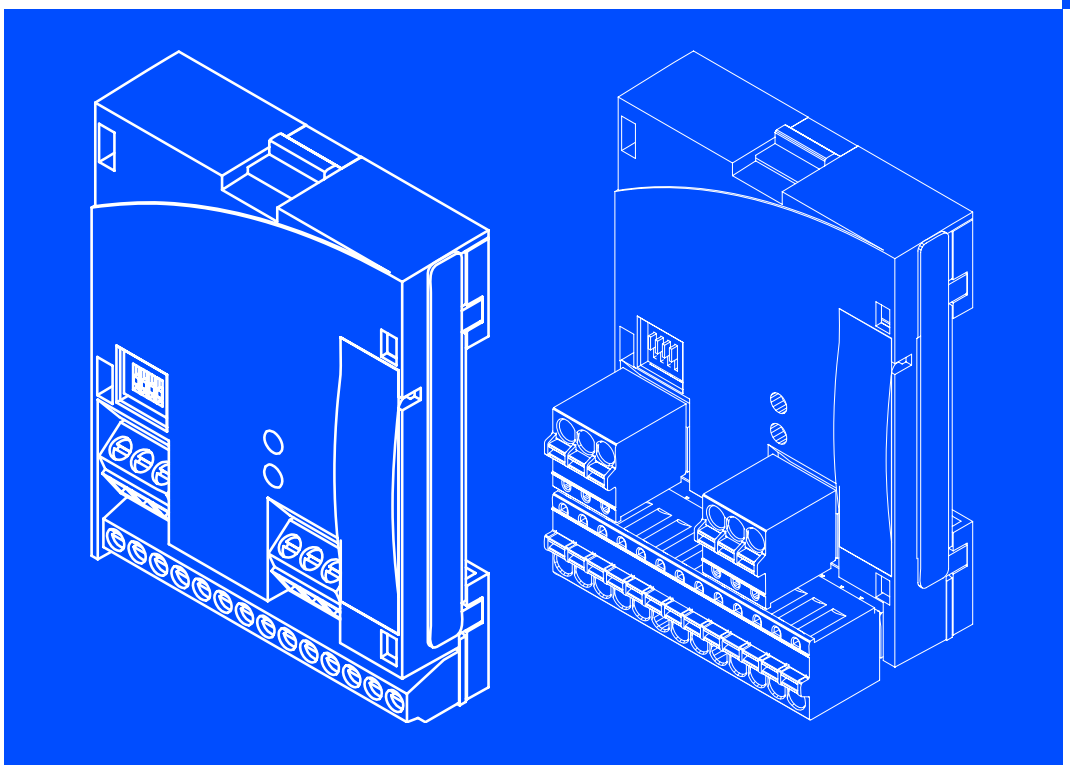
EDS82ZAFIC
13403579

# L-force Communication

**Communication Manual**

# INTERBUS



**E82ZAFIC001 / E82ZAFIC010**

**Function module**

Lenze

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# 1 About this documentation

### Contents

This documentation exclusively contains descriptions of the INTERBUS function modules E82ZAFIC001 and E82ZAFIC010.

**Note!**

This documentation supplements the **mounting instructions** supplied with the function/communication module and the **documentation of the used standard device**.

**The mounting instructions contain safety instructions which must be observed!**

- The features and functions of the function module are described in detail.
- Typical applications are explained by means of examples.
- Moreover, this documentation contains the following:
  - Safety instructions which must be observed.
  - The essential technical data of the function module
  - Information on versions of the Lenze standard devices to be used
  - Notes on troubleshooting and fault elimination

The theoretical concepts are only explained to the level of detail required to understand the function of the function module.

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

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

All brand names mentioned in this documentation are trademarks of their respective owners.

### Validity information

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

| Function module | Type designation | From hardware version | From software version |
|---|---|---|---|
| INTERBUS | E82ZAFIC001 | 4A | 20 |
| | E82ZAFIC010 | | |

### Target group

This documentation is intended for all persons who plan, install, commission and maintain the networking and remote service of a machine.

