msg. 100)**

| Cause                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Severity/response |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <p>Error during processing of backplane bus telegrams. This error occurs during operation.</p> <p>a) Error in the PLC application: The task runtime is longer than the set task interval. The jitter of the backplane bus task is too high (&gt;120 µs).</p> <p>b) EMC influences (transmission interference): The telegrams are transmitted in insufficient quality.</p> <p>c) Mechanical influences: Short circuits of the signal cables due to jammed sockets. Missing or dirty contacts. The telegrams are transmitted in insufficient quality.</p> <p>d) An I/O module is defective.</p> <p>e) The number of I/O modules or the size of the process image cannot be processed by the controller.</p> <p>f) Controller is defective. The MF LEDs light up on all modules.</p> | <p>a) Check PLC application for possible causes of runtime extension or jitter and correct if necessary.</p> <p>b) Check the shielding. Check whether the error is related to special events (e.g. switching on the drives).</p> <p>c) Check and clean contacts between I/O modules and sockets.</p> <p>d) Replace I/O modules one by one to find the defective module.</p> <p>e) Reduce the number of I/O modules.</p> <p>f) The MF LEDs light up for all modules: Measure the voltage at the 5 V contacts of the last module at the backplane bus (pin 3 and 5). Replace controller.</p> | Fault             |

671744101 | 0x280A0065 **Too many I/Os for task cycle time (I/O module msg. 101)**

| Cause                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Severity/response |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <p>Error during processing of backplane bus telegrams. This error occurs during operation.</p> <p>a) Error in the PLC application: The task runtime is longer than the set task interval. The jitter of the backplane bus task is too high (&gt;120 µs).</p> <p>b) EMC influences (transmission interference): The telegrams are transmitted in insufficient quality.</p> <p>c) Mechanical influences: Short circuits of the signal cables due to jammed sockets. Missing or dirty contacts. The telegrams are transmitted in insufficient quality.</p> <p>d) An I/O module is defective.</p> <p>e) The number of I/O modules or the size of the process image cannot be processed by the controller.</p> <p>f) Controller is defective. The MF LEDs light up on all modules.</p> | <p>a) Check PLC application for possible causes of runtime extension or jitter and correct if necessary.</p> <p>b) Check the shielding. Check whether the error is related to special events (e.g. switching on the drives).</p> <p>c) Check and clean contacts between I/O modules and sockets.</p> <p>d) Replace I/O modules one by one to find the defective module.</p> <p>e) Reduce the number of I/O modules.</p> <p>f) The MF LEDs light up for all modules: Measure the voltage at the 5 V contacts of the last module at the backplane bus (pin 3 and 5). Replace controller.</p> | Fault             |



# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies

671744102 | 0x280A0066 **Too many I/Os for task cycle time (I/O module msg. 102)**

| Cause                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Severity/response |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <p>Error during processing of backplane bus telegrams. This error occurs during operation.</p> <p>a) Error in the PLC application: The task runtime is longer than the set task interval. The jitter of the backplane bus task is too high (&gt;120 µs).</p> <p>b) EMC influences (transmission interference): The telegrams are transmitted in insufficient quality.</p> <p>c) Mechanical influences: Short circuits of the signal cables due to jammed sockets. Missing or dirty contacts. The telegrams are transmitted in insufficient quality.</p> <p>d) An I/O module is defective.</p> <p>e) The number of I/O modules or the size of the process image cannot be processed by the controller.</p> <p>f) Controller is defective. The MF LEDs light up on all modules.</p> | <p>a) Check PLC application for possible causes of runtime extension or jitter and correct if necessary.</p> <p>b) Check the shielding. Check whether the error is related to special events (e.g. switching on the drives).</p> <p>c) Check and clean contacts between I/O modules and sockets.</p> <p>d) Replace I/O modules one by one to find the defective module.</p> <p>e) Reduce the number of I/O modules.</p> <p>f) The MF LEDs light up for all modules: Measure the voltage at the 5 V contacts of the last module at the backplane bus (pin 3 and 5). Replace controller.</p> | Fault             |

671744103 | 0x280A0067 **Too many I/Os for task cycle time (I/O module msg. 103)**

| Cause                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Severity/response |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <p>Error during processing of backplane bus telegrams. This error occurs during operation.</p> <p>a) Error in the PLC application: The task runtime is longer than the set task interval. The jitter of the backplane bus task is too high (&gt;120 µs).</p> <p>b) EMC influences (transmission interference): The telegrams are transmitted in insufficient quality.</p> <p>c) Mechanical influences: Short circuits of the signal cables due to jammed sockets. Missing or dirty contacts. The telegrams are transmitted in insufficient quality.</p> <p>d) An I/O module is defective.</p> <p>e) The number of I/O modules or the size of the process image cannot be processed by the controller.</p> <p>f) Controller is defective. The MF LEDs light up on all modules.</p> | <p>a) Check PLC application for possible causes of runtime extension or jitter and correct if necessary.</p> <p>b) Check the shielding. Check whether the error is related to special events (e.g. switching on the drives).</p> <p>c) Check and clean contacts between I/O modules and sockets.</p> <p>d) Replace I/O modules one by one to find the defective module.</p> <p>e) Reduce the number of I/O modules.</p> <p>f) The MF LEDs light up for all modules: Measure the voltage at the 5 V contacts of the last module at the backplane bus (pin 3 and 5). Replace controller.</p> | Fault             |

671744104 | 0x280A0068 **Timeout backplane bus communication (I/O module msg. 104)**

| Cause                                                                                                                                                                                                                                                                                                                                                                                                               | Remedy                                                                                                                                                                                                                            | Severity/response |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <p>The data exchange between the backplane bus and the PLC application is not possible within the specified time.</p> <p>a) Follow-up error of the "Too many I/O modules..." error (I/O module messages 100 ... 103).</p> <p>b) Error in the PLC application: The task runtime is violated.</p> <p>c) Backplane bus structure: Many passive modules are plugged in between the I/O modules (EPM-S7xx/EPM-S9xx).</p> | <p>a) Check the error sequence in the logbook and eliminate the errors "Too many I/O modules..." (I/O module message 100 ... 103).</p> <p>b) Correct PLC application.</p> <p>c) Remove passive I/O modules, change structure.</p> | Fault             |

# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies



## 671744105 | 0x280A0069 Timeout backplane bus communication (I/O module msg. 105)

| Cause                                                                                                                                                                                                                                                                                                                                                                                                               | Remedy                                                                                                                                                                                                                             | Severity/response |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <p>The data exchange between the backplane bus and the PLC application is not possible within the specified time.</p> <p>a) Follow-up error of the "Too many I/O modules..." error (I/O module messages 100 ... 103).</p> <p>b) Error in the PLC application: The task runtime is violated.</p> <p>c) Backplane bus structure: Many passive modules are plugged in between the I/O modules (EPM-S7xx/EPM-S9xx).</p> | <p>a) Check the error sequence in the logbook and eliminate the errors "Too many I/O modules...". (I/O module message 100 ... 103).</p> <p>b) Correct PLC application.</p> <p>c) Remove passive I/O modules, change structure.</p> | Fault             |

## 671744106 | 0x280A006A Timeout backplane bus communication (I/O module msg. 106)

| Cause                                                                                                                                                                                                                                                                                                                                                                                                               | Remedy                                                                                                                                                                                                                             | Severity/response |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <p>The data exchange between the backplane bus and the PLC application is not possible within the specified time.</p> <p>a) Follow-up error of the "Too many I/O modules..." error (I/O module messages 100 ... 103).</p> <p>b) Error in the PLC application: The task runtime is violated.</p> <p>c) Backplane bus structure: Many passive modules are plugged in between the I/O modules (EPM-S7xx/EPM-S9xx).</p> | <p>a) Check the error sequence in the logbook and eliminate the errors "Too many I/O modules...". (I/O module message 100 ... 103).</p> <p>b) Correct PLC application.</p> <p>c) Remove passive I/O modules, change structure.</p> | Fault             |

## 671744107 | 0x280A006B Timeout backplane bus communication (I/O module msg. 107)

| Cause                                                                                                                                                                                                                                                                                                                                                                                                               | Remedy                                                                                                                                                                                                                             | Severity/response |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <p>The data exchange between the backplane bus and the PLC application is not possible within the specified time.</p> <p>a) Follow-up error of the "Too many I/O modules..." error (I/O module messages 100 ... 103).</p> <p>b) Error in the PLC application: The task runtime is violated.</p> <p>c) Backplane bus structure: Many passive modules are plugged in between the I/O modules (EPM-S7xx/EPM-S9xx).</p> | <p>a) Check the error sequence in the logbook and eliminate the errors "Too many I/O modules...". (I/O module message 100 ... 103).</p> <p>b) Correct PLC application.</p> <p>c) Remove passive I/O modules, change structure.</p> | Fault             |

## 671744108 | 0x280A006C Timeout backplane bus communication (I/O module msg. 108)

| Cause                                                                                                                                                                                                                                                                                                                                                                                                               | Remedy                                                                                                                                                                                                                             | Severity/response |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <p>The data exchange between the backplane bus and the PLC application is not possible within the specified time.</p> <p>a) Follow-up error of the "Too many I/O modules..." error (I/O module messages 100 ... 103).</p> <p>b) Error in the PLC application: The task runtime is violated.</p> <p>c) Backplane bus structure: Many passive modules are plugged in between the I/O modules (EPM-S7xx/EPM-S9xx).</p> | <p>a) Check the error sequence in the logbook and eliminate the errors "Too many I/O modules...". (I/O module message 100 ... 103).</p> <p>b) Correct PLC application.</p> <p>c) Remove passive I/O modules, change structure.</p> | Fault             |



# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies

## 671744109 | 0x280A006D Timeout backplane bus communication (I/O module msg. 109)

| Cause                                                                                                                                                                                                                                                                                                                                                                                                               | Remedy                                                                                                                                                                                                                             | Severity/response |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <p>The data exchange between the backplane bus and the PLC application is not possible within the specified time.</p> <p>a) Follow-up error of the "Too many I/O modules..." error (I/O module messages 100 ... 103).</p> <p>b) Error in the PLC application: The task runtime is violated.</p> <p>c) Backplane bus structure: Many passive modules are plugged in between the I/O modules (EPM-S7xx/EPM-S9xx).</p> | <p>a) Check the error sequence in the logbook and eliminate the errors "Too many I/O modules...". (I/O module message 100 ... 103).</p> <p>b) Correct PLC application.</p> <p>c) Remove passive I/O modules, change structure.</p> | Fault             |

## 671744111 | 0x280A006F Internal error (I/O module msg. 110)

| Cause          | Remedy                                                           | Severity/response |
|----------------|------------------------------------------------------------------|-------------------|
| Internal error | Restart device. If the error persists, contact the manufacturer. | Fault             |

## 671744112 | 0x280A0070 Powerfail backplane bus detected (I/O module msg. 112)

| Cause                          | Remedy | Severity/response |
|--------------------------------|--------|-------------------|
| Voltage interruption detected. | -      | Fault             |

## 671744116 | 0x280A0074 Timeout backplane bus communication (I/O module msg. 116)

| Cause                                                                                                                                                                                                                                                                                                                                                                                                               | Remedy                                                                                                                                                                                                                             | Severity/response |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <p>The data exchange between the backplane bus and the PLC application is not possible within the specified time.</p> <p>a) Follow-up error of the "Too many I/O modules..." error (I/O module messages 100 ... 103).</p> <p>b) Error in the PLC application: The task runtime is violated.</p> <p>c) Backplane bus structure: Many passive modules are plugged in between the I/O modules (EPM-S7xx/EPM-S9xx).</p> | <p>a) Check the error sequence in the logbook and eliminate the errors "Too many I/O modules...". (I/O module message 100 ... 103).</p> <p>b) Correct PLC application.</p> <p>c) Remove passive I/O modules, change structure.</p> | Fault             |

## 671744117 | 0x280A0075 Timeout backplane bus communication (I/O module msg. 117)

| Cause                                                                                                                                                                                                                                                                                                                                                                                                               | Remedy                                                                                                                                                                                                                             | Severity/response |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <p>The data exchange between the backplane bus and the PLC application is not possible within the specified time.</p> <p>a) Follow-up error of the "Too many I/O modules..." error (I/O module messages 100 ... 103).</p> <p>b) Error in the PLC application: The task runtime is violated.</p> <p>c) Backplane bus structure: Many passive modules are plugged in between the I/O modules (EPM-S7xx/EPM-S9xx).</p> | <p>a) Check the error sequence in the logbook and eliminate the errors "Too many I/O modules...". (I/O module message 100 ... 103).</p> <p>b) Correct PLC application.</p> <p>c) Remove passive I/O modules, change structure.</p> | Fault             |

# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies



## 671744118 | 0x280A0076 Timeout backplane bus communication (I/O module msg. 118)

| Cause                                                                                                                                                                                                                                                                                                                                                                                                               | Remedy                                                                                                                                                                                                                             | Severity/response |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <p>The data exchange between the backplane bus and the PLC application is not possible within the specified time.</p> <p>a) Follow-up error of the "Too many I/O modules..." error (I/O module messages 100 ... 103).</p> <p>b) Error in the PLC application: The task runtime is violated.</p> <p>c) Backplane bus structure: Many passive modules are plugged in between the I/O modules (EPM-S7xx/EPM-S9xx).</p> | <p>a) Check the error sequence in the logbook and eliminate the errors "Too many I/O modules...". (I/O module message 100 ... 103).</p> <p>b) Correct PLC application.</p> <p>c) Remove passive I/O modules, change structure.</p> | Fault             |

## 671744119 | 0x280A0077 Timeout backplane bus communication (I/O module msg. 119)

| Cause                                                                                                                                                                                                                                                                                                                                                                                                               | Remedy                                                                                                                                                                                                                             | Severity/response |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <p>The data exchange between the backplane bus and the PLC application is not possible within the specified time.</p> <p>a) Follow-up error of the "Too many I/O modules..." error (I/O module messages 100 ... 103).</p> <p>b) Error in the PLC application: The task runtime is violated.</p> <p>c) Backplane bus structure: Many passive modules are plugged in between the I/O modules (EPM-S7xx/EPM-S9xx).</p> | <p>a) Check the error sequence in the logbook and eliminate the errors "Too many I/O modules...". (I/O module message 100 ... 103).</p> <p>b) Correct PLC application.</p> <p>c) Remove passive I/O modules, change structure.</p> | Fault             |

## 671744120 | 0x280A0078 Timeout backplane bus communication (I/O module msg. 120)

| Cause                                                                                                                                                                                                                                                                                                                                                                                                               | Remedy                                                                                                                                                                                                                             | Severity/response |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <p>The data exchange between the backplane bus and the PLC application is not possible within the specified time.</p> <p>a) Follow-up error of the "Too many I/O modules..." error (I/O module messages 100 ... 103).</p> <p>b) Error in the PLC application: The task runtime is violated.</p> <p>c) Backplane bus structure: Many passive modules are plugged in between the I/O modules (EPM-S7xx/EPM-S9xx).</p> | <p>a) Check the error sequence in the logbook and eliminate the errors "Too many I/O modules...". (I/O module message 100 ... 103).</p> <p>b) Correct PLC application.</p> <p>c) Remove passive I/O modules, change structure.</p> | Fault             |

## 671744121 | 0x280A0079 Timeout backplane bus communication (I/O module msg. 121)

| Cause                                                                                                                                                                                                                                                                                                                                                                                                               | Remedy                                                                                                                                                                                                                             | Severity/response |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <p>The data exchange between the backplane bus and the PLC application is not possible within the specified time.</p> <p>a) Follow-up error of the "Too many I/O modules..." error (I/O module messages 100 ... 103).</p> <p>b) Error in the PLC application: The task runtime is violated.</p> <p>c) Backplane bus structure: Many passive modules are plugged in between the I/O modules (EPM-S7xx/EPM-S9xx).</p> | <p>a) Check the error sequence in the logbook and eliminate the errors "Too many I/O modules...". (I/O module message 100 ... 103).</p> <p>b) Correct PLC application.</p> <p>c) Remove passive I/O modules, change structure.</p> | Fault             |



# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies

## 671744136 | 0x280A0088 Configuration error I/O module topology (I/O module msg. 136)

| Cause                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Severity/response |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <p>The I/O modules configured in the PLC application were not found on the backplane bus.</p> <p>a) The bus structure in the PLC application does not match the actual bus structure.</p> <p>b) There is no contact between the electronic module and the base module of the I/O module.</p> <p>c) There is no contact between two adjacent base modules of the I/O system.</p> <p>d) An I/O module is defective.</p> <p>e) The voltage supply to the I/O modules has been interrupted.</p> <p>f) Controller is defective. The MF LEDs light up on all modules.</p> | <p>a) Compare PLC application with the actual bus structure.</p> <p>b) Plug the electronic module firmly onto the base module.</p> <p>c) Plug in base modules correctly.</p> <p>d) Replace defective I/O module (the MF LEDs of the affected module light up).</p> <p>e) When using EPM-S702 modules, check and restore the power supply to the modules.</p> <p>f) The MF LEDs light up for all modules: Measure the voltage at the 5 V contacts of the last module at the backplane bus (pin 3 and 5). Replace controller.</p> | Fault             |

## 671744137 | 0x280A0089 Too many tasks for I/O module operation (I/O module msg. 137)

| Cause                                     | Remedy                                                 | Severity/response |
|-------------------------------------------|--------------------------------------------------------|-------------------|
| Too many tasks for I/O module processing. | Reduce the number of tasks for processing I/O modules. | Fault             |

## 671744138 | 0x280A008A Internal error (I/O module msg. 138)

| Cause          | Remedy                                                           | Severity/response |
|----------------|------------------------------------------------------------------|-------------------|
| Internal error | Restart device. If the error persists, contact the manufacturer. | Fault             |

## 671744139 | 0x280A008B Internal error (I/O module msg. 139)

| Cause          | Remedy                                                           | Severity/response |
|----------------|------------------------------------------------------------------|-------------------|
| Internal error | Restart device. If the error persists, contact the manufacturer. | Fault             |

## 671744140 | 0x280A008C Internal error (I/O module msg. 140)

| Cause          | Remedy                                                           | Severity/response |
|----------------|------------------------------------------------------------------|-------------------|
| Internal error | Restart device. If the error persists, contact the manufacturer. | Fault             |

## 671744181 | 0x280A00B5 Internal error (I/O module msg. 181)

| Cause          | Remedy                                                           | Severity/response |
|----------------|------------------------------------------------------------------|-------------------|
| Internal error | Restart device. If the error persists, contact the manufacturer. | Fault             |

## 671744200 | 0x280A00C8 Internal error (I/O module msg. 200)

| Cause          | Remedy                                                           | Severity/response |
|----------------|------------------------------------------------------------------|-------------------|
| Internal error | Restart device. If the error persists, contact the manufacturer. | Fault             |

# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies



## 671744220 | 0x280A00DC Internal error (I/O module msg. 220)

| Cause          | Remedy                                                           | Severity/response |
|----------------|------------------------------------------------------------------|-------------------|
| Internal error | Restart device. If the error persists, contact the manufacturer. | Fault             |

## 671744221 | 0x280A00DD Internal error (I/O module msg. 221)

| Cause          | Remedy                                                           | Severity/response |
|----------------|------------------------------------------------------------------|-------------------|
| Internal error | Restart device. If the error persists, contact the manufacturer. | Fault             |

## 671744222 | 0x280A00DE I/O system driver could not be opened (I/O module msg. 222)

| Cause                                                                                                                                      | Remedy                                                                                                                  | Severity/response |
|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------|
| The I/O system driver (backplane bus driver) could not be started after an update of the controller firmware or due to a defective device. | <ul style="list-style-type: none"><li>• Update or restore the controller again.</li><li>• Replace controller.</li></ul> | Fault             |

## 671809806 | 0x280B010e Faulty system units

| Cause                                                               | Remedy                                                               | Severity/response |
|---------------------------------------------------------------------|----------------------------------------------------------------------|-------------------|
| Faulty system components were detected when the device was started. | Restart the device. If the error persists, contact the manufacturer. | Fault             |

## 671810816 | 0x280B0500 PLC buffer overflow

| Cause                                                                            | Remedy                                                                                                         | Severity/response |
|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|-------------------|
| In the "PLC Designer" not all log messages could be displayed in the log dialog. | Open the log dialog in the "PLC Designer" only in situations where there is not a high volume of log messages. | Warning           |

## 671813633 | 0x280B1001 Application cannot be started

| Cause                                                                   | Remedy                                                               | Severity/response |
|-------------------------------------------------------------------------|----------------------------------------------------------------------|-------------------|
| The boot application cannot be started due to faulty system components. | Restart the device. If the error persists, contact the manufacturer. | Fault             |

## 805307009 | 0x30000281 Init cmd response error - Slave not present

| Cause                                                                                                                          | Remedy                                                                                                            | Severity/response |
|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-------------------|
| The following error occurred during the execution of the slave init cmd for initializing the slave: Slave no longer available. | <ul style="list-style-type: none"><li>• Check whether the slave is available.</li><li>• Check features.</li></ul> | Fault             |

## 805307010 | 0x30000282 Init cmd response error - Erron in AL Status

| Cause                                                                                                                                               | Remedy                                                                                                            | Severity/response |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-------------------|
| The following error occurred during the execution of the slave init cmd for initializing the slave: Setting the EtherCAT status was not successful. | <ul style="list-style-type: none"><li>• Check whether the slave is available.</li><li>• Check features.</li></ul> | Fault             |



# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies

## 805307011 | 0x30000283 Init cmd response error - Mailbox Error

| Cause                                                                                                                                                | Remedy                                                                                                                    | Severity/response |
|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-------------------|
| The following error occurred during the execution of the slave init cmd for initializing the slave: Setting the mailbox features was not successful. | <ul style="list-style-type: none"><li>• Check whether the slave is available.</li><li>• Check mailbox features.</li></ul> | Fault             |

## 805307012 | 0x30000284 Init cmd response error - PDI Watchdog expired

| Cause                                                                                                                          | Remedy                       | Severity/response |
|--------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------|
| The following error occurred during the execution of the slave init cmd for initializing the slave: Problem with PDI watchdog. | Check PDI watchdog features. | Fault             |

## 805311432 | 0x300013C8 CoE - SDO Abort 'Toggle bit not alternated (0x05030000)'

| Cause                                         | Remedy                                     | Severity/response |
|-----------------------------------------------|--------------------------------------------|-------------------|
| The status of the toggle bit has not changed. | For information only. No remedy necessary. | Information       |

## 805311433 | 0x300013C9 CoE - SDO Abort 'SDO protocol time-out (0x05040000)'

| Cause                | Remedy                           | Severity/response |
|----------------------|----------------------------------|-------------------|
| SDO protocol timeout | Check if timeout is set too low. | Warning           |

## 805311434 | 0x300013CA CoE - SDO Abort 'Client/server command specifier not valid or unknown (0x05040001)'

| Cause                                                                  | Remedy                                                                                                       | Severity/response |
|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|-------------------|
| Invalid or unknown specification symbol for the client/server command. | <ul style="list-style-type: none"><li>Check access authorization.</li><li>Check object properties.</li></ul> | Information       |

## 805311435 | 0x300013CB CoE - SDO Abort 'Invalid block size (block mode only) (0x05040002)'

| Cause                                     | Remedy                                                                                                       | Severity/response |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------|-------------------|
| Invalid block size (only in "block mode") | <ul style="list-style-type: none"><li>Check access authorization.</li><li>Check object properties.</li></ul> | Information       |

## 805311436 | 0x300013CC CoE - SDO Abort 'Invalid sequence number (block mode only) (0x05040003)'

| Cause                                          | Remedy                                                                                                       | Severity/response |
|------------------------------------------------|--------------------------------------------------------------------------------------------------------------|-------------------|
| Invalid sequence number (only in "block mode") | <ul style="list-style-type: none"><li>Check access authorization.</li><li>Check object properties.</li></ul> | Information       |

## 805311437 | 0x300013CD CoE - SDO Abort 'CRC error (block mode only) (0x05040004)'

| Cause                            | Remedy                                                                                                       | Severity/response |
|----------------------------------|--------------------------------------------------------------------------------------------------------------|-------------------|
| CRC error (only in "block mode") | <ul style="list-style-type: none"><li>Check access authorization.</li><li>Check object properties.</li></ul> | Information       |

## 805311438 | 0x300013CE CoE - SDO Abort 'Out of memory (0x05040005)'

| Cause                                     | Remedy                                                                                                       | Severity/response |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------|-------------------|
| Too little free space in the main memory. | <ul style="list-style-type: none"><li>Check access authorization.</li><li>Check object properties.</li></ul> | Information       |

# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies



805311439 | 0x300013CF CoE - SDO Abort 'Unsupported access to an object (0x06010000)'

| Cause          | Remedy                                                  | Severity/response |
|----------------|---------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties. | Information       |

805311440 | 0x300013D0 CoE - SDO Abort 'Attempt to read a write only object (0x06010001)'

| Cause          | Remedy                      | Severity/response |
|----------------|-----------------------------|-------------------|
| Access denied. | Check access authorization. | Information       |

805311441 | 0x300013D1 CoE - SDO Abort 'Attempt to write a read only object (0x06010002)'

| Cause          | Remedy                      | Severity/response |
|----------------|-----------------------------|-------------------|
| Access denied. | Check access authorization. | Information       |

805311442 | 0x300013D2 CoE - SDO-Abort 'Object does not exist in the object dictionary (0x06020000)'

| Cause          | Remedy                                                 | Severity/response |
|----------------|--------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check if object exists. | Information       |

805311443 | 0x300013D3 CoE - SDO Abort 'Object cannot be mapped to the PDO (0x06040041)'

| Cause          | Remedy                                                 | Severity/response |
|----------------|--------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check if object exists. | Information       |

805311444 | 0x300013D4 CoE - SDO Abort 'Number and length of objects to be mapped exceed PDO length (0x06040042)'

| Cause          | Remedy                                        | Severity/response |
|----------------|-----------------------------------------------|-------------------|
| Access denied. | Check the length of the objects to be mapped. | Information       |

805311445 | 0x300013D5 CoE - SDO Abort 'General parameter incompatibility (0x06040043)'

| Cause          | Remedy                      | Severity/response |
|----------------|-----------------------------|-------------------|
| Access denied. | Check access authorization. | Information       |

805311446 | 0x300013D6 CoE - SDO Abort 'General internal incompatibility in the device (0x06040047)'

| Cause          | Remedy                      | Severity/response |
|----------------|-----------------------------|-------------------|
| Access denied. | Check access authorization. | Information       |

805311447 | 0x300013D7 CoE - SDO Abort 'Access failed due to an hardware error (0x06060000)'

| Cause          | Remedy                                                  | Severity/response |
|----------------|---------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties. | Information       |



# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies

805311448 | 0x300013D8 CoE - SDO Abort 'Data type or length of service parameters do not match (0x06070010)'

| Cause          | Remedy                                                  | Severity/response |
|----------------|---------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties. | Information       |

805311449 | 0x300013D9 CoE - SDO Abort 'Data type does not match, service parameter too high (0x06070012)'

| Cause          | Remedy                                                  | Severity/response |
|----------------|---------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties. | Information       |

805311450 | 0x300013DA CoE - SDO Abort 'Data type does not match, service parameter too low (0x06070013)'

| Cause          | Remedy                                                  | Severity/response |
|----------------|---------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties. | Information       |

805311451 | 0x300013DB CoE - SDO Abort 'Subindex does not exist (0x06090011)'

| Cause          | Remedy                                                  | Severity/response |
|----------------|---------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties. | Information       |

805311452 | 0x300013DC CoE - SDO Abort 'Write access - Parameter value exceeds limits (0x06090030)'

| Cause          | Remedy                                                  | Severity/response |
|----------------|---------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties. | Information       |

805311453 | 0x300013DD CoE - SDO Abort 'Write access - Parameter value too high (0x06090031)'

| Cause          | Remedy                                                  | Severity/response |
|----------------|---------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties. | Information       |

805311454 | 0x300013DE CoE - SDO Abort 'Write access - Parameter value too low (0x06090032)'

| Cause          | Remedy                                                  | Severity/response |
|----------------|---------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties. | Information       |

805311455 | 0x300013DF CoE - SDO Abort 'Maximum value less than minimum value (0x06090036)'

| Cause          | Remedy                                                  | Severity/response |
|----------------|---------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties. | Information       |

805311456 | 0x300013E0 CoE - SDO Abort 'General error (0x08000000)'

| Cause          | Remedy                                                  | Severity/response |
|----------------|---------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties. | Information       |

# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies



805311457 | 0x300013E1 **CoE - SDO Abort 'Data cannot be transferred/stored in application (0x08000020)'**

| Cause          | Remedy                                                  | Severity/response |
|----------------|---------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties. | Information       |

805311458 | 0x300013E2 **CoE - SDO Abort 'Local control - Data cannot be transferred/stored in application (0x08000021)'**

| Cause          | Remedy                                                  | Severity/response |
|----------------|---------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties. | Information       |

805311459 | 0x300013E3 **CoE - SDO Abort 'Actual device state - Data cannot be transferred/stored in application (0x08000022)'**

| Cause          | Remedy                                                  | Severity/response |
|----------------|---------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties. | Information       |

805311460 | 0x300013E4 **CoE - SDO Abort 'Object dictionary - Dynamic generation fails or object dictionary is missing (0x08000023)'**

| Cause          | Remedy                                                  | Severity/response |
|----------------|---------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties. | Information       |

805311461 | 0x300013E5 **CoE - SDO Abort 'Unknown abort code'**

| Cause          | Remedy                                                  | Severity/response |
|----------------|---------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties. | Information       |

805311462 | 0x300013E6 **CoE - Invalid parameter**

| Cause          | Remedy                                                                                | Severity/response |
|----------------|---------------------------------------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties.<br>Check transfer properties. | Information       |

805311463 | 0x300013E7 **CoE - CoE protocol not supported**

| Cause          | Remedy                                                                                | Severity/response |
|----------------|---------------------------------------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties.<br>Check transfer properties. | Information       |

805311464 | 0x300013E8 **CoE - Unknown FoE error**

| Cause          | Remedy                                                                   | Severity/response |
|----------------|--------------------------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check file.<br>Check transfer properties. | Information       |



# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies

805311465 | 0x300013E9 CoE - FoE error 'Not found'

| Cause          | Remedy                                                                   | Severity/response |
|----------------|--------------------------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check file.<br>Check transfer properties. | Information       |

805311466 | 0x300013EA CoE - FoE error 'Access denied'

| Cause          | Remedy                                                                   | Severity/response |
|----------------|--------------------------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check file.<br>Check transfer properties. | Information       |

805311467 | 0x300013EB CoE - FoE error 'Disk full'

| Cause          | Remedy                                                                   | Severity/response |
|----------------|--------------------------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check file.<br>Check transfer properties. | Information       |

805311468 | 0x300013EC CoE - FoE error 'Illegal'

| Cause          | Remedy                                                                   | Severity/response |
|----------------|--------------------------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check file.<br>Check transfer properties. | Information       |

805311469 | 0x300013ED CoE - FoE error 'Wrong packet number'

| Cause          | Remedy                                                  | Severity/response |
|----------------|---------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties. | Information       |

805311470 | 0x300013EE CoE - FoE error 'Already existing'

| Cause          | Remedy                                                                   | Severity/response |
|----------------|--------------------------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check file.<br>Check transfer properties. | Information       |

805311471 | 0x300013EF CoE - FoE error 'User missing'

| Cause          | Remedy                                                                   | Severity/response |
|----------------|--------------------------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check file.<br>Check transfer properties. | Information       |

805311472 | 0x300013F0 CoE - FoE error 'Only possible in bootstrap'

| Cause          | Remedy                                                                   | Severity/response |
|----------------|--------------------------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check file.<br>Check transfer properties. | Information       |

# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies



805311473 | 0x300013F1 **CoE - FoE error 'No bootstrap'**

| Cause          | Remedy                                                                   | Severity/response |
|----------------|--------------------------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check file.<br>Check transfer properties. | Information       |

805311474 | 0x300013F2 **CoE - FoE error 'No access rights'**

| Cause          | Remedy                                                                   | Severity/response |
|----------------|--------------------------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check file.<br>Check transfer properties. | Information       |

805311475 | 0x300013F3 **CoE - FoE error 'Program error'**

| Cause          | Remedy                                                  | Severity/response |
|----------------|---------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check object properties. | Information       |

805311476 | 0x300013F4 **CoE - FoE error 'Invalid parameter'**

| Cause          | Remedy                                                                   | Severity/response |
|----------------|--------------------------------------------------------------------------|-------------------|
| Access denied. | Check access authorization.<br>Check file.<br>Check transfer properties. | Information       |