**Tip!**

Information and auxiliary devices around the Lenze products can be found in the download area at

**http://www.Lenze.com**

## 1.1 Document history

| Version | | | Description |
|---|---|---|---|
| 1.0 | 11/2002 | TD06 | First edition |
| 2.0 | 02/2012 | TD17 | General revision |

### Your opinion is important to us!

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

If you have suggestions for improvement, please e-mail us to:

feedback-docu@Lenze.de

Thank you for your support.

Your Lenze documentation team

## 1.2 Conventions used

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

| Type of information | Identification | Examples/notes |
|---|---|---|
| Spelling of numbers | | |
| Decimal separator | Point | In general, the decimal point is used.<br>For instance: 1234.56 |
| Decimal | Standard notation | For example: 1234 |
| Hexadecimal | 0x[0 ... 9, A ... F] | For example: 0x60F4 |
| Binary<br>● Nibble | In quotation marks<br>Point | For example: '100'<br>For example: '0110.0100' |
| Text | | |
| Program name | » « | PC software<br>For example: »Engineer«, »Global Drive Control« (GDC) |
| Icons | | |
| Page reference | 🕮 | Reference to another page with additional information<br>For instance: 🕮 16 = see page 16 |

## 1.3 Terminology used

| Term | Meaning |
|---|---|
| INTERBUS | Fieldbus system by PHOENIX CONTACT |
| Standard device | Lenze controllers the function module can be used with (8200 vector, 8200 motec). |
| Controller | |
| Master | INTERBUS node which takes over the master function in the fieldbus system. |
| Slave | INTERBUS node which represents a slave in the fieldbus system. |
| Code | "Container" for one or several parameters used to parameterise or monitor the controller. |
| Subcode | If a code contains several parameters, they are stored in "subcodes".<br>In the documentation, the slash "/" is used to separate the code from the subcode (e.g. "C00118/3"). |
| POW | Process output data word |
| PIW | Process input data word |
| PCP | Peripherals Communication Protocol |

## 1.4 Notes used

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

### Safety instructions

Structure of safety instructions:

**Danger!**

(characterises the type and severity of danger)

**Note**

(describes the danger and gives information about how to prevent dangerous situations)

| Pictograph and signal word | Meaning |
|---|---|
|  **Danger!** | **Danger of personal injury through dangerous electrical voltage.** Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken. |
|  **Danger!** | **Danger of personal injury through a general source of danger.** Reference to an imminent danger that may result in death or serious personal injury if the corresponding measures are not taken. |
|  **Stop!** | **Danger of property damage.** Reference to a possible danger that may result in property damage if the corresponding measures are not taken. |

### Application notes

| Pictograph and signal word | Meaning |
|---|---|
|  **Note!** | Important note to ensure troublefree operation |
|  **Tip!** | Useful tip for simple handling |
|  | Reference to another documentation |

# 2 Safety instructions

**Note!**

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

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

## 2.1 General safety information

**Danger!**

Disregarding the following basic safety measures may lead to severe personal injury and damage to material assets!

- Lenze drive and automation components ...
  ... must only be used for the intended purpose.
  ... must never be operated if damaged.
  ... must never be subjected to technical modifications.
  ... must never be operated unless completely assembled.
  ... must never be operated without the covers/guards.
  ... can - depending on their degree of protection - have live, movable or rotating parts during or after operation. Surfaces can be hot.
- All specifications of the corresponding enclosed documentation must be observed.
  This is vital for a safe and trouble-free operation and for achieving the specified product features.
  The procedural notes and circuit details provided in this document are proposals which the user must check for suitability for his application. The manufacturer does not accept any liability for the suitability of the specified procedures and circuit proposals.
- Only qualified skilled personnel are permitted to work with or on Lenze drive and automation components.
  According to IEC 60364 or CENELEC HD 384, these are persons ...
  ... who are familiar with the installation, assembly, commissioning and operation of the product,
  ... possess the appropriate qualifications for their work,
  ... and are acquainted with and can apply all the accident prevent regulations, directives and laws applicable at the place of use.