805311477 | 0x300013F5 **FoE error - Timeout**

| Cause                                                           | Remedy                                                                    | Severity/response |
|-----------------------------------------------------------------|---------------------------------------------------------------------------|-------------------|
| A timeout has occurred during the FoE transfer (read or write). | If possible, increase the timeout setting or reduce the bus and CPU load. | Fault             |

805311881 | 0x30001589 **EtherCAT - State change of master successful**

| Cause                                        | Remedy                                     | Severity/response |
|----------------------------------------------|--------------------------------------------|-------------------|
| EtherCAT - State change of master successful | For information only. No remedy necessary. | Fault             |

805311882 | 0x3000158A **EtherCAT - Bus scan successful**

| Cause                          | Remedy                                     | Severity/response |
|--------------------------------|--------------------------------------------|-------------------|
| EtherCAT - Bus scan successful | For information only. No remedy necessary. | Fault             |

805311883 | 0x3000158B **EtherCAT - Bus scan error**

| Cause                         | Remedy                  | Severity/response |
|-------------------------------|-------------------------|-------------------|
| Error in the network topology | Check network topology. | Fault             |



# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies

805311892 | 0x30001594 **CoE - Emergency request**

| Cause                                                     | Remedy                                                                                                                                                                                                                                                                                              | Severity/response |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Internal error during transmission of emergency messages. | Check the documentation of the slave device for this emergency message. Note: "data: ..." shows by codes which error has occurred in which slave device/module. Detailed information about the coding of error messages can be found in the documentation of the corresponding slave device/module. | Information       |

805311893 | 0x30001595 **Cyclic command WKC error**

| Cause     | Remedy                                         | Severity/response |
|-----------|------------------------------------------------|-------------------|
| WKC error | Check slave status.<br>Check network topology. | Fault             |

805311894 | 0x30001596 **Master init command WKC error**

| Cause     | Remedy                                         | Severity/response |
|-----------|------------------------------------------------|-------------------|
| WKC error | Check slave status.<br>Check network topology. | Warning           |

805311895 | 0x30001597 **Slave init command WKC error**

| Cause     | Remedy                                         | Severity/response |
|-----------|------------------------------------------------|-------------------|
| WKC error | Check slave status.<br>Check network topology. | Warning           |

805311896 | 0x30001598 **EoE receive WKC error**

| Cause     | Remedy                                         | Severity/response |
|-----------|------------------------------------------------|-------------------|
| WKC error | Check slave status.<br>Check network topology. | Warning           |

805311897 | 0x30001599 **CoE receive WKC error**

| Cause     | Remedy                                         | Severity/response |
|-----------|------------------------------------------------|-------------------|
| WKC error | Check slave status.<br>Check network topology. | Warning           |

805311898 | 0x3000159A **FoE receive WKC error**

| Cause     | Remedy                                         | Severity/response |
|-----------|------------------------------------------------|-------------------|
| WKC error | Check slave status.<br>Check network topology. | Fault             |

805311900 | 0x3000159C **EoE send WKC error**

| Cause     | Remedy                                         | Severity/response |
|-----------|------------------------------------------------|-------------------|
| WKC error | Check slave status.<br>Check network topology. | Warning           |

# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies



805311901 | 0x3000159D **CoE send WKC error**

| Cause     | Remedy                                         | Severity/response |
|-----------|------------------------------------------------|-------------------|
| WKC error | Check slave status.<br>Check network topology. | Warning           |

805311902 | 0x3000159E **FoE send WKC error**

| Cause     | Remedy                                         | Severity/response |
|-----------|------------------------------------------------|-------------------|
| WKC error | Check slave status.<br>Check network topology. | Warning           |

805311909 | 0x300015A5 **Init command response error - No response**

| Cause          | Remedy                                                               | Severity/response |
|----------------|----------------------------------------------------------------------|-------------------|
| Internal error | Restart the device. If the error persists, contact the manufacturer. | Warning           |

805311910 | 0x300015A6 **Init command response error - Validation error**

| Cause          | Remedy                                                               | Severity/response |
|----------------|----------------------------------------------------------------------|-------------------|
| Internal error | Restart the device. If the error persists, contact the manufacturer. | Warning           |

805311911 | 0x300015A7 **Init command response error - Failed**

| Cause          | Remedy                                                               | Severity/response |
|----------------|----------------------------------------------------------------------|-------------------|
| Internal error | Restart the device. If the error persists, contact the manufacturer. | Warning           |

805311912 | 0x300015A8 **Master init command response error - No response**

| Cause          | Remedy                                                               | Severity/response |
|----------------|----------------------------------------------------------------------|-------------------|
| Internal error | Restart the device. If the error persists, contact the manufacturer. | Warning           |

805311913 | 0x300015A9 **Master init command response error - Validation error**

| Cause          | Remedy                                                               | Severity/response |
|----------------|----------------------------------------------------------------------|-------------------|
| Internal error | Restart the device. If the error persists, contact the manufacturer. | Warning           |

805311915 | 0x300015AB **Mailbox init command timeout**

| Cause          | Remedy                                                               | Severity/response |
|----------------|----------------------------------------------------------------------|-------------------|
| Internal error | Restart the device. If the error persists, contact the manufacturer. | Warning           |

805311916 | 0x300015AC **At least one EtherCAT slave not in 'Operational'**

| Cause                                                                | Remedy                                         | Severity/response |
|----------------------------------------------------------------------|------------------------------------------------|-------------------|
| Master is "Operational".<br>At least one slave is not "Operational". | Check slave status.<br>Check network topology. | Warning           |



# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies

805311917 | 0x300015AD **EtherCAT cable connected**

| Cause                    | Remedy                                     | Severity/response |
|--------------------------|--------------------------------------------|-------------------|
| EtherCAT cable connected | For information only. No remedy necessary. | Information       |

805311918 | 0x300015AE **EtherCAT cable not connected**

| Cause                      | Remedy                 | Severity/response |
|----------------------------|------------------------|-------------------|
| Network cabling is faulty. | Check network cabling. | Information       |

805311921 | 0x300015B1 **At least one slave is in state 'Error'**

| Cause                                       | Remedy                                         | Severity/response |
|---------------------------------------------|------------------------------------------------|-------------------|
| At least one slave is in the "Error" state. | Check slave status.<br>Check network topology. | Warning           |

805311922 | 0x300015B2 **Slave error**

| Cause                     | Remedy                                                                                           | Severity/response |
|---------------------------|--------------------------------------------------------------------------------------------------|-------------------|
| A slave reports an error. | Analyze detailed error message in the logbook.<br>Check slave status.<br>Check network topology. | Warning           |

805311923 | 0x300015B3 **Communication to device interrupted**

| Cause                                                                                                           | Remedy                                         | Severity/response |
|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------|-------------------|
| The connection to the slave is interrupted.<br>The slave does not respond.<br>The slave is no longer available. | Check slave status.<br>Check network topology. | Warning           |

805311924 | 0x300015B4 **SDO abort**

| Cause              | Remedy                                                                                                   | Severity/response |
|--------------------|----------------------------------------------------------------------------------------------------------|-------------------|
| CoE access denied. | Analyze detailed error message in the logbook.<br>Check object properties.<br>Check transfer properties. | Warning           |

805311925 | 0x300015B5 **DC slaves are 'in-sync'**

| Cause                   | Remedy                                     | Severity/response |
|-------------------------|--------------------------------------------|-------------------|
| DC slaves are 'in-sync' | For information only. No remedy necessary. | Information       |

805311926 | 0x300015B6 **DC slaves are 'out-of-sync'**

| Cause                                               | Remedy                                                                    | Severity/response |
|-----------------------------------------------------|---------------------------------------------------------------------------|-------------------|
| The DC deviation is outside the permissible limits. | Check slave status.<br>Check slave properties.<br>Check network topology. | Warning           |

805312086 | 0x30001656 **Communication to device interrupted**

| Cause                      | Remedy                                         | Severity/response |
|----------------------------|------------------------------------------------|-------------------|
| Communication interruption | Check slave status.<br>Check network topology. | Information       |

# Diagnostics and fault elimination

Events, causes and remedies

Causes and remedies



805312087 | 0x30001657 **Slave is not in expected status**

| Cause                                                     | Remedy                                                                                           | Severity/response |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------------|
| Detected slave status differs from expected slave status. | Analyze detailed error message in the logbook.<br>Check slave status.<br>Check network topology. | Warning           |

805312112 | 0x30001670 **Bus scan timeout**

| Cause                                    | Remedy                                                                    | Severity/response |
|------------------------------------------|---------------------------------------------------------------------------|-------------------|
| The bus scan was aborted due to timeout. | Analyze detailed error message in the logbook.<br>Check network topology. | Warning           |

805312568 | 0x30001838 **Configuration error - Check of VendorID failed**

| Cause                               | Remedy                                                                    | Severity/response |
|-------------------------------------|---------------------------------------------------------------------------|-------------------|
| The vendor ID could not be checked. | Analyze detailed error message in the logbook.<br>Check network topology. | Warning           |

805312569 | 0x30001839 **Configuration error - Check of ProductCode failed**

| Cause                                  | Remedy                                                                    | Severity/response |
|----------------------------------------|---------------------------------------------------------------------------|-------------------|
| The product code could not be checked. | Analyze detailed error message in the logbook.<br>Check network topology. | Information       |

805312570 | 0x3000183A **Configuration error - Check of Revision failed**

| Cause                              | Remedy                                                                    | Severity/response |
|------------------------------------|---------------------------------------------------------------------------|-------------------|
| The revision could not be checked. | Analyze detailed error message in the logbook.<br>Check network topology. | Information       |

805312571 | 0x3000183B **Configuration error - Check of VendorID failed**

| Cause                               | Remedy                                                                    | Severity/response |
|-------------------------------------|---------------------------------------------------------------------------|-------------------|
| The vendor ID could not be checked. | Analyze detailed error message in the logbook.<br>Check network topology. | Information       |

805312572 | 0x3000183C **Configuration error - Odd device at bus end**

| Cause                                                | Remedy                                                                    | Severity/response |
|------------------------------------------------------|---------------------------------------------------------------------------|-------------------|
| A surplus device was detected at the end of the bus. | Analyze detailed error message in the logbook.<br>Check network topology. | Information       |

805312578 | 0x30001842 **Internal error counter resetted**

| Cause                           | Remedy                                     | Severity/response |
|---------------------------------|--------------------------------------------|-------------------|
| Internal error counter resetted | For information only. No remedy necessary. | Information       |

805312580 | 0x30001844 **All slaves 'Operational' again**

| Cause                          | Remedy                                     | Severity/response |
|--------------------------------|--------------------------------------------|-------------------|
| All slaves 'Operational' again | For information only. No remedy necessary. | Information       |



# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies

805312581 | 0x30001845 **Cyclic command WKC error**

| Cause     | Remedy                                                                                           | Severity/response |
|-----------|--------------------------------------------------------------------------------------------------|-------------------|
| WKC error | Analyze detailed error message in the logbook.<br>Check slave status.<br>Check network topology. | Warning           |

805312582 | 0x30001846 **Frame response error**

| Cause                | Remedy                                                                                           | Severity/response |
|----------------------|--------------------------------------------------------------------------------------------------|-------------------|
| Frame response error | Analyze detailed error message in the logbook.<br>Check slave status.<br>Check network topology. | Warning           |

805312583 | 0x30001847 **Not all slaves are 'Operational'**

| Cause                                          | Remedy                                                                                           | Severity/response |
|------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------------|
| Not all slaves have been set to 'Operational'. | Analyze detailed error message in the logbook.<br>Check slave status.<br>Check network topology. | Information       |

805312584 | 0x30001848 **Emergency message - Overflow, further messages blocked**

| Cause                        | Remedy                                                                | Severity/response |
|------------------------------|-----------------------------------------------------------------------|-------------------|
| Too many emergency messages. | Check if slave sends too many emergency messages.<br>Eliminate cause. | Warning           |

805312588 | 0x3000184C **New configuration loaded**

| Cause                    | Remedy                                     | Severity/response |
|--------------------------|--------------------------------------------|-------------------|
| New configuration loaded | For information only. No remedy necessary. | Information       |

805312589 | 0x3000184D **New configuration loaded, no slaves defined**

| Cause                                       | Remedy                                     | Severity/response |
|---------------------------------------------|--------------------------------------------|-------------------|
| New configuration loaded, no slaves defined | For information only. No remedy necessary. | Information       |

805312590 | 0x3000184E **Master - Start failed, configuration error**

| Cause          | Remedy                                         | Severity/response |
|----------------|------------------------------------------------|-------------------|
| Internal error | Check slave status.<br>Check network topology. | Information       |

805312591 | 0x3000184F **New configuration loaded from slaves EEPROM**

| Cause                                                               | Remedy                                     | Severity/response |
|---------------------------------------------------------------------|--------------------------------------------|-------------------|
| A new configuration has been loaded from the EEPROMs of the slaves. | For information only. No remedy necessary. | Information       |

# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies



805312598 | 0x30001856 **Master - Start failed**

| Cause          | Remedy                                         | Severity/response |
|----------------|------------------------------------------------|-------------------|
| Internal error | Check slave status.<br>Check network topology. | Warning           |

805312599 | 0x30001857 **Master - Start failed, bus configuration error**

| Cause                   | Remedy                  | Severity/response |
|-------------------------|-------------------------|-------------------|
| Bus configuration error | Check network topology. | Warning           |

805312600 | 0x30001858 **Master - Start failed, EtherCAT cable disconnected**

| Cause                      | Remedy                 | Severity/response |
|----------------------------|------------------------|-------------------|
| Network cabling is faulty. | Check network cabling. | Warning           |

805312601 | 0x30001859 **Master - Start failed, DC/DCM configuration**

| Cause                                                              | Remedy                     | Severity/response |
|--------------------------------------------------------------------|----------------------------|-------------------|
| The master cannot be started due to a faulty DC/DCM configuration. | Check slave configuration. | Warning           |

805312602 | 0x3000185A **Master - Start failed, cannot set slaves to 'Pre-Operational'**

| Cause                                      | Remedy                     | Severity/response |
|--------------------------------------------|----------------------------|-------------------|
| Slaves cannot be set to 'Pre-Operational'. | Check slave configuration. | Warning           |

805312608 | 0x30001860 **Master - Set 'Operational' failed**

| Cause                           | Remedy                     | Severity/response |
|---------------------------------|----------------------------|-------------------|
| 'Operational' could not be set. | Check slave configuration. | Warning           |

805312610 | 0x30001862 **Master - Set 'Operational' failed, EtherCAT cable disconnected**

| Cause                      | Remedy                 | Severity/response |
|----------------------------|------------------------|-------------------|
| Network cabling is faulty. | Check network cabling. | Warning           |

805312613 | 0x30001865 **Master - Set 'Operational' takes some time...**

| Cause                                         | Remedy                                     | Severity/response |
|-----------------------------------------------|--------------------------------------------|-------------------|
| Master - Set 'Operational' takes some time... | For information only. No remedy necessary. | Warning           |

805312614 | 0x30001866 **Master - Set 'Operational' failed, time-out**

| Cause          | Remedy                                         | Severity/response |
|----------------|------------------------------------------------|-------------------|
| Internal error | Check slave status.<br>Check network topology. | Warning           |



# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies

805312615 | 0x30001867 **Master - Set 'Operational' failed, slave error**

| Cause       | Remedy                                                                                                         | Severity/response |
|-------------|----------------------------------------------------------------------------------------------------------------|-------------------|
| Slave error | Analyze previous error message (slave error) in the logbook.<br>Check slave status.<br>Check network topology. | Warning           |

805312616 | 0x30001868 **Master - Set 'Operational' aborted by reset command**

| Cause                                               | Remedy                                     | Severity/response |
|-----------------------------------------------------|--------------------------------------------|-------------------|
| Master - Set 'Operational' aborted by reset command | For information only. No remedy necessary. | Warning           |

805312618 | 0x3000186A **Master - Stopping failed**

| Cause                     | Remedy                                    | Severity/response |
|---------------------------|-------------------------------------------|-------------------|
| Master cannot be stopped. | For information only. No remedy required. | Warning           |

805312619 | 0x3000186B **Master - Stopping failed, cannot set Slaves 'Pre-Operational'**

| Cause       | Remedy                                    | Severity/response |
|-------------|-------------------------------------------|-------------------|
| Slave error | For information only. No remedy required. | Warning           |

805312628 | 0x30001874 **Master - Shutdown failed**

| Cause                    | Remedy                                     | Severity/response |
|--------------------------|--------------------------------------------|-------------------|
| Master - Shutdown failed | For information only. No remedy necessary. | Warning           |

805312638 | 0x3000187E **Remote API Server - Start failed**

| Cause          | Remedy                                                               | Severity/response |
|----------------|----------------------------------------------------------------------|-------------------|
| Internal error | Restart the device. If the error persists, contact the manufacturer. | Warning           |

805312648 | 0x30001888 **Start Download Service**

| Cause                  | Remedy                                     | Severity/response |
|------------------------|--------------------------------------------|-------------------|
| Start Download Service | For information only. No remedy necessary. | Information       |

805312649 | 0x30001889 **Download Service done**

| Cause                 | Remedy                                     | Severity/response |
|-----------------------|--------------------------------------------|-------------------|
| Download Service done | For information only. No remedy necessary. | Information       |

805312668 | 0x3000189C **MMC - Internal error**

| Cause          | Remedy                                                               | Severity/response |
|----------------|----------------------------------------------------------------------|-------------------|
| Internal error | Restart the device. If the error persists, contact the manufacturer. | Warning           |

# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies



805312669 | 0x3000189D **MMC - 'Modular Machine Configuration' is active**

| Cause                                            | Remedy                                     | Severity/response |
|--------------------------------------------------|--------------------------------------------|-------------------|
| MMC - "Modular Machine Configuration" is active. | For information only. No remedy necessary. | Information       |

805312670 | 0x3000189E **MMC - Service started**

| Cause                 | Remedy                                     | Severity/response |
|-----------------------|--------------------------------------------|-------------------|
| MMC - Service started | For information only. No remedy necessary. | Information       |

805312671 | 0x3000189F **MMC - Service stopped**

| Cause                 | Remedy                                     | Severity/response |
|-----------------------|--------------------------------------------|-------------------|
| MMC - Service stopped | For information only. No remedy necessary. | Information       |

805312672 | 0x300018A0 **MMC - Error in configuration files**

| Cause                             | Remedy                        | Severity/response |
|-----------------------------------|-------------------------------|-------------------|
| MMC configuration file is faulty. | Check MMC configuration file. | Warning           |

805312673 | 0x300018A1 **MMC - File does not exist**

| Cause                     | Remedy                                     | Severity/response |
|---------------------------|--------------------------------------------|-------------------|
| MMC - File does not exist | For information only. No remedy necessary. | Warning           |

805312674 | 0x300018A2 **MMC - Parsing error**

| Cause                             | Remedy                        | Severity/response |
|-----------------------------------|-------------------------------|-------------------|
| MMC configuration file is faulty. | Check MMC configuration file. | Warning           |

805312675 | 0x300018A3 **MMC - parsing of file successful**

| Cause                            | Remedy                                     | Severity/response |
|----------------------------------|--------------------------------------------|-------------------|
| MMC - parsing of file successful | For information only. No remedy necessary. | Warning           |

805312676 | 0x300018A4 **MMC - Devices not sorted in ascending order or devices missing**

| Cause                             | Remedy                        | Severity/response |
|-----------------------------------|-------------------------------|-------------------|
| MMC configuration file is faulty. | Check MMC configuration file. | Warning           |

805312677 | 0x300018A5 **MMC - Number of devices in device tree differs**

| Cause                             | Remedy                                                   | Severity/response |
|-----------------------------------|----------------------------------------------------------|-------------------|
| MMC configuration file is faulty. | Check MMC configuration file.<br>Check network topology. | Warning           |

805312678 | 0x300018A6 **MMC - Device type mismatch for Alias Address**

| Cause                             | Remedy                                                                          | Severity/response |
|-----------------------------------|---------------------------------------------------------------------------------|-------------------|
| MMC configuration file is faulty. | Check MMC configuration file.<br>Analyze detailed error message in the logbook. | Warning           |



# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies

805312679 | 0x300018A7 **MMC - Invalid Alias Address**

| Cause                    | Remedy                                                                               | Severity/response |
|--------------------------|--------------------------------------------------------------------------------------|-------------------|
| Incorrect alias address. | Check SSA addresses of the slaves.<br>Analyze detailed error message in the logbook. | Warning           |

805312680 | 0x300018A8 **MMC - Duplicated Alias Address**

| Cause                 | Remedy                                                                               | Severity/response |
|-----------------------|--------------------------------------------------------------------------------------|-------------------|
| Double alias address. | Check SSA addresses of the slaves.<br>Analyze detailed error message in the logbook. | Warning           |

805312681 | 0x300018A9 **MMC - No configuration checks**

| Cause                         | Remedy                                     | Severity/response |
|-------------------------------|--------------------------------------------|-------------------|
| MMC - No configuration checks | For information only. No remedy necessary. | Information       |

805312682 | 0x300018AA **MMC - Invalid configuration**

| Cause          | Remedy                                                               | Severity/response |
|----------------|----------------------------------------------------------------------|-------------------|
| Internal error | Restart the device. If the error persists, contact the manufacturer. | Warning           |

805312683 | 0x300018AB **MMC - Mandatory slave missing**

| Cause                                                            | Remedy                                                   | Severity/response |
|------------------------------------------------------------------|----------------------------------------------------------|-------------------|
| MMC configuration file is faulty.<br>Network topology is faulty. | Check MMC configuration file.<br>Check network topology. | Warning           |

805312684 | 0x300018AC **MMC - Optional slave is present, but not allowed**

| Cause                                                            | Remedy                                                   | Severity/response |
|------------------------------------------------------------------|----------------------------------------------------------|-------------------|
| MMC configuration file is faulty.<br>Network topology is faulty. | Check MMC configuration file.<br>Check network topology. | Warning           |

805312685 | 0x300018AD **MMC - No valid service active**

| Cause                         | Remedy                                     | Severity/response |
|-------------------------------|--------------------------------------------|-------------------|
| MMC - No valid service active | For information only. No remedy necessary. | Warning           |

805312686 | 0x300018AE **MMC - Address assignment error, less slaves connected than configured**

| Cause                                                            | Remedy                                                                                                     | Severity/response |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-------------------|
| MMC configuration file is faulty.<br>Network topology is faulty. | Analyze detailed error message in the logbook.<br>Check MMC configuration file.<br>Check network topology. | Warning           |

805312687 | 0x300018AF **MMC - Address assignment error, more slaves connected than configured**

| Cause                                                            | Remedy                                                                                                     | Severity/response |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-------------------|
| MMC configuration file is faulty.<br>Network topology is faulty. | Analyze detailed error message in the logbook.<br>Check MMC configuration file.<br>Check network topology. | Fault             |

# Diagnostics and fault elimination

Events, causes and remedies

Causes and remedies



805312688 | 0x300018B0 **MMC - Address assignment error, invalid device**

| Cause                                                            | Remedy                                                                                                     | Severity/response |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-------------------|
| MMC configuration file is faulty.<br>Network topology is faulty. | Analyze detailed error message in the logbook.<br>Check MMC configuration file.<br>Check network topology. | Fault             |

805312689 | 0x300018B1 **MMC - Address assignment successful**

| Cause                               | Remedy                                     | Severity/response |
|-------------------------------------|--------------------------------------------|-------------------|
| MMC - Address assignment successful | For information only. No remedy necessary. | Information       |

805312690 | 0x300018B2 **MMC - Address assignment failed**

| Cause                                                            | Remedy                                                                                                     | Severity/response |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-------------------|
| MMC configuration file is faulty.<br>Network topology is faulty. | Analyze detailed error message in the logbook.<br>Check MMC configuration file.<br>Check network topology. | Information       |

805312691 | 0x300018B3 **MMC - Address assignment done**

| Cause                         | Remedy                                     | Severity/response |
|-------------------------------|--------------------------------------------|-------------------|
| MMC - Address assignment done | For information only. No remedy necessary. | Information       |

805312692 | 0x300018B4 **MMC - Address assignment error, writing address by CoE**

| Cause                                                  | Remedy                                     | Severity/response |
|--------------------------------------------------------|--------------------------------------------|-------------------|
| MMC - Address assignment error, writing address by CoE | For information only. No remedy necessary. | Warning           |

805312693 | 0x300018B5 **MMC - Slave identification error**

| Cause                                                            | Remedy                                                                                                     | Severity/response |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-------------------|
| MMC configuration file is faulty.<br>Network topology is faulty. | Analyze detailed error message in the logbook.<br>Check MMC configuration file.<br>Check network topology. | Warning           |

805312694 | 0x300018B6 **MMC - Slave identification error, slave ident data failed**

| Cause                                                            | Remedy                                                                                                     | Severity/response |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-------------------|
| MMC configuration file is faulty.<br>Network topology is faulty. | Analyze detailed error message in the logbook.<br>Check MMC configuration file.<br>Check network topology. | Warning           |

805312695 | 0x300018B7 **MMC - Service state cannot be changed, set bus to 'INIT' first**

| Cause                                                        | Remedy                                                             | Severity/response |
|--------------------------------------------------------------|--------------------------------------------------------------------|-------------------|
| Service request rejected because master not in "Init" status | Check status of the master.<br>Set status of the master to "Init". | Information       |



# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies

805312768 | 0x30001900 **CoE - Emergency request**

| Cause                                                     | Remedy                                                                                                                                                                                                                                                                                                    | Severity/response |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Internal error during transmission of emergency messages. | Check the documentation of the slave device for this emergency message.<br>Note: "data: ..." shows by codes which error has occurred in which slave device/module.<br>Detailed information about the coding of error messages can be found in the documentation of the corresponding slave device/module. | Information       |

805312769 | 0x30001901 **Topology check results ignored**

| Cause                                                                                                        | Remedy                                     | Severity/response |
|--------------------------------------------------------------------------------------------------------------|--------------------------------------------|-------------------|
| A topology check was performed, but the results were ignored. An attempt is made to drive the bus up anyway. | For information only. No remedy necessary. | Warning           |

805312770 | 0x30001902 **Simultaneous use of MMC and Hotconnect is not permitted**

| Cause                                                                                                                                                                                                | Remedy                                                                                                                                     | Severity/response |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| The obsolete function blocks L_ETC_MMController and L_ETC_MMControllerBus (MMC0) cannot be used simultaneously with the creation of HotConnect groups in the "PLC Designer" tab "HotConnect" (MMC1). | Remove function block L_ETC_MMController (or the library that uses this FB) or delete all HotConnect groups in the "PLC Designer" project. | Fault             |

805312771 | 0x30001903 **Number of configured HC-Groups exceeds limit**

| Cause                                                                                                    | Remedy                                           | Severity/response |
|----------------------------------------------------------------------------------------------------------|--------------------------------------------------|-------------------|
| More HotConnect groups have been created in the PLC application than are supported by the target system. | Reduce HotConnect groups in the PLC application. | Fault             |

805312772 | 0x30001904 **Unexpected Identification Value**

| Cause                                                                                                                                                                | Remedy                                                                                                                                                                                                                                         | Severity/response |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| In the physical bus structure, at least one slave has been assigned an identification value by SSA or ID switch that has not been configured in the PLC application. | <ul style="list-style-type: none"><li>Analyze detailed error message in the logbook.</li><li>Connected slaves check whether an identification value has been assigned by the SSA or ID switch that does not match the configuration.</li></ul> | Fault             |

805312773 | 0x30001905 **Slave missing**

| Cause                                                 | Remedy          | Severity/response |
|-------------------------------------------------------|-----------------|-------------------|
| The specified slave is missing in a HotConnect group. | Check topology. | Fault             |

805312774 | 0x30001906 **Unexpected Slave**

| Cause                                                                                                  | Remedy                                                                                                                 | Severity/response |
|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|-------------------|
| An unconfigured slave is present in a HotConnect group after the slave specified in the logbook entry. | <ul style="list-style-type: none"><li>Analyze detailed error message in the logbook.</li><li>Check topology.</li></ul> | Fault             |

# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies



805312775 | 0x30001907 **Same Identification Value available multiple times**

| Cause                                                                                                               | Remedy                                                             | Severity/response |
|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-------------------|
| In the physical bus structure, at least two slaves have the same identification value assigned by SSA or ID switch. | Check the topology, in particular the SSAs and/or ID switches set. | Fault             |

805312776 | 0x30001908 **Identification Value is incorrect**

| Cause                                                                                                                                           | Remedy                                                                                                                                                                       | Severity/response |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| During the topology check, an undefined error has occurred with regard to the identification value of the slave specified in the logbook entry. | <ul style="list-style-type: none"> <li>Analyze detailed error message in the logbook.</li> <li>Check the topology, in particular the SSAs and/or ID switches set.</li> </ul> | Fault             |

805312784 | 0x30001910 **HC-Group - setting timeout**

| Cause                                                                  | Remedy                                     | Severity/response |
|------------------------------------------------------------------------|--------------------------------------------|-------------------|
| A timeout has occurred when changing the status of a HotConnect group. | If possible, increase the timeout setting. | Fault             |

805314560 | 0x30002000 **BusCycleTask is 'out-of-sync'**

| Cause          | Remedy                                                               | Severity/response |
|----------------|----------------------------------------------------------------------|-------------------|
| Internal error | Restart the device. If the error persists, contact the manufacturer. | Fault             |

822310534 | 0x31037686 **Network - Configuration error**

| Cause                                                                                                                               | Remedy                                                                                                                                                                                                                                                                      | Severity/response |
|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Network option incorrectly plugged in or not plugged in.<br>Network option in PLC project does not match configured network option. | <ul style="list-style-type: none"> <li>Use the type code to check whether the network option used is correct.</li> <li>Compare the network option configured in the PLC project with the network option configured in the controller (see parameter 0x231F:xxx).</li> </ul> | Fault             |

822313360 | 0x31038190 **Network - Watchdog time-out**

| Cause                                               | Remedy                                                                                                                                                                                                                 | Severity/response                                                        |
|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Permanent interruption of communication to the PLC. | <ul style="list-style-type: none"> <li>Check wiring of the network.</li> <li>Eliminate EMC interferences.</li> <li>Check cables and connections.</li> <li>Plug Ethernet cable into RJ45 sockets X2x6/ X2x7.</li> </ul> | Warning (configurable)<br>Setting parameters: <a href="#">0x2859:001</a> |

822313361 | 0x31038191 **Network - Disruption of cyclic data exchange**

| Cause                                               | Remedy                                                                                                                                     | Severity/response                                                            |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Permanent interruption of communication to the PLC. | <ul style="list-style-type: none"> <li>Check cables and connections.</li> <li>Plug Ethernet cable into RJ45 sockets X2x6/ X2x7.</li> </ul> | No response (configurable)<br>Setting parameters: <a href="#">0x2859:002</a> |



# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies

## 822313362 | 0x31038192 Network - Initialization error

| Cause                                               | Remedy                                                                                                                                                        | Severity/response                              |
|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| Network option was parameterized with wrong values. | <ul style="list-style-type: none"> <li>Check station name.</li> <li>Check IP configuration.</li> <li>Check other parameters of the network option.</li> </ul> | Warning (configurable)                         |
|                                                     |                                                                                                                                                               | Setting parameters: <a href="#">0x2859:004</a> |

## 822313363 | 0x31038193 Network - Invalid cyclic process data

| Cause                                                      | Remedy                                                                                                                                                                                           | Severity/response                              |
|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| Process data marked invalid by the network option is sent. | <ul style="list-style-type: none"> <li>Check whether the PLC is in the "STOP" state.</li> <li>Check cables and connections.</li> <li>Plug Ethernet cable into RJ45 sockets X2x6/X2x7.</li> </ul> | Warning (configurable)                         |
|                                                            |                                                                                                                                                                                                  | Setting parameters: <a href="#">0x2859:005</a> |

## 822313607 | 0x31038287 Network - Invalid configuration

| Cause                                                                                | Remedy                       | Severity/response                              |
|--------------------------------------------------------------------------------------|------------------------------|------------------------------------------------|
| A module or submodule does not correspond to the configuration of the IO controller. | Check/correct configuration. | Warning (configurable)                         |
|                                                                                      |                              | Setting parameters: <a href="#">0x2859:003</a> |

## 822313608 | 0x31038288 Network - Max. count of supported process data reached

| Cause                                                                     | Remedy                                                                                                                        | Severity/response |
|---------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------|
| The maximum supported number/size of configurable PDOs has been exceeded. | Decrease the number or size of the configured PDOs.<br>The maximum number and size of PDOs can be found in the documentation. | Fault             |