## 2.2 Device- and application-specific safety instructions

- During operation, the function module must be firmly connected to the standard device.
- With external voltage supply, always use a separate power supply unit, safely separated to EN 61800-5-1 (”SELV”/”PELV”), in every control cabinet.
- Only use cables corresponding to the given specifications (📖 20).

**Documentation for the standard device, control system, system/machine**

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

## 2.3 Residual hazards

### Protection of persons

- If the controllers are used on a phase earthed mains with a rated mains voltage ≥ 400 V, protection against accidental contact is not ensured without implementing external measures. (See chapter ”4.3”, 📖 14)

### Device protection

- The module contains electronic components that can be damaged or destroyed by electrostatic discharge.

# 3 Product description

## 3.1 Application as directed

The function module ...

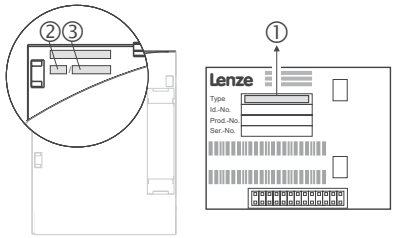
- is an accessory module for use in conjunction with the following Lenze standard devices:

| Product series | Device name | From hardware version |
|---|---|---|
| Frequency inverter | 8200 vector | Vx14 |
| | 8200 motec | Vx14 |

- connects Lenze standard devices to the serial INTERBUS communication system.
- is a device intended for use in industrial power systems.

**Any other use shall be deemed inappropriate!**

## 3.2 Identification



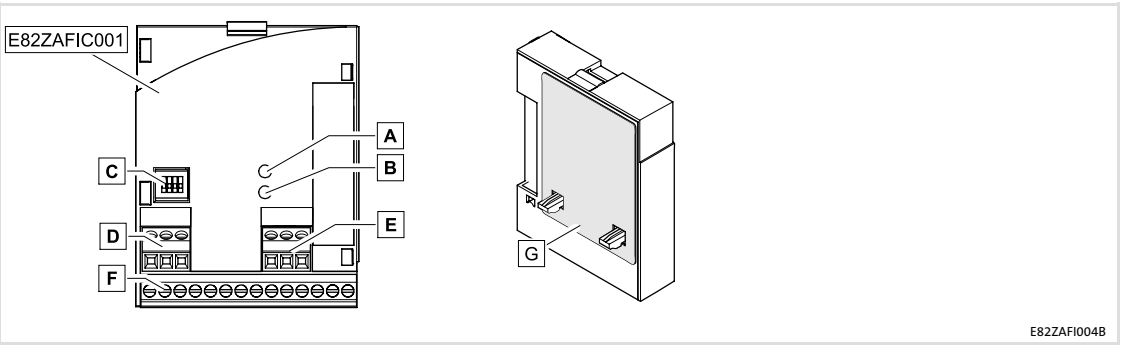

E82ZAFX005

| ① | | | ② | ③ | |
|---|---|---|---|---|---|
| **E82ZAF** | **I** | **C** | **xxx** | **xx** | **xx** |

Series
INTERBUS
Version
Variant
001: Coated version
010: PT version
Hardware version
Software version