## 822313609 | 0x31038289 Network - Too few Application Credit for network operation

| Cause                                                                                                                                  | Remedy                                                                                                                                                                                                                            | Severity/response |
|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| The network module cannot be operated because the required Application Credit is not sufficient or no Application Credit is available. | <ul style="list-style-type: none"> <li>Check your available Application Credit.</li> <li>Check the configuration of the use of Application Credit.</li> <li>If necessary, use an SD card with more Application Credit.</li> </ul> | Fault             |

## 827331073 | 0x31501201 Address space update failed

| Cause                                  | Remedy                                                                          | Severity/response |
|----------------------------------------|---------------------------------------------------------------------------------|-------------------|
| The address area could not be updated. | In the "PLC Designer" reduce the number of symbols in the symbol configuration. | Warning           |

## 827331074 | 0x31501202 Client user authentication failed

| Cause                                  | Remedy                                                                                                 | Severity/response |
|----------------------------------------|--------------------------------------------------------------------------------------------------------|-------------------|
| Client user authentication has failed. | Check in the "PLC Designer" in the user management whether user and associated password are available. | Warning           |

# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies



827331075 | 0x31501203 **Client operation failed**

| Cause                            | Remedy                                                                                                                                                                                                                         | Severity/response |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| The client operation has failed. | Check client operation and its arguments against the meaning of the present OPC UA status code.<br><a href="http://www.opcfoundation.org/UA/schemas/StatusCode.csv">http://www.opcfoundation.org/UA/schemas/StatusCode.csv</a> | Warning           |

827331078 | 0x31501206 **Client has been rejected because the certificate is not trusted**

| Cause                                                                                  | Remedy                                                                                                 | Severity/response |
|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-------------------|
| A client connection was not established because the client certificate is not trusted. | Open the security screen in the "PLC Designer" and check the certificates. Trust or update certificate | Warning           |

827331079 | 0x31501207 **Needed element for mapping is missing or erroneous**

| Cause                                                                                                                 | Remedy                                                        | Severity/response |
|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-------------------|
| The mapping file contains incorrect entries (e.g. missing elements or incorrect values such as data type or node ID). | Correct mapping file (add missing elements/ enter correctly). | Warning           |

827331080 | 0x31501208 **Namespace-ID for namespace-URI could not be found**

| Cause                                                                                                        | Remedy                           | Severity/response |
|--------------------------------------------------------------------------------------------------------------|----------------------------------|-------------------|
| The namespace URI for a mapping element is incorrect and cannot be assigned to the namespaces of the server. | Check and correct namespace URI. | Warning           |

827331081 | 0x31501209 **Node-ID for CSV name could not be found**

| Cause                                                                        | Remedy                                                              | Severity/response |
|------------------------------------------------------------------------------|---------------------------------------------------------------------|-------------------|
| The placeholder keyword for the node ID is incorrect and could not be found. | Check the placeholder keyword and update the CSV file if necessary. | Warning           |

827331088 | 0x31501210 **Node-ID of element not valid**

| Cause                                                                                                                                        | Remedy                                                          | Severity/response |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------|
| The node ID is either empty or has an incorrect value that does not correspond to the OPC UA specification (e.g. incorrect identifier type). | Check the node ID and compare it with the nodeset if necessary. | Warning           |

827331089 | 0x31501211 **Element is missing for mapping**

| Cause                                                                                                       | Remedy                                      | Severity/response |
|-------------------------------------------------------------------------------------------------------------|---------------------------------------------|-------------------|
| The mapping file contains a mapping element for which the parameter element or variable element is missing. | Correct mapping file (add missing element). | Warning           |

827331090 | 0x31501212 **CSV file could not be found**

| Cause                                                | Remedy                                                         | Severity/response |
|------------------------------------------------------|----------------------------------------------------------------|-------------------|
| The CSV file was not found in the expected location. | Store the CSV file under "/sdcard/plc/prg/pta/opc_ua_server/". | Warning           |



# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies

827331091 | 0x31501213 **CSV file is erroneous**

| Cause                                        | Remedy                                         | Severity/response |
|----------------------------------------------|------------------------------------------------|-------------------|
| The CSV format of the CSV file is incorrect. | Check and correct CSV file with CSV validator. | Warning           |

827331092 | 0x31501214 **Name collision in CSV file**

| Cause                                                         | Remedy                              | Severity/response |
|---------------------------------------------------------------|-------------------------------------|-------------------|
| There are several entries with the same name in the CSV file. | Fix name collision in the CSV file. | Warning           |

827331093 | 0x31501215 **The arguments of the node of the mapping file do not match the arguments of the nodeset file**

| Cause                                                                                                                                 | Remedy                                                              | Severity/response |
|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|-------------------|
| The mapping file does not correspond to the nodesets. Different versions may have been used here in which the arguments do not match. | Synchronize mapping file and nodeset file and check methods/events. | Warning           |

827331094 | 0x31501216 **The notifier for the node could not be found. Setting notifier to server node**

| Cause                                                          | Remedy                                                                          | Severity/response |
|----------------------------------------------------------------|---------------------------------------------------------------------------------|-------------------|
| The node ID of the notifier could not be found in the nodeset. | Synchronize mapping file and nodeset file and check OptionalPlaceholder/Events. | Warning           |

827331095 | 0x31501217 **The method was called again, before the current execution was finalised**

| Cause                                                                 | Remedy                                                                           | Severity/response |
|-----------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------|
| A mapped method was called again before the first call was completed. | Wait until method has been finalized. If necessary, increase the client timeout. | Warning           |

827331096 | 0x31501218 **Out of memory**

| Cause              | Remedy                                           | Severity/response |
|--------------------|--------------------------------------------------|-------------------|
| Not enough memory. | Reduce number of sessions, monitored items, .... | Warning           |

827331105 | 0x31501221 **GDS - Client could not connect**

| Cause                                                  | Remedy                                                                                                                                                                | Severity/response |
|--------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Connection problems between GDS client and GDS server. | <ul style="list-style-type: none"><li>• Check network configuration.</li><li>• Test hostname resolution.</li><li>• Check whether the GDS server is running.</li></ul> | Warning           |

827331106 | 0x31501222 **GDS - Client could not finish operation.**

| Cause                                                     | Remedy                                                                                                                                | Severity/response |
|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Error in communication between GDS client and GDS server. | Check whether the server and client configuration match. For example, evaluate date, credentials, trace and WarningGdsClientInternal. | Warning           |

# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies



827331108 | 0x31501224 **SKS - Pull client could not connect to SKS**

| Cause                                                | Remedy                                                                                                                                                     | Severity/response |
|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Connection problems between SKS pull client and SKS. | <ul style="list-style-type: none"><li>• Check network configuration.</li><li>• Test hostname resolution.</li><li>• Check whether SKS is running.</li></ul> | Warning           |

827331109 | 0x31501225 **SKS - Pull client could not retrieve valid keys**

| Cause                     | Remedy                                                                      | Severity/response |
|---------------------------|-----------------------------------------------------------------------------|-------------------|
| Error during key rolling. | Check whether the configuration of the keys and security groups is correct. | Warning           |

827331110 | 0x31501226 **Client failed to verify server certificate**

| Cause                                                                               | Remedy                                                                      | Severity/response |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------|
| The GDS/SKS server certificate is currently not trusted or contains invalid fields. | Trust the certificate, set the correct time on the controller if necessary. | Warning           |

827331329 | 0x31501301 **Out of memory**

| Cause              | Remedy                                                                          | Severity/response |
|--------------------|---------------------------------------------------------------------------------|-------------------|
| Not enough memory. | In the "PLC Designer" reduce the number of symbols in the symbol configuration. | Fault             |

827331330 | 0x31501302 **Failed to update address space**

| Cause                                  | Remedy                                                                          | Severity/response |
|----------------------------------------|---------------------------------------------------------------------------------|-------------------|
| The address area could not be updated. | In the "PLC Designer" reduce the number of symbols in the symbol configuration. | Fault             |

827331332 | 0x31501304 **Nodeset file could not be found**

| Cause                                | Remedy                                           | Severity/response |
|--------------------------------------|--------------------------------------------------|-------------------|
| The nodeset file could not be found. | Check the file and name of the MappingModel.xml. | Fault             |

827331333 | 0x31501305 **Mapping file is erroneous**

| Cause                                         | Remedy                                             | Severity/response |
|-----------------------------------------------|----------------------------------------------------|-------------------|
| The content of the mapping file is incorrect. | Check and correct mapping file with XML validator. | Fault             |

827331334 | 0x31501306 **Mapping file includes more nodesets than supported**

| Cause                                                                              | Remedy                              | Severity/response |
|------------------------------------------------------------------------------------|-------------------------------------|-------------------|
| More nodesets are configured in the mapping file than are supported by the device. | Reduce the number of nodesets used. | Fault             |



# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies

## 827396609 | 0x31511201 PubSub - PubSub module activation failed

| Cause                                                                                                        | Remedy                                                            | Severity/response |
|--------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-------------------|
| The PubSub module could not be started. Possibly due to an internal error or a corrupt PubSub configuration. | Check the PubSub configuration and create a new one if necessary. | Warning           |

## 827396610 | 0x31511202 PubSub - PubSub module activation failed because of missing credit points

| Cause                                                                 | Remedy                                                                                                                                                                                                                              | Severity/response |
|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| The PubSub module could not be started. The license check has failed. | <ul style="list-style-type: none"><li>• Check your available Application Credit.</li><li>• Check the configuration of the use of Application Credit.</li><li>• If necessary, use an SD card with more Application Credit.</li></ul> | Warning           |

## 827396613 | 0x31511205 PubSub - The keyfile was deleted

| Cause                                                                   | Remedy                                                         | Severity/response |
|-------------------------------------------------------------------------|----------------------------------------------------------------|-------------------|
| PubSub could not start due to the incorrect time stamp of the key file. | Check the system time of the device and the NTP functionality. | Warning           |

## 827396865 | 0x31511301 PubSub - The configuration is invalid

| Cause                                                        | Remedy                      | Severity/response |
|--------------------------------------------------------------|-----------------------------|-------------------|
| The PubSub configuration could not be loaded without errors. | Check PubSub configuration. | Fault             |

## 827396866 | 0x31511302 PubSub - Data access has been denied for the user

| Cause                                                                       | Remedy                                  | Severity/response |
|-----------------------------------------------------------------------------|-----------------------------------------|-------------------|
| The current user does not have the necessary data access rights for PubSub. | Assign the required rights to the user. | Fault             |

## 827396867 | 0x31511303 PubSub - The configuration size limit was exceeded

| Cause                                                      | Remedy                                       | Severity/response |
|------------------------------------------------------------|----------------------------------------------|-------------------|
| The encoded PubSub configuration is larger than permitted. | Reduce the size of the PubSub configuration. | Fault             |

## 827396868 | 0x31511304 PubSub - Configuration contains too many connections

| Cause                                                                          | Remedy                                       | Severity/response |
|--------------------------------------------------------------------------------|----------------------------------------------|-------------------|
| The PubSub configuration contains more connections than the maximum permitted. | Reduce the number of configured connections. | Fault             |

## 827396869 | 0x31511305 PubSub - Configuration contains too many WriterGroups

| Cause                                                                           | Remedy                                        | Severity/response |
|---------------------------------------------------------------------------------|-----------------------------------------------|-------------------|
| The PubSub configuration contains more WriterGroups than the maximum permitted. | Reduce the number of configured WriterGroups. | Fault             |

# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies



827396870 | 0x31511306 **PubSub - Configuration contains too many ReaderGroups**

| Cause                                                                           | Remedy                                        | Severity/response |
|---------------------------------------------------------------------------------|-----------------------------------------------|-------------------|
| The PubSub configuration contains more ReaderGroups than the maximum permitted. | Reduce the number of configured ReaderGroups. | Fault             |

827396871 | 0x31511307 **PubSub - Configuration contains too many Writers**

| Cause                                                                      | Remedy                                   | Severity/response |
|----------------------------------------------------------------------------|------------------------------------------|-------------------|
| The PubSub configuration contains more writers than the maximum permitted. | Reduce the number of configured writers. | Fault             |

827396872 | 0x31511308 **PubSub - Configuration contains too many Readers**

| Cause                                                                      | Remedy                                   | Severity/response |
|----------------------------------------------------------------------------|------------------------------------------|-------------------|
| The PubSub configuration contains more readers than the maximum permitted. | Reduce the number of configured readers. | Fault             |

827396873 | 0x31511309 **PubSub - Configuration contains too many published DataSets**

| Cause                                                                                 | Remedy                                              | Severity/response |
|---------------------------------------------------------------------------------------|-----------------------------------------------------|-------------------|
| The PubSub configuration contains more published DataSets than the maximum permitted. | Reduce the number of configured published DataSets. | Fault             |

827396880 | 0x31511310 **PubSub - Configuration contains too many subscribed DataSets**

| Cause                                                                                  | Remedy                                               | Severity/response |
|----------------------------------------------------------------------------------------|------------------------------------------------------|-------------------|
| The PubSub configuration contains more subscribed DataSets than the maximum permitted. | Reduce the number of configured subscribed DataSets. | Fault             |

827396881 | 0x31511311 **Internal error**

| Cause          | Remedy                                                               | Severity/response |
|----------------|----------------------------------------------------------------------|-------------------|
| Internal error | Restart the device. If the error persists, contact the manufacturer. | Fault             |

827396882 | 0x31511312 **PubSub - The XML configuration could not be parsed**

| Cause                                             | Remedy                                         | Severity/response |
|---------------------------------------------------|------------------------------------------------|-------------------|
| The PubSub XML configuration could not be parsed. | Check the PubSub XML configuration for errors. | Fault             |

827396883 | 0x31511313 **PubSub - The keyfile is invalid**

| Cause                                     | Remedy                                                         | Severity/response |
|-------------------------------------------|----------------------------------------------------------------|-------------------|
| The PubSub key file is incorrect/invalid. | Check the system time of the device and the NTP functionality. | Fault             |

827397121 | 0x31511401 **PubSub - The PubSub module was started and is running on connections**

| Cause            | Remedy | Severity/response |
|------------------|--------|-------------------|
| Information only |        | Information       |



# Diagnostics and fault elimination

Events, causes and remedies  
Causes and remedies

827462149 | 0x31521205 **Session with handle disconnected because of external connection error**

| Cause                                                      | Remedy                                                                                                                                                                                                                                                                                                                                                                                                                       | Severity/response |
|------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| An event led to the termination of an incoming connection. | <p>Common faults can be localized/eliminated by the following checks:</p> <ul style="list-style-type: none"> <li>• Is the network connection available?</li> <li>• Is the server ready for operation?</li> <li>• Are server and client compatible? (Safety requirements/capabilities)</li> <li>• Is the security configuration valid? (Certificates renewed/accepted, users changed, connection guidelines, etc.)</li> </ul> | Warning           |

827462150 | 0x31521206 **Session with handle disconnected because of connection error**

| Cause                                                                                                                                                                                                                                                                                                                                                                    | Remedy                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Severity/response |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <p>An event led to the termination of an incoming connection.</p> <ul style="list-style-type: none"> <li>• The error number coded in accordance with the PLCopen specification "OPC UA Client Function Blocks for IEC 61131-3" provides information on the specific cause.</li> <li>• A list of possible error numbers is documented in "L_IOCP_OPUCUClient".</li> </ul> | <p>The remedy depends on the specific error number.</p> <p>Common faults can be localized/eliminated by the following checks:</p> <ul style="list-style-type: none"> <li>• Is the network connection available?</li> <li>• Is the server ready for operation?</li> <li>• Are server and client compatible? (Safety requirements/capabilities)</li> <li>• Is the security configuration valid? (Certificates renewed/accepted, users changed, connection guidelines, etc.)</li> </ul> | Warning           |

827462401 | 0x31521301 **Execution stopped due to Error**

| Cause                                                                                                                                                                                                                                                                                                                                                                | Remedy                                                                                                                                                                                                                                                  | Severity/response |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <p>A fatal error prevents the OPC UA client from running.</p> <ul style="list-style-type: none"> <li>• The error number coded in accordance with the PLCopen specification "OPC UA Client Function Blocks for IEC 61131-3" provides information on the specific cause.</li> <li>• A list of possible error numbers is documented in "L_IOCP_OPUCUClient".</li> </ul> | <p>The remedy depends on the specific error number.</p> <p>Due to the degree of severity, the following measures may be necessary:</p> <ul style="list-style-type: none"> <li>• New firmware installation</li> <li>• New application program</li> </ul> | Fault             |