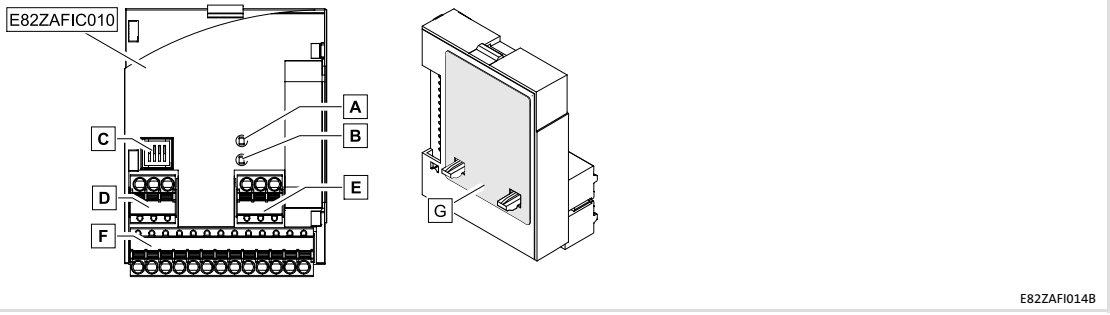
## 3.3 Connections and interfaces

### E82ZAFIC001function module




| Pos. | Description | See |
|---|---|---|
| **A** | LED (yellow): Status of the INTERBUS communication | 📖 54 |
| **B** | LED (green): Connection status to the controller | |
| **C** | DIP switch S1<br>● Setting for the last node = OFF<br>● Setting for all other nodes = ON | 📖 29 |
| | DIP switches S2 ... S4<br>● Configuration of<br>– the process data words (PCD)<br>– the parameter data words (PCP)<br>– the ID codes | |
| **D** | Plug connector X3.1<br>● Connection for external voltage supply of the function module | 📖 15 |
| **E** | Plug connector X3.2<br>● Reference terminal GND1, e.g. for external voltage supply of the function module<br>● Reference terminal GND2, e.g. for external supply of the controller inhibit (CINH) | |
| **F** | Plug connector X3.3<br>● Connection for<br>– INTERBUS<br>– controller inhibit (CINH)<br>– internal supply of the controller inhibit (CINH) | |
| **G** | Nameplate | 📖 10 |

## Function module E82ZAFIC010 (PT version)




| Pos. | Description | See |
|---|---|---|
| **A** | LED (yellow): Status of the INTERBUS communication | 📖 54 |
| **B** | LED (green): Connection status to the controller | |
| **C** | DIP switch S1<br>● Setting for the last node = OFF<br>● Setting for all other nodes = ON | 📖 29 |
| | DIP switches S2 ... S4<br>● Configuration of<br>– the process data words (PCD)<br>– the parameter data words (PCP)<br>– the ID codes | |
| **D** | Plug connector X3.1<br>● Connection for external voltage supply of the function module | 📖 15 |
| **E** | Plug connector X3.2<br>● Reference terminal GND1, e.g. for external voltage supply of the function module<br>● Reference terminal GND2, e.g. for external supply of the controller inhibit (CINH) | |
| **F** | Plug connector X3.3<br>● Connection for<br>– INTERBUS<br>– controller inhibit (CINH)<br>– internal supply of the controller inhibit (CINH) | |
| **G** | Nameplate | 📖 10 |

# 4 Technical data

## 4.1 General data

| Field | Values |
|---|---|
| Order designation | E82ZAFIC001 (coated)<br>E82ZAFIC010 (PT version) |
| Communication medium | RS485 |
| Network topology | Ring (go and return line in the same cable) |
| Number of bus nodes | Dependent on INTERBUS master (e.g. Phoenix Contact G4 master).<br>For the following data, which depend on whether PCP communication is used or not, always the smaller value applies:<br>● with PCP communication: max. 62 *or*<br>● without PCP communication: max. 256/number of PCDs |
| Distance between two bus nodes | Max. 400 m |
| INTERBUS identification (ID code) | ● With 1 word PCP: 227 (0xE3)<br>● Without PCP: 3 (0x03) |
| Drive profile | DRIVECOM profile ”Drive technology 20” |
| INTERBUS node | Slave |
| Baud rate | 500 kbps |
| Process data words (PCD), 16 bits | 1 ... 4 words |
| Parameter data words (PCP), 16 bits | 0 or 1 word |
| PDU length | Max. 64 bytes |
| Supported PCP services | ● Initiate<br>● Abort<br>● Status<br>● Identify<br>● Get-0V-long<br>● Read<br>● Write |
| Communication time | ● Sum of the cycle time and the processing time in the bus nodes. The times are independent of each other.<br>● Processing time in the standard device<br>– Parameter data (PCP): approx. 30 ms + 20 ms tolerance<br>– Process data (PCD): approx. 3 ms + 2 ms tolerance |

## 4.2 Operating conditions

| Ambient conditions | | |
|---|---|---|
| **Climate** | | |
| Storage | IEC/EN 60721-3-1 | 1K3 (-25 to +60 °C) |
| Transport | IEC/EN 60721-3-2 | 2K3 (-25 to +70 °C) |
| Operation | Corresponding to the data of the Lenze standard device used (see documentation of the standard device). | |
| Pollution | EN 61800-5-1 | Degree of pollution 2 |
| Degree of protection | IP20 (protection against accidental contact according to NEMA 250 type 1) | |

## 4.3 Protective insulation

| **Insulation between incoming bus and ...** | **Type of insulation** (acc. to EN 61800-5-1) |
|---|---|
| ● 8200 vector/motec power section | Reinforced insulation |
| ● Reference earth / PE | Functional insulation |
| ● Terminal X3.1/59 | Functional insulation |
| ● Terminal X3.3/20 | Functional insulation |
| ● Terminal X3.3/28 | Functional insulation |

| **Insulation between incoming bus and ...** | **Type of insulation** (acc. to EN 61800-5-1) |
|---|---|
| Outgoing bus | Functional insulation |

| **Insulation between outgoing bus and ...** | **Type of insulation** (acc. to EN 61800-5-1) |
|---|---|
| ● 8200 vector/motec power section | Reinforced insulation |
| ● Reference earth / PE | Functional insulation |
| ● Terminal X3.1/59 | No electrical isolation |
| ● Terminal X3.3/20 | No electrical isolation |
| ● Terminal X3.3/28 | Functional insulation |

## 4.4 Connection terminals

| Terminal X3.1/ | Designation | Function / level |
|---|---|---|
| 59 | | External voltage supply of the function module<br>● U = 24 V DC (21.6 V - 0% ... 26.4 V + 0 %)<br>● Current consumption for 24 V DC: I = 90 mA<br>If the supply voltage is looped through to other bus nodes via terminal 59, the current flowing must not exceed 3 A. |
| 7 | GND1 | Reference potential for terminal X3.3/20 |

| Terminal X3.2/ | Designation | Function / level |
|---|---|---|
| 7 | GND1 | Reference potential for terminal X3.3/20 |
| 39 | GND2 | Reference potential for controller inhibit (CINH) on terminal X3.3/28 |

| Terminal X3.3/ | Designation | Function / level |
|---|---|---|
| A | /DO1 | RS485 data line (incoming) |
| B | DO1 | |
| C | /DI1 | |
| D | DI1 | |
| E | GND3 | Reference potential for incoming data line |
| F | /DO2 | RS485 data line (outgoing) |
| G | DO2 | |
| H | /DI2 | |
| J | DI2 | |
| K | GND1 | Reference potential for outgoing data line |
| ⏚ | | Additional HF shield termination |
| 28 | CINH | Controller inhibit<br>● Input resistance: 3.3 kΩ<br>● Start = HIGH (+12 ... +30 V DC)<br>● Stop = LOW (0 ... +3 V DC) |
| 20 | | DC voltage source for internal supply of controller inhibit (CINH)<br>● +20 V DC (reference: GND1)<br>● $I_{max}$ = 10 mA |

## 4.5 Communication time

### 4.5.1 Cycle time

The cycle time of the communication system is the time required to exchange all process data between the INTERBUS master and the nodes.