# Technical data

Standards and operating conditions  
Conformities and approvals



## 15 Technical data

### 15.1 Standards and operating conditions

#### 15.1.1 Conformities and approvals

| Conformities |                        |  |                           |
|--------------|------------------------|--|---------------------------|
| CE           | 2011/65/EU             |  | RoHS Directive            |
|              | 2014/30/EU             |  | EMC Directive             |
| 70186304     | 54790016               |  | 54790017                  |
|              | 54790013               |  | 54790014                  |
| UL           | UL 61010-1             |  | Process Control Equipment |
|              | UL/CSA/IEC 61010-2-201 |  |                           |

#### 15.1.2 Protection of persons and device protection

| Degree of protection |              |      |  |
|----------------------|--------------|------|--|
| EN                   | EN IEC 60529 | IP20 |  |

#### 15.1.3 EMC data

| Noise emission      |                  |  |  |
|---------------------|------------------|--|--|
| Industrial premises | EN IEC 61000-6-4 |  |  |
| Noise immunity      |                  |  |  |
| Industrial premises | EN IEC 61000-6-2 |  |  |

#### 15.1.4 Environmental conditions

|                      |                                   |                                                                                  |                                                                                                                                                                                            |
|----------------------|-----------------------------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Climate              |                                   |                                                                                  |                                                                                                                                                                                            |
| Operation            | EN<br>60721-3-3:1995 +<br>A2:1997 | 3K3 temperature: (0 ... +60 °C)<br>humidity: 10 ... 95 % without<br>condensation | Mounting position: On horizontally mounted DIN rail<br>Note: The buffer time of the RTC is intended for four weeks.<br>The buffer time is derated depending on the ambient<br>temperature. |
|                      |                                   | 3K3 temperature: (0 ... +55 °C)<br>humidity: 10 ... 95 % without<br>condensation | Mounting position: On vertically mounted DIN rail<br>Note: The buffer time of the RTC is intended for four weeks.<br>The buffer time is derated depending on the ambient<br>temperature.   |
| Storage              | EN<br>60721-3-1:1997              | 1K3 (-25 ... +70 °C)                                                             |                                                                                                                                                                                            |
| Transport            | EN<br>60721-3-2:1997              | 2K3 (-25 ... +70 °C)                                                             |                                                                                                                                                                                            |
| Site altitude        |                                   |                                                                                  |                                                                                                                                                                                            |
| ≤2000 m amsl         |                                   |                                                                                  |                                                                                                                                                                                            |
| Pollution            |                                   |                                                                                  |                                                                                                                                                                                            |
|                      | EN IEC 61010-1                    | Degree of pollution 2                                                            |                                                                                                                                                                                            |
| Vibration resistance |                                   |                                                                                  |                                                                                                                                                                                            |
| Vibrations           | EN IEC 60068-2-6                  | 3M5                                                                              |                                                                                                                                                                                            |
| Shock                | IEC 60068-2-27                    |                                                                                  |                                                                                                                                                                                            |
|                      | EN<br>60721-3-3:1995 +<br>A2:1997 |                                                                                  |                                                                                                                                                                                            |



## 15.2 Rated data

| Voltage [V DC]   | Current [A] | Power* [W]     |
|------------------|-------------|----------------|
| 24 (+18 ... +30) | 0.45        | 10.8 (at 24 V) |

Tab. 3: \* Power without USB load



## 16 Environmental notes and recycling

Lenze products are intended for use by companies in industrial environments. This means that they are also subject to requirements regarding recycling and disposal. Both mechanical and electrical components such as electric motors, gearboxes, and inverters contain valuable raw materials that can be recycled and reused. Proper recycling is important and sensible from both an economic and ecological perspective.

For information on the proper disposal and legal requirements of our products, please refer to the information on the respective product page on the Internet:

<https://www.lenze.com/en-de/products>

If you require support, please contact your local branch:

<https://www.lenze.com/en-de/company/global-presence>

Note: By disposing of devices and packaging properly, you are helping us to protect the environment and conserve resources.



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Further information on Lenze's environmental and climate responsibility and on the topic of energy efficiency can be found on the Internet:

<https://www.lenze.com/en-de/company/sustainability>

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## 17 Appendix

### 17.1 Parameter attribute list

- The parameter attribute list contains all parameters of the controller.
- The parameter attribute list is sorted by addresses (index:subindex) in ascending order.

**How to read the parameter attribute list:**

| Column          | Meaning                                                                  |                |                                         |
|-----------------|--------------------------------------------------------------------------|----------------|-----------------------------------------|
| Address         | Address of the parameter in the object directory. Format: Index:Subindex |                |                                         |
| Name            | Parameter name                                                           |                |                                         |
| Default setting | Default setting of the parameter                                         |                |                                         |
| Data type       | Data type of the parameter:                                              |                |                                         |
|                 | I16                                                                      | INTEGER_16     | 2 bytes with sign                       |
|                 | I32                                                                      | INTEGER_32     | 4 bytes with sign                       |
|                 | U8                                                                       | UNSIGNED_8     | 1 byte without sign                     |
|                 | U16                                                                      | UNSIGNED_16    | 2 bytes without sign                    |
|                 | U32                                                                      | UNSIGNED_32    | 4 bytes without sign                    |
|                 | U64                                                                      | UNSIGNED_64    | 8 bytes without sign                    |
|                 | STRING[xx]                                                               | VISIBLE_STRING | ASCII string (with character length xx) |
|                 | OCTET[xx]                                                                | OCTET_STRING   | OCTET string (with xx bytes)            |

**Parameter attribute list (short overview of all parameter indexes)**

| Address    | Name                                                | Default setting  | Data type   |
|------------|-----------------------------------------------------|------------------|-------------|
| 0x1000     | Device type                                         | - (Read only)    | U32         |
| 0x1008     | Manufacturer device name                            | - (Read only)    | STRING[50]  |
| 0x1009     | Manufacturer hardware version                       | - (Read only)    | STRING[50]  |
| 0x100A     | Manufacturer software version                       | - (Read only)    | STRING[50]  |
| 0x1018:001 | Identity object: Vendor ID                          | - (Read only)    | U32         |
| 0x1018:002 | Identity object: Product ID                         | - (Read only)    | U32         |
| 0x1018:003 | Identity object: Revision number                    | - (Read only)    | U32         |
| 0x1018:004 | Identity object: Serial number                      | - (Read only)    | U32         |
| 0x2000:001 | Device data: Product code                           | - (Read only)    | STRING[50]  |
| 0x2000:002 | Device data: Serial number                          | - (Read only)    | STRING[50]  |
| 0x2000:003 | Device data: Production date                        | - (Read only)    | STRING[50]  |
| 0x2000:004 | Device data: CU firmware version                    | - (Read only)    | STRING[50]  |
| 0x2000:006 | Device data: CU bootloader version                  | - (Read only)    | STRING[50]  |
| 0x2000:015 | Device data: Communication firmware revision number | - (Read only)    | STRING[50]  |
| 0x2000:020 | Device data: CPU name                               | - (Read only)    | STRING[50]  |
| 0x2000:030 | Device data: CU operating system version            | - (Read only)    | STRING[50]  |
| 0x2001     | Device name                                         | "My Device"      | STRING[128] |
| 0x2002:006 | Device module: CU serial number                     | - (Read only)    | STRING[50]  |
| 0x2002:020 | Device module: Driver version                       | - (Read only)    | STRING[50]  |
| 0x2010:001 | Device event monitor: EreignisortEvent location     | - (Read only)    | U8          |
| 0x2010:002 | Device event monitor: Severity                      | - (Read only)    | U8          |
| 0x2010:003 | Device event monitor: Event status                  | - (Read only)    | U8          |
| 0x2010:005 | Device event monitor: Number of current event       | - (Read only)    | U32         |
| 0x2010:006 | Device event monitor: Time stamp of current event   | - (Read only)    | U32         |
| 0x2010:007 | Device event monitor: Event CRC                     | - (Read only)    | U32         |
| 0x2012:001 | Device information: SD card status                  | - (Read only)    | U8          |
| 0x2012:002 | Device information: Application Credit available    | - (Read only)    | U16         |
| 0x2012:003 | Device information: Dual use licence                | - (Read only)    | U8          |
| 0x2012:004 | Device information: SD card total memory            | - (Read only)    | U32         |
| 0x2012:005 | Device information: SD card free memory             | - (Read only)    | U32         |
| 0x2012:006 | Device information: SD card used memory             | x kB (Read only) | U32         |
| 0x2012:007 | Device information: License information             | - (Read only)    | STRING[32]  |



| Address    | Name                                                 | Default setting               | Data type   |
|------------|------------------------------------------------------|-------------------------------|-------------|
| 0x2013:001 | Application information: Active application          | - (Read only)                 | U16         |
| 0x2013:002 | Application information: Application Credit required | - (Read only)                 | U16         |
| 0x2014:001 | General network identification: Hostname             | - (Read only)                 | STRING[128] |
| 0x2021:001 | Optical tracking: Start detection                    | <b>Stop [0]</b>               | U8          |
| 0x2021:002 | Optical tracking: Blinking duration                  | <b>5 s</b>                    | U16         |
| 0x2022:001 | Device commands: Load default settings               | <b>Off / ready [0]</b>        | U8          |
| 0x2022:003 | Device commands: Save user data                      | <b>Off / ready [0]</b>        | U8          |
| 0x2022:015 | Device commands: Delete logbook                      | <b>Off / ready [0]</b>        | U8          |
| 0x2022:035 | Device commands: Restart Device                      | <b>Off / ready [0]</b>        | U8          |
| 0x2022:036 | Device commands: Export Logbook                      | <b>Off / ready [0]</b>        | U8          |
| 0x2022:037 | Device commands: Delete Logfiles                     | <b>Off / ready [0]</b>        | U8          |
| 0x2022:039 | Device commands: Load TA default settings            | <b>Off / ready [0]</b>        | U8          |
| 0x2022:040 | Device commands: backup                              | <b>Off / ready [0]</b>        | U8          |
| 0x2022:043 | Device commands: Device command: Restore             | <b>Off / ready [0]</b>        | U8          |
| 0x2022:044 | Device commands: Start PLC application               | <b>Off / ready [0]</b>        | U8          |
| 0x2022:045 | Device commands: Stop PLC application                | <b>Off / ready [0]</b>        | U8          |
| 0x2022:046 | Device commands: Reload boot project                 | <b>Off / ready [0]</b>        | U8          |
| 0x2022:047 | Device commands: Start Up/Downgrade                  | <b>Off / ready [0]</b>        | U8          |
| 0x2022:048 | Device commands: Cold restart PLC application        | <b>Off / ready [0]</b>        | U8          |
| 0x2022:049 | Device commands: Delete PLC application              | <b>Off / ready [0]</b>        | U8          |
| 0x231F:001 | Communication module ID: Active module ID            | - (Read only)                 | U8          |
| 0x231F:005 | Communication module ID: Network selection           | <b>0</b>                      | U8          |
| 0x2360     | EtherCAT communication                               | <b>No action/no error [0]</b> | U8          |
| 0x2362:007 | Active EtherCAT settings: Tx length                  | - (Read only)                 | U16         |
| 0x2362:008 | Active EtherCAT settings: Rx length                  | - (Read only)                 | U16         |
| 0x2368     | EtherCAT status                                      | - (Read only)                 | U16         |
| 0x2369     | EtherCAT error                                       | - (Read only)                 | U16         |
| 0x2380     | PROFINET communication                               | <b>No action/no error [0]</b> | U8          |
| 0x2381:001 | PROFINET settings: IP address                        | <b>0.0.0.0</b>                | U32         |
| 0x2381:002 | PROFINET settings: Subnet                            | <b>0.0.0.0</b>                | U32         |
| 0x2381:003 | PROFINET settings: Gateway                           | <b>0.0.0.0</b>                | U32         |
| 0x2381:004 | PROFINET settings: Station name                      | <b>"0"</b>                    | STRING[240] |
| 0x2381:005 | PROFINET settings: I&M1 System designation           | <b>"0"</b>                    | STRING[32]  |
| 0x2381:006 | PROFINET settings: I&M1 Installation site            | <b>"0"</b>                    | STRING[22]  |
| 0x2381:007 | PROFINET settings: I&M2 Installation date            | <b>"0"</b>                    | STRING[16]  |
| 0x2381:008 | PROFINET settings: I&M3 additional information       | <b>"0"</b>                    | STRING[54]  |
| 0x2382:001 | Active PROFINET settings: IP address                 | - (Read only)                 | U32         |
| 0x2382:002 | Active PROFINET settings: Subnet                     | - (Read only)                 | U32         |
| 0x2382:003 | Active PROFINET settings: Gateway                    | - (Read only)                 | U32         |
| 0x2382:004 | Active PROFINET settings: Station name               | - (Read only)                 | STRING[240] |
| 0x2382:005 | Active PROFINET settings: MAC Address                | - (Read only)                 | OCTET[6]    |
| 0x2388     | PROFINET status                                      | - (Read only)                 | U16         |
| 0x2389:001 | PROFINET error: Error 1                              | - (Read only)                 | U16         |
| 0x2389:002 | PROFINET error: Error 2                              | - (Read only)                 | U16         |
| 0x2450     | Engineering port control                             | <b>No action/No error [0]</b> | U8          |
| 0x2451:001 | Engineering port settings: IP address                | <b>0.0.0.0</b>                | U32         |
| 0x2451:002 | Engineering port settings: Subnet                    | <b>0.0.0.0</b>                | U32         |
| 0x2451:003 | Engineering port settings: Gateway                   | <b>0.0.0.0</b>                | U32         |
| 0x2451:004 | Engineering port settings: DHCP                      | <b>Disabled [0]</b>           | U8          |
| 0x2452:001 | Active engineering port settings: IP address         | - (Read only)                 | U32         |
| 0x2452:002 | Active engineering port settings: Subnet             | - (Read only)                 | U32         |
| 0x2452:003 | Active engineering port settings: Gateway            | - (Read only)                 | U32         |
| 0x2452:004 | Active engineering port settings: DHCP               | - (Read only)                 | U8          |
| 0x2452:005 | Active engineering port settings: MAC address        | - (Read only)                 | OCTET[6]    |
| 0x2453:001 | Ethernet switch: Restart                             | <b>No action/No error [0]</b> | U8          |