It depends on the data of the communication system and can be calculated e. g. for a baud rate of 500 kbps as follows:

$$t_{zykl} = 3.35 \cdot 10^{-3} (n + 48 + 3\,BK) + 0.24\,L + 0.2$$

| | |
|---|---|
| $t_{cycl}$ | Cycle time [ms] |
| n | Sum of all data bits in the INTERBUS ring |
| BT | Number of bus terminals |
| L | Length of the remote bus cable [km] |

The following diagram shows the relationship between the cycle time and the number of connected bus nodes. The given values refer to the connection of Lenze controllers (e. g. 82xx) with 48 bits (1 parameter data word + 2 process data words.

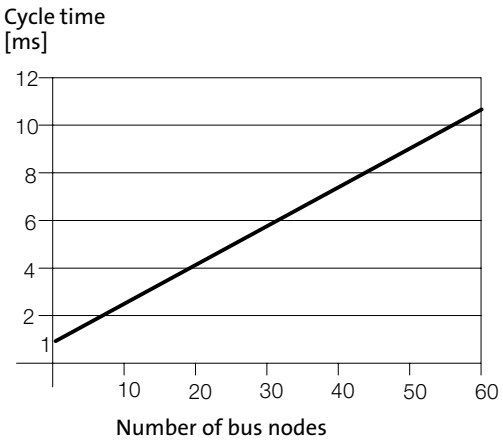



Fig. 4-1 Relationship between cycle time and number of bus nodes

### 4.5.2 Processing time 8200 vector / 8200 motec

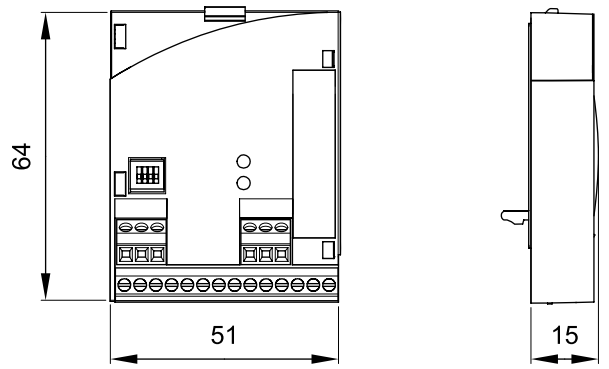
The processing time in the controller is added to the INTERBUS transmission time or cycle time.

There are no dependencies between parameter data and process data.

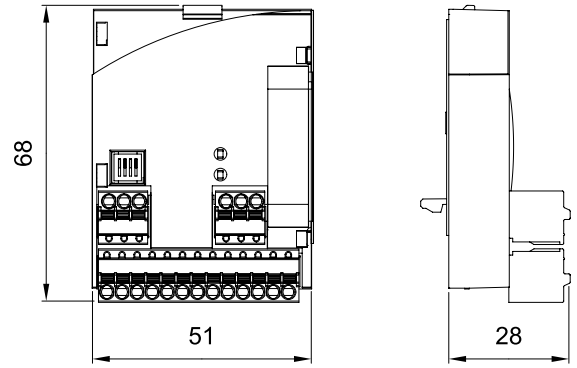
- Parameter data (PCP): approx. 30 ms + 20 ms tolerance
- Process data (PCD): approx. 3 ms + 2 ms tolerance

## 4.6 Dimensions

### E82ZAFIC001function module




### Function module E82ZAFIC010 (PT version)



# 5 Installation

**Danger!**

Inappropriate handling of the function module and the standard device can cause serious injuries to persons and damage to material assets.

Observe the safety instructions and residual hazards included in the documentation of the standard device.

**Stop!**

The device contains components that can be destroyed by electrostatic discharge!

Before working on the device, the personnel must ensure that they are free of electrostatic charge by using appropriate measures.