| Address    | Name                                                                | Default setting                                   | Data type |
|------------|---------------------------------------------------------------------|---------------------------------------------------|-----------|
| 0x2454:001 | Ethernet switch settings: IP address                                | 0.0.0.0                                           | U32       |
| 0x2454:002 | Ethernet switch settings: Subnet                                    | 0.0.0.0                                           | U32       |
| 0x2455:001 | Active ethernet switch settings: IP address                         | - (Read only)                                     | U32       |
| 0x2455:002 | Active ethernet switch settings: Subnet                             | - (Read only)                                     | U32       |
| 0x2455:005 | Active ethernet switch settings: MAC address                        | - (Read only)                                     | OCTET[6]  |
| 0x2459:001 | Name server addresses: Name server address 1                        | - (Read only)                                     | U32       |
| 0x2459:002 | Name server addresses: Name server address 2                        | - (Read only)                                     | U32       |
| 0x245A:002 | NTP server addresses: NTP server address 1                          | 0.0.0.0                                           | U32       |
| 0x245A:003 | NTP server addresses: NTP server address 2                          | 0.0.0.0                                           | U32       |
| 0x245A:004 | NTP server addresses: NTP server address 3                          | 0.0.0.0                                           | U32       |
| 0x245A:005 | NTP server addresses: NTP server address 4                          | 0.0.0.0                                           | U32       |
| 0x245B:001 | System time: Setting method                                         | NTP server [0]                                    | U8        |
| 0x245B:002 | System time: Current time                                           | 0 ns                                              | U64       |
| 0x245B:003 | System time: NTP server                                             | Deactivated [0]                                   | U8        |
| 0x245C:001 | Local Time: Time Zone                                               | Unknown time zone [0]                             | U16       |
| 0x245C:002 | Local Time: Current time                                            | 0 ns                                              | U64       |
| 0x2470:001 | OPC UA server control: Restart server                               | No action/no error [0]                            | U8        |
| 0x2471:013 | OPC UA server settings: Min. publishing intervall                   | 100 ms                                            | U32       |
| 0x2471:014 | OPC UA server settings: Min. sample intervall                       | 100 ms                                            | U32       |
| 0x2471:051 | OPC UA server settings: PLCopen model array expansion               | Enabled [1]                                       | U8        |
| 0x2471:055 | OPC UA server settings: Public filesystem                           | Disabled [0]                                      | U8        |
| 0x2471:103 | OPC UA server settings: Max. number of external sessions            | 1                                                 | U8        |
| 0x2471:129 | OPC UA server settings: Provisioning mode                           | Deactivated [0]                                   | U8        |
| 0x2471:130 | OPC UA server settings: Accept untrusted client certificates        | Deactivated [0]                                   | U8        |
| 0x2471:131 | OPC UA server settings: Product name                                | "Lenze Controller OPC UA Server"                  | STRING[]  |
| 0x2471:132 | OPC UA server settings: Product URI                                 | "Lenze:Controller:OPCUAServer"                    | STRING[]  |
| 0x2471:133 | OPC UA server settings: Application name                            | "Lenze Controller OPC UA Server@[hostname]"       | STRING[]  |
| 0x2471:134 | OPC UA server settings: Application URI                             | "urn:<br>[hostname]:Lenze:Controller:OPCUAServer" | STRING[]  |
| 0x2471:135 | OPC UA server settings: Server Endpoint IP                          | 0                                                 | U16       |
| 0x2471:141 | OPC UA server settings: Certificate country                         | "DE"                                              | STRING[]  |
| 0x2471:142 | OPC UA server settings: Certificate domain component                | "lenze.com"                                       | STRING[]  |
| 0x2471:143 | OPC UA server settings: Certificate locality                        | "Aerzen"                                          | STRING[]  |
| 0x2471:144 | OPC UA server settings: Certificate organization                    | "Lenze"                                           | STRING[]  |
| 0x2471:145 | OPC UA server settings: Certificate organization unit               | "Controls"                                        | STRING[]  |
| 0x2471:146 | OPC UA server settings: Certificate state                           | "Niedersachsen"                                   | STRING[]  |
| 0x2471:147 | OPC UA server settings: Certificate alternative IPs                 | "0"                                               | STRING[]  |
| 0x2471:150 | OPC UA server settings: GDS client mode                             | Disabled [0]                                      | U8        |
| 0x2471:156 | OPC UA server settings: GDS endpoint URL                            | "0"                                               | STRING[]  |
| 0x2471:157 | OPC UA server settings: GDS user                                    | "0"                                               | STRING[]  |
| 0x2471:158 | OPC UA server settings: GDS password                                | "0"                                               | STRING[]  |
| 0x2471:159 | OPC UA server settings: GDS hostname check                          | Disabled [0]                                      | U8        |
| 0x2472:011 | Active OPC UA server settings: Max. number of subscriptions         | - (Read only)                                     | U16       |
| 0x2472:012 | Active OPC UA server settings: Max. number of monitored items       | - (Read only)                                     | U16       |
| 0x2472:013 | Active OPC UA server settings: Min. publishing intervall            | - (Read only)                                     | U16       |
| 0x2472:014 | Active OPC UA server settings: Min. sample intervall                | - (Read only)                                     | U16       |
| 0x2472:051 | Active OPC UA server settings: PLCopen model array expansion        | - (Read only)                                     | U8        |
| 0x2472:055 | Active OPC UA server settings: Public filesystem                    | - (Read only)                                     | U8        |
| 0x2472:103 | Active OPC UA server settings: Max. number of external sessions     | - (Read only)                                     | U8        |
| 0x2472:129 | Active OPC UA server settings: Provisioning mode                    | - (Read only)                                     | U8        |
| 0x2472:130 | Active OPC UA server settings: Accept untrusted client certificates | - (Read only)                                     | U8        |
| 0x2472:131 | Active OPC UA server settings: Product name                         | - (Read only)                                     | STRING[]  |
| 0x2472:132 | Active OPC UA server settings: Product URI                          | - (Read only)                                     | STRING[]  |
| 0x2472:133 | Active OPC UA server settings: Application name                     | - (Read only)                                     | STRING[]  |



| Address    | Name                                                         | Default setting        | Data type |
|------------|--------------------------------------------------------------|------------------------|-----------|
| 0x2472:134 | Active OPC UA server settings: Application URI               | - (Read only)          | STRING[]  |
| 0x2472:135 | Active OPC UA server settings: Server Endpoint IP            | - (Read only)          | U16       |
| 0x2472:141 | Active OPC UA server settings: Certificate country           | - (Read only)          | STRING[]  |
| 0x2472:142 | Active OPC UA server settings: Certificate domain component  | - (Read only)          | STRING[]  |
| 0x2472:143 | Active OPC UA server settings: Certificate locality          | - (Read only)          | STRING[]  |
| 0x2472:144 | Active OPC UA server settings: Certificate organization      | - (Read only)          | STRING[]  |
| 0x2472:145 | Active OPC UA server settings: Certificate organization unit | - (Read only)          | STRING[]  |
| 0x2472:146 | Active OPC UA server settings: Certificate state             | - (Read only)          | STRING[]  |
| 0x2472:147 | Active OPC UA server settings: Certificate alternative IPs   | - (Read only)          | STRING[]  |
| 0x2472:150 | Active OPC UA server settings: GDS client mode               | - (Read only)          | U8        |
| 0x2473:001 | OPC UA server diagnosis: State                               | - (Read only)          | U8        |
| 0x2473:002 | OPC UA server diagnosis: Error                               | - (Read only)          | U16       |
| 0x2473:011 | OPC UA server diagnosis: Used number of subscriptions        | - (Read only)          | U8        |
| 0x2473:012 | OPC UA server diagnosis: Used number of monitored items      | - (Read only)          | U16       |
| 0x2473:052 | OPC UA server diagnosis: PLCopen model resource utilization  | x % (Read only)        | U8        |
| 0x2473:053 | OPC UA server diagnosis: User model resource utilization     | x % (Read only)        | U8        |
| 0x2473:101 | OPC UA server diagnosis: Used number of engineering sessions | - (Read only)          | U8        |
| 0x2473:102 | OPC UA server diagnosis: Used number of system sessions      | - (Read only)          | U8        |
| 0x2473:103 | OPC UA server diagnosis: Used number of external sessions    | - (Read only)          | U8        |
| 0x2473:130 | OPC UA server diagnosis: Client of external session 1        | - (Read only)          | STRING[]  |
| 0x2473:131 | OPC UA server diagnosis: Client of external session 2        | - (Read only)          | STRING[]  |
| 0x2473:132 | OPC UA server diagnosis: Client of external session 3        | - (Read only)          | STRING[]  |
| 0x2473:133 | OPC UA server diagnosis: Client of external session 4        | - (Read only)          | STRING[]  |
| 0x2473:134 | OPC UA server diagnosis: Client of external session 5        | - (Read only)          | STRING[]  |
| 0x2473:135 | OPC UA server diagnosis: Client of external session 6        | - (Read only)          | STRING[]  |
| 0x2473:136 | OPC UA server diagnosis: Client of external session 7        | - (Read only)          | STRING[]  |
| 0x2473:137 | OPC UA server diagnosis: Client of external session 8        | - (Read only)          | STRING[]  |
| 0x2473:138 | OPC UA server diagnosis: Client of external session 9        | - (Read only)          | STRING[]  |
| 0x2473:139 | OPC UA server diagnosis: Client of external session 10       | - (Read only)          | STRING[]  |
| 0x2473:140 | OPC UA server diagnosis: Client of external session 11       | - (Read only)          | STRING[]  |
| 0x2473:141 | OPC UA server diagnosis: Client of external session 12       | - (Read only)          | STRING[]  |
| 0x2473:190 | OPC UA server diagnosis: GDS client state                    | - (Read only)          | U8        |
| 0x2473:191 | OPC UA server diagnosis: GDS client registration state       | - (Read only)          | U8        |
| 0x2473:192 | OPC UA server diagnosis: GDS certificates state              | - (Read only)          | U8        |
| 0x2473:193 | OPC UA server diagnosis: GDS certificates update             | x ms (Read only)       | U64       |
| 0x2473:194 | OPC UA server diagnosis: GDS trust list state                | - (Read only)          | U8        |
| 0x2473:195 | OPC UA server diagnosis: GDS trust list update               | x ms (Read only)       | U64       |
| 0x2477:100 | OPC UA client settings: Client 1 user                        | "0"                    | STRING[]  |
| 0x2477:101 | OPC UA client settings: Client 1 password                    | "0"                    | STRING[]  |
| 0x2477:102 | OPC UA client settings: Client 2 user                        | "0"                    | STRING[]  |
| 0x2477:103 | OPC UA client settings: Client 2 password                    | "0"                    | STRING[]  |
| 0x2477:104 | OPC UA client settings: Client 3 user                        | "0"                    | STRING[]  |
| 0x2477:105 | OPC UA client settings: Client 3 password                    | "0"                    | STRING[]  |
| 0x2477:106 | OPC UA client settings: Client 4 user                        | "0"                    | STRING[]  |
| 0x2477:107 | OPC UA client settings: Client 4 password                    | "0"                    | STRING[]  |
| 0x2477:108 | OPC UA client settings: Client 5 user                        | "0"                    | STRING[]  |
| 0x2477:109 | OPC UA client settings: Client 5 password                    | "0"                    | STRING[]  |
| 0x2477:110 | OPC UA client settings: Client 6 user                        | "0"                    | STRING[]  |
| 0x2477:111 | OPC UA client settings: Client 6 password                    | "0"                    | STRING[]  |
| 0x247B:001 | OPC UA PubSub control: Activation                            | Disabled [0]           | U8        |
| 0x247B:002 | OPC UA PubSub control: Restart PubSub                        | No action/no error [0] | U8        |
| 0x247C:001 | OPC UA PubSub settings: PubSub config mode                   | Static [0]             | U8        |
| 0x247C:013 | OPC UA PubSub settings: Min. publishing intervall            | 50                     | U32       |
| 0x247C:130 | OPC UA PubSub settings: SKS server activation                | Disabled [0]           | U8        |
| 0x247C:150 | OPC UA PubSub settings: SKS client mode                      | Disabled [0]           | U8        |



| Address    | Name                                                           | Default setting        | Data type |
|------------|----------------------------------------------------------------|------------------------|-----------|
| 0x247C:156 | OPC UA PubSub settings: SKS endpoint URL                       | "0"                    | STRING[]  |
| 0x247C:157 | OPC UA PubSub settings: SKS user                               | "0"                    | STRING[]  |
| 0x247C:158 | OPC UA PubSub settings: SKS password                           | "0"                    | STRING[]  |
| 0x247C:159 | OPC UA PubSub settings: SKS hostname check                     | Disabled [0]           | U8        |
| 0x247D:001 | Active OPC UA PubSub settings: PubSub config mode              | - (Read only)          | U8        |
| 0x247D:013 | Active OPC UA PubSub settings: Min. publishing intervall       | - (Read only)          | U32       |
| 0x247D:130 | Active OPC UA PubSub settings: SKS server activation           | - (Read only)          | U8        |
| 0x247D:150 | Active OPC UA PubSub settings: SKS client mode                 | - (Read only)          | U8        |
| 0x247E:001 | OPC UA PubSub diagnosis: PubSub state                          | - (Read only)          | U8        |
| 0x247E:002 | OPC UA PubSub diagnosis: Configured connections                | - (Read only)          | U8        |
| 0x247E:003 | OPC UA PubSub diagnosis: Configured publisher                  | - (Read only)          | U8        |
| 0x247E:004 | OPC UA PubSub diagnosis: Configured subscriber                 | - (Read only)          | U8        |
| 0x247E:050 | OPC UA PubSub diagnosis: SKS client state                      | - (Read only)          | U8        |
| 0x247E:051 | OPC UA PubSub diagnosis: SKS Keys State                        | - (Read only)          | U8        |
| 0x2539:002 | Hardware-Diagnose: Control board temperature                   | x °C (Read only)       | S16       |
| 0x2539:003 | Hardware-Diagnose: CPU temperature                             | x °C (Read only)       | S16       |
| 0x2841     | Reset error                                                    | 0                      | U8        |
| 0x2859:001 | Network monitoring: Watchdog elapsed                           | Warning [2]            | U8        |
| 0x2859:002 | Network monitoring: Data exchange exited                       | No response [0]        | U8        |
| 0x2859:003 | Network monitoring: Invalid configuration                      | Warning [2]            | U8        |
| 0x2859:004 | Network monitoring: Initialisation error                       | Warning [2]            | U8        |
| 0x2859:005 | Network monitoring: Invalid process data                       | Warning [2]            | U8        |
| 0x285A:001 | Diagnostic configuration: Alarm suppression                    | 0                      | U16       |
| 0x2D81:001 | Life-diagnosis: Operating time                                 | x s (Read only)        | U32       |
| 0x2D81:002 | Life-diagnosis: Power-on time                                  | x s (Read only)        | U32       |
| 0x2D81:004 | Life-diagnosis: Main switching cycles                          | - (Read only)          | U32       |
| 0x5810:001 | Application diagnostics: Application state                     | - (Read only)          | U8        |
| 0x5810:002 | Application diagnostics: Used memory size                      | x kB (Read only)       | U32       |
| 0x5820:001 | Field devices: Field devices firmware update                   | Disabled [0]           | U8        |
| 0x5850:001 | EtherCAT master commands: Kommunikation neu starten            | No action/no error [0] | U8        |
| 0x5850:002 | EtherCAT master commands: Reset counters                       | No action/no error [0] | U16       |
| 0x5851:001 | EtherCAT master diagnosis: EtherCAT master state               | - (Read only)          | U8        |
| 0x5851:002 | EtherCAT master diagnosis: EtherCAT master state summary       | - (Read only)          | U32       |
| 0x5851:003 | EtherCAT master diagnosis: EtherCAT error                      | - (Read only)          | U32       |
| 0x5851:004 | EtherCAT master diagnosis: Bus scan match                      | - (Read only)          | U8        |
| 0x5851:005 | EtherCAT master diagnosis: Configured cycle time               | x µs (Read only)       | U32       |
| 0x5851:006 | EtherCAT master diagnosis: Connected slaves                    | - (Read only)          | U32       |
| 0x5851:007 | EtherCAT master diagnosis: Configured slaves                   | - (Read only)          | U32       |
| 0x5851:008 | EtherCAT master diagnosis: TX frame counter                    | - (Read only)          | U32       |
| 0x5851:009 | EtherCAT master diagnosis: Lost frame counter                  | - (Read only)          | U32       |
| 0x5851:010 | EtherCAT master diagnosis: Working counter error               | - (Read only)          | U32       |
| 0x5851:011 | EtherCAT master diagnosis: DC slave sync deviation limit       | - (Read only)          | U32       |
| 0x5851:012 | EtherCAT master diagnosis: DC current deviation                | - (Read only)          | S32       |
| 0x5851:013 | EtherCAT master diagnosis: Master mode                         | - (Read only)          | U16       |
| 0x5851:014 | EtherCAT master diagnosis: Slave state summary                 | - (Read only)          | U16       |
| 0x5851:015 | EtherCAT master diagnosis: State machine                       | - (Read only)          | U16       |
| 0x5851:030 | EtherCAT master diagnosis: Connection error level              | - (Read only)          | U8        |
| 0x5851:031 | EtherCAT master diagnosis: Error counter threshold for logging | 100                    | U8        |
| 0x5851:032 | EtherCAT master diagnosis: RX error counter                    | - (Read only)          | U32       |
| 0x5851:033 | EtherCAT master diagnosis: Processing unit error counter       | - (Read only)          | U32       |
| 0x5851:034 | EtherCAT master diagnosis: PDI error counter                   | - (Read only)          | U32       |
| 0x5851:035 | EtherCAT master diagnosis: Lost link counter                   | - (Read only)          | U32       |
| 0x585C:001 | EtherCAT master slave information: Slave address               | 0                      | S32       |
| 0x585C:002 | EtherCAT master slave information: Vendor ID                   | - (Read only)          | U32       |
| 0x585C:003 | EtherCAT master slave information: Product code                | - (Read only)          | U32       |



| Address    | Name                                                                            | Default setting | Data type |
|------------|---------------------------------------------------------------------------------|-----------------|-----------|
| 0x585C:004 | EtherCAT master slave information: Revision                                     | - (Read only)   | U32       |
| 0x585C:005 | EtherCAT master slave information: Serial number                                | - (Read only)   | U32       |
| 0x585C:006 | EtherCAT master slave information: Auto-increment address                       | - (Read only)   | S32       |
| 0x585C:007 | EtherCAT master slave information: Fixed address                                | - (Read only)   | U16       |
| 0x585C:008 | EtherCAT master slave information: Second station address                       | - (Read only)   | U16       |
| 0x585C:010 | EtherCAT master slave information: Master data link status                      | - (Read only)   | U16       |
| 0x585C:011 | EtherCAT master slave information: Master AL Status                             | - (Read only)   | U16       |
| 0x585C:012 | EtherCAT master slave information: Master RX Error Counter (Port 0-3)           | - (Read only)   | U64       |
| 0x585C:013 | EtherCAT master slave information: Master Forwarded RX Error Counter (Port 0-3) | - (Read only)   | U32       |
| 0x585C:014 | EtherCAT master slave information: Master Processing Unit Error Counter         | - (Read only)   | U8        |
| 0x585C:015 | EtherCAT master slave information: Master PDI Error Counter                     | - (Read only)   | U8        |
| 0x585C:016 | EtherCAT master slave information: Master Lost Link Counter (Port 0-3)          | - (Read only)   | U32       |
| 0x585C:017 | EtherCAT master slave information: Master DC Sync 0 Period                      | - (Read only)   | U32       |
| 0x585C:018 | EtherCAT master slave information: Master DC Sync 1 Period                      | - (Read only)   | U32       |
| 0x585D:001 | EtherCAT master slave information: Master - Slave Address (AutoInc or Fixed)    | 0               | S32       |
| 0x585D:002 | EtherCAT master slave information: Master VendorID                              | - (Read only)   | U32       |
| 0x585D:003 | EtherCAT master slave information: Master Product code                          | - (Read only)   | U32       |
| 0x585D:004 | EtherCAT master slave information: Master Revision                              | - (Read only)   | U32       |
| 0x585D:005 | EtherCAT master slave information: Master Serial number                         | - (Read only)   | U32       |
| 0x585D:006 | EtherCAT master slave information: Master Auto-increment address                | - (Read only)   | S32       |
| 0x585D:007 | EtherCAT master slave information: Master Fixed address                         | - (Read only)   | U16       |
| 0x585D:008 | EtherCAT master slave information: Master Second station address                | - (Read only)   | U16       |
| 0x585D:010 | EtherCAT master slave information: Master data link status                      | - (Read only)   | U16       |
| 0x585D:011 | EtherCAT master slave information: Master AL Status                             | - (Read only)   | U16       |
| 0x585D:012 | EtherCAT master slave information: Master RX Error Counter (Port 0-3)           | - (Read only)   | U64       |
| 0x585D:013 | EtherCAT master slave information: Master Forwarded RX Error Counter (Port 0-3) | - (Read only)   | U32       |
| 0x585D:014 | EtherCAT master slave information: Master Processing Unit Error Counter         | - (Read only)   | U8        |
| 0x585D:015 | EtherCAT master slave information: Master PDI Error Counter                     | - (Read only)   | U8        |
| 0x585D:016 | EtherCAT master slave information: Master Lost Link Counter (Port 0-3)          | - (Read only)   | U32       |
| 0x585D:017 | EtherCAT master slave information: Master DC Sync 0 Period                      | - (Read only)   | U32       |
| 0x585D:018 | EtherCAT master slave information: Master DC Sync 1 Period                      | - (Read only)   | U32       |
| 0x585E:001 | EtherCAT master slave information: Master - Slave Address (AutoInc or Fixed)    | 0               | S32       |
| 0x585E:002 | EtherCAT master slave information: Master VendorID                              | - (Read only)   | U32       |
| 0x585E:003 | EtherCAT master slave information: Master Product code                          | - (Read only)   | U32       |
| 0x585E:004 | EtherCAT master slave information: Master Revision                              | - (Read only)   | U32       |
| 0x585E:005 | EtherCAT master slave information: Master Serial number                         | - (Read only)   | U32       |
| 0x585E:006 | EtherCAT master slave information: Master Auto-increment address                | - (Read only)   | S32       |
| 0x585E:007 | EtherCAT master slave information: Master Fixed address                         | - (Read only)   | U16       |
| 0x585E:008 | EtherCAT master slave information: Master Second station address                | - (Read only)   | U16       |
| 0x585E:010 | EtherCAT master slave information: Master data link status                      | - (Read only)   | U16       |
| 0x585E:011 | EtherCAT master slave information: Master AL Status                             | - (Read only)   | U16       |
| 0x585E:012 | EtherCAT master slave information: Master RX Error Counter (Port 0-3)           | - (Read only)   | U64       |
| 0x585E:013 | EtherCAT master slave information: Master Forwarded RX Error Counter (Port 0-3) | - (Read only)   | U32       |
| 0x585E:014 | EtherCAT master slave information: Master Processing Unit Error Counter         | - (Read only)   | U8        |
| 0x585E:015 | EtherCAT master slave information: Master PDI Error Counter                     | - (Read only)   | U8        |
| 0x585E:016 | EtherCAT master slave information: Master Lost Link Counter (Port 0-3)          | - (Read only)   | U32       |
| 0x585E:017 | EtherCAT master slave information: Master DC Sync 0 Period                      | - (Read only)   | U32       |
| 0x585E:018 | EtherCAT master slave information: Master DC Sync 1 Period                      | - (Read only)   | U32       |



| Address    | Name                                                                            | Default setting | Data type   |
|------------|---------------------------------------------------------------------------------|-----------------|-------------|
| 0x585F:001 | EtherCAT master slave information: Master - Slave Address (AutoInc or Fixed)    | 0               | S32         |
| 0x585F:002 | EtherCAT master slave information: Master VendorID                              | - (Read only)   | U32         |
| 0x585F:003 | EtherCAT master slave information: Master Product code                          | - (Read only)   | U32         |
| 0x585F:004 | EtherCAT master slave information: Master Revision                              | - (Read only)   | U32         |
| 0x585F:005 | EtherCAT master slave information: Master Serial number                         | - (Read only)   | U32         |
| 0x585F:006 | EtherCAT master slave information: Master Auto-increment address                | - (Read only)   | S32         |
| 0x585F:007 | EtherCAT master slave information: Master Fixed address                         | - (Read only)   | U16         |
| 0x585F:008 | EtherCAT master slave information: Master Second station address                | - (Read only)   | U16         |
| 0x585F:010 | EtherCAT master slave information: Master data link status                      | - (Read only)   | U16         |
| 0x585F:011 | EtherCAT master slave information: Master AL Status                             | - (Read only)   | U16         |
| 0x585F:012 | EtherCAT master slave information: Master RX Error Counter (Port 0-3)           | - (Read only)   | U64         |
| 0x585F:013 | EtherCAT master slave information: Master Forwarded RX Error Counter (Port 0-3) | - (Read only)   | U32         |
| 0x585F:014 | EtherCAT master slave information: Master Processing Unit Error Counter         | - (Read only)   | U8          |
| 0x585F:015 | EtherCAT master slave information: Master PDI Error Counter                     | - (Read only)   | U8          |
| 0x585F:016 | EtherCAT master slave information: Master Lost Link Counter (Port 0-3)          | - (Read only)   | U32         |
| 0x585F:017 | EtherCAT master slave information: Master DC Sync 0 Period                      | - (Read only)   | U32         |
| 0x585F:018 | EtherCAT master slave information: Master DC Sync 1 Period                      | - (Read only)   | U32         |
| 0x5901:001 | Security setting HAProxy: Certificate fingerprint                               | - (Read only)   | STRING[128] |
| 0x5901:002 | Security setting HAProxy: HTTPS redirect                                        | - (Read only)   | U8          |
| 0x5902:001 | Security device settings: Mount USB stick                                       | Deactivated [0] | U8          |
| 0x5910:001 | Firewall: Activation                                                            | Deactivated [0] | U8          |
| 0x5910:002 | Firewall: IP range 1 start                                                      | 0               | U32         |
| 0x5910:003 | Firewall: IP range 1 end                                                        | 0               | U32         |
| 0x5910:004 | Firewall: IP range 2 start                                                      | 0               | U32         |
| 0x5910:005 | Firewall: IP range 2 end                                                        | 0               | U32         |
| 0x5910:006 | Firewall: IP range 3 start                                                      | 0               | U32         |
| 0x5910:007 | Firewall: IP range 3 end                                                        | 0               | U32         |
| 0x5910:008 | Firewall: IP range 4 start                                                      | 0               | U32         |
| 0x5910:009 | Firewall: IP range 4 end                                                        | 0               | U32         |
| 0x5911:001 | Well-known ports: Secure Shell (SSH): Network                                   | 0               | U8          |
| 0x5911:002 | Well-known ports: Secure Shell (SSH): Client IP range                           | Any [0]         | U16         |
| 0x5911:003 | Well-known ports: Secure Shell (SSH): Activation                                | Drop [0]        | U16         |
| 0x5911:031 | Well-known ports: Network Time Protocol (NTP): Network                          | 0               | U8          |
| 0x5911:032 | Well-known ports: Network Time Protocol (NTP): Client IP range                  | Any [0]         | U16         |
| 0x5911:033 | Well-known ports: Network Time Protocol (NTP): Activation                       | Drop [0]        | U16         |
| 0x5911:051 | Well-known ports: Hypertext Transfer Protocol Secure (HTTPS): Network           | 0               | U8          |
| 0x5911:052 | Well-known ports: Hypertext Transfer Protocol Secure (HTTPS): Client IP range   | Any [0]         | U16         |
| 0x5911:053 | Well-known ports: Hypertext Transfer Protocol Secure (HTTPS): Activation        | Drop [0]        | U16         |
| 0x5912:001 | Registered ports: PLC Designer TCP gateway search: Network                      | 0               | U8          |
| 0x5912:002 | Registered ports: PLC Designer TCP gateway search: Client IP range              | Any [0]         | U16         |
| 0x5912:003 | Registered ports: PLC Designer TCP gateway search: Activation                   | Drop [0]        | U16         |
| 0x5912:011 | Registered ports: PLC Designer UDP communication: Network                       | 0               | U8          |
| 0x5912:012 | Registered ports: PLC Designer UDP communication: Client IP range               | Any [0]         | U16         |
| 0x5912:013 | Registered ports: PLC Designer UDP communication: Activation                    | Drop [0]        | U16         |
| 0x5912:031 | Registered ports: Lenze specific device-search (ESDCP): Network                 | 0               | U8          |
| 0x5912:032 | Registered ports: Lenze specific device-search (ESDCP): Client IP range         | Any [0]         | U16         |
| 0x5912:033 | Registered ports: Lenze specific device-search (ESDCP): Activation              | Drop [0]        | U16         |
| 0x5912:041 | Registered ports: OPC UA server: Network                                        | 0               | U8          |
| 0x5912:042 | Registered ports: OPC UA server: Client IP range                                | Any [0]         | U16         |
| 0x5912:043 | Registered ports: OPC UA server: Activation                                     | Drop [0]        | U16         |



| Address    | Name                                                                            | Default setting | Data type |
|------------|---------------------------------------------------------------------------------|-----------------|-----------|
| 0x5912:051 | Registered ports: EtherCAT master diagnostic tool: Network                      | 0               | U8        |
| 0x5912:052 | Registered ports: EtherCAT master diagnostic tool: Client IP range              | Any [0]         | U16       |
| 0x5912:053 | Registered ports: EtherCAT master diagnostic tool: Activation                   | Drop [0]        | U16       |
| 0x5912:061 | Registered ports: UI designer RAW: Network                                      | 0               | U8        |
| 0x5912:062 | Registered ports: UI designer RAW: Client IP range                              | Any [0]         | U16       |
| 0x5912:063 | Registered ports: UI designer RAW: Activation                                   | Drop [0]        | U16       |
| 0x5912:071 | Registered ports: UI designer secure RAW: Network                               | 0               | U8        |
| 0x5912:072 | Registered ports: UI designer secure RAW: Client IP range                       | Any [0]         | U16       |
| 0x5912:073 | Registered ports: UI designer secure RAW: Activation                            | Drop [0]        | U16       |
| 0x5912:091 | Registered ports: PLC Designer gateway: Network                                 | 0               | U8        |
| 0x5912:092 | Registered ports: PLC Designer gateway: Client IP range                         | Any [0]         | U16       |
| 0x5912:093 | Registered ports: PLC Designer gateway: Activation                              | Drop [0]        | U16       |
| 0x5912:101 | Registered ports: Lenze specific engineering access (SFTP/SCP): Network         | 0               | U8        |
| 0x5912:102 | Registered ports: Lenze specific engineering access (SFTP/SCP): Client IP range | Any [0]         | U16       |
| 0x5912:103 | Registered ports: Lenze specific engineering access (SFTP/SCP): Activation      | Drop [0]        | U16       |
| 0x5912:131 | Registered ports: SFTP/SCP: Network                                             | 0               | U8        |
| 0x5912:132 | Registered ports: SFTP/SCP: Client IP range                                     | Any [0]         | U16       |
| 0x5912:133 | Registered ports: SFTP/SCP: Activation                                          | Drop [0]        | U16       |
| 0x5912:151 | Registered ports: OPC UA PubSub (UADP): Network                                 | 0               | U8        |
| 0x5912:152 | Registered ports: OPC UA PubSub (UADP): Client IP Range                         | Any [0]         | U16       |
| 0x5912:153 | Registered ports: OPC UA PubSub (UADP): Activation                              | - (Read only)   | U16       |
| 0x5913:001 | Application ports: Application port 1: Network                                  | 0               | U8        |
| 0x5913:002 | Application ports: Application port 1: Client IP range                          | Any [0]         | U16       |
| 0x5913:003 | Application ports: Application port 1: Activation                               | Drop [0]        | U16       |
| 0x5913:007 | Application ports: Application port 1: Protocol type                            | None [0]        | U16       |
| 0x5913:008 | Application ports: Application port 1: Port range start                         | 0               | U16       |
| 0x5913:009 | Application ports: Application port 1: Port range end                           | 0               | U16       |
| 0x5913:010 | Application ports: Application port 1: Protocol name                            | "0"             | STRING[]  |
| 0x5913:011 | Application ports: Application port 2: Network                                  | 0               | U8        |
| 0x5913:012 | Application ports: Application port 2: Client IP range                          | Any [0]         | U16       |
| 0x5913:013 | Application ports: Application port 2: Activation                               | Drop [0]        | U16       |
| 0x5913:017 | Application ports: Application port 2: Protocol type                            | None [0]        | U16       |
| 0x5913:018 | Application ports: Application port 2: Port range start                         | 0               | U16       |
| 0x5913:019 | Application ports: Application port 2: Port range end                           | 0               | U16       |
| 0x5913:020 | Application ports: Application port 2: Protocol name                            | "0"             | STRING[]  |
| 0x5913:021 | Application ports: Application port 3: Network                                  | 0               | U8        |
| 0x5913:022 | Application ports: Application port 3: Client IP range                          | Any [0]         | U16       |
| 0x5913:023 | Application ports: Application port 3: Activation                               | Drop [0]        | U16       |
| 0x5913:027 | Application ports: Application port 3: Protocol type                            | None [0]        | U16       |
| 0x5913:028 | Application ports: Application port 3: Port range start                         | 0               | U16       |
| 0x5913:029 | Application ports: Application port 3: Port range end                           | 0               | U16       |
| 0x5913:030 | Application ports: Application port 3: Protocol name                            | "0"             | STRING[]  |
| 0x5913:031 | Application ports: Application port 4: Network                                  | 0               | U8        |
| 0x5913:032 | Application ports: Application port 4: Client IP range                          | Any [0]         | U16       |
| 0x5913:033 | Application ports: Application port 4: Activation                               | Drop [0]        | U16       |
| 0x5913:037 | Application ports: Application port 4: Protocol type                            | None [0]        | U16       |
| 0x5913:038 | Application ports: Application port 4: Port range start                         | 0               | U16       |
| 0x5913:039 | Application ports: Application port 4: Port range end                           | 0               | U16       |
| 0x5913:040 | Application ports: Application port 4: Protocol name                            | "0"             | STRING[]  |
| 0x5914:001 | SysLog client: Activation                                                       | Deactivated [0] | U8        |
| 0x5914:002 | SysLog client: SysLog server IP address                                         | 0               | U32       |
| 0x5914:003 | SysLog client: SysLog server port                                               | 514             | U16       |
| 0x5914:004 | SysLog client: Protocol type                                                    | UDP [0]         | U8        |



## Appendix

### Parameter attribute list

| Address                    | Name                              | Default setting          | Data type |
|----------------------------|-----------------------------------|--------------------------|-----------|
| <a href="#">0x5914:005</a> | SysLog client: Message encryption | <b>Not encrypted [0]</b> | U8        |
| <a href="#">0x5914:006</a> | SysLog client: Message severities | <b>15</b>                | U8        |