## 5.1 Mechanical installation

Follow the notes given in the Mounting Instructions for the standard device for the mechanical installation of the function module.

The Mounting Instructions for the standard device ...

- ► are part of the scope of supply and are enclosed with each device.
- ► provide tips to avoid damage provide tips to avoid damage through improper handling.
- ► describe the obligatory order of installation steps.

## 5.2 Electrical installation

### 5.2.1 Wiring according to EMC (CE-typical drive system)

For wiring according to EMC requirements observe the following points:

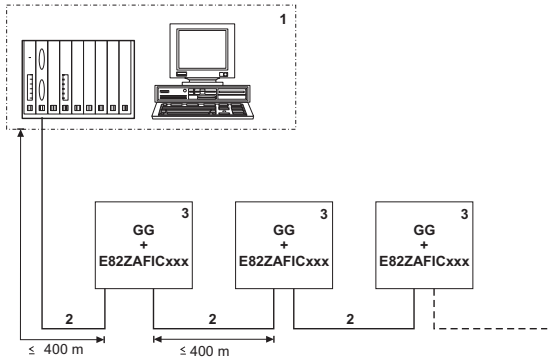
**Note!**

- ► Separate control cables/data lines from motor cables.
- ► Connect the shields of control cables/data lines *at both ends* in the case of digital signals.
- ► Use an equalizing conductor with a cross-section of at least 16 $mm^2$ (reference: PE) to avoid potential differences between the bus nodes.
- ► Observe the other notes concerning EMC-compliant wiring given in the documentation for the standard device.

**Wiring procedure**

1. Observe the bus topology, do not use any stubs.
2. Follow the wiring notes given in the documentation for the control system.
3. Only use cables which comply with the specifications listed (📖 20).
4. Observe the notes concerning the voltage supply of the function module (📖 21).

## 5.2.2 Wiring with a host (master)




| No. | Element | Description |
|---|---|---|
| 1 | Host | E.g. PC or PLC with INTERBUS master interface module |
| 2 | Bus cable | Connects the INTERBUS master interface module to the function modules. |
| 3 | INTERBUS slave | Applicable standard device (📖 10) with function module.<br>● Set DIP switch S1 (📖 29):<br>– Setting for the last node = OFF<br>– Setting for all other nodes = ON |

### Specification of the transmission cable

| General characteristics | |
|---|---|
| Cable type | Sold by the meter,<br>(e.g. PHOENIX CONTACT: IBS RBC Meter-T, Order No. 28 06 28 6) |
| Number of conductors | 3 × 2, twisted pairs, with shared shield |
| Conductor cross-section | > 0.2 $mm^2$ |
| DC cable resistance | < 96 Ω/km |
| Impedance (characteristic) | ● 120 Ω ± 20 % (f = 64 kHz)<br>● 100 Ω ±15 Ω (f > 1 MHz) |
| Capacitance per unit length | < 60 nF/km (f = 800 Hz) |

### 5.2.3 Voltage supply

**Internal DC voltage supply**

The internal voltage ...

- supplies the controller inhibit (CINH).
- is available at terminal X3.3/20.

**External voltage supply**

**Note!**

Always use a separate power supply unit in every control cabinet and safely separate it according to EN 61800-5-1 (”SELV”/”PELV”) in the case of external voltage supply and larger distances between the control cabinets.

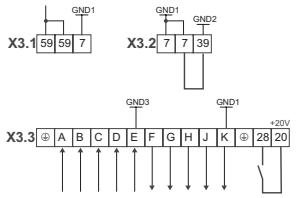
External voltage supply of the communication module is required if communication via the fieldbus is to be maintained even when the power supply of the standard device fails.

**Note!**

With external voltage supply of the function module, the active bus terminating resistor is fed independently of the operation of the standard device. In this way, the bus system remains active even when the standard device is switched off or fails.

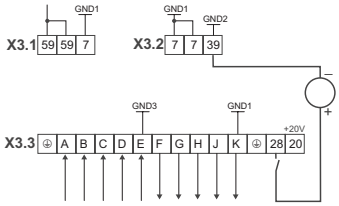
## Supply of controller inhibit (CINH)

**Supply via the internal voltage source (X3.3/20)**




E82ZAFI001

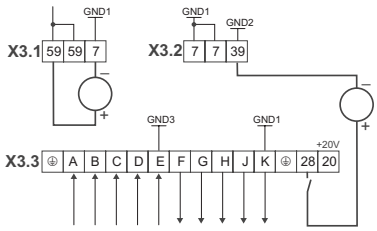
**Supply via the external voltage source**




E82ZAFI002

——— Minimum wiring required for operation

**Supply of function module and controller inhibit (CINH) via external voltage source**




E82ZAFI003

——— Minimum wiring required for operation

### 5.2.4 Terminal assignment

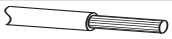
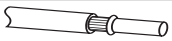
| Terminal X3.1/ | Designation | Function / level |
|---|---|---|
| 59 | | External voltage supply of the function module<br>● U = 24 V DC (21.6 V - 0% ... 26.4 V + 0 %)<br>● Current consumption for 24 V DC: I = 90 mA<br>If the supply voltage is looped through to other bus nodes via terminal 59, the current flowing must not exceed 3 A. |
| 7 | GND1 | Reference potential for terminal X3.3/20 |

| Terminal X3.2/ | Designation | Function / level |
|---|---|---|
| 7 | GND1 | Reference potential for terminal X3.3/20 |
| 39 | GND2 | Reference potential for controller inhibit (CINH) on terminal X3.3/28 |

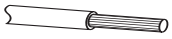
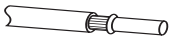
| Terminal X3.3/ | Designation | Function / level |
|---|---|---|
| A | /DO1 | RS485 data line (incoming) |
| B | DO1 | |
| C | /DI1 | |
| D | DI1 | |
| E | GND3 | Reference potential for incoming data line |
| F | /DO2 | RS485 data line (outgoing) |
| G | DO2 | |
| H | /DI2 | |
| J | DI2 | |
| K | GND1 | Reference potential for outgoing data line |
| ⏚ | | Additional HF shield termination |
| 28 | CINH | Controller inhibit<br>● Input resistance: 3.3 kΩ<br>● Start = HIGH (+12 ... +30 V DC)<br>● Stop = LOW (0 ... +3 V DC) |
| 20 | | DC voltage source for internal supply of controller inhibit (CINH)<br>● +20 V DC (reference: GND1)<br>● $I_{max}$ = 10 mA |

## 5.2.5 Cable cross-sections and screw-tightening torques

### E82ZAFIC001function module

| Range | Values | |
|---|---|---|
| Electrical connection | Terminal strip with screw connection | |
| Possible connections | rigid: | |
| |  | 1.5 mm² (AWG 16) |
| | flexible: | |
| |  | without wire end ferrule<br>1.0 mm² (AWG 18) |
| |  | with wire end ferrule, without plastic sleeve<br>0.5 mm² (AWG 20) |
| |  | with wire end ferrule, with plastic sleeve<br>0.5 mm² (AWG 20) |
| Tightening torque | 0.22 ... 0.25 Nm (1.9 ... 2.2 lb-in) | |
| Bare end | 5 mm | |

### Function module E82ZAFIC010 (PT version)

| Field | Values | |
|---|---|---|
| Electrical connection | 2-pin plug connector with spring connection | |
| Possible connections | rigid: | |
| |  | 1.5 mm² (AWG 16) |
| | flexible: | |
| |  | without wire end ferrule<br>1.5 mm² (AWG 16) |
| |  | with wire end ferrule, without plastic sleeve<br>1.5 mm² (AWG 16) |
| |  | with wire end ferrule, with plastic sleeve<br>1.5 mm² (AWG 16) |
| Stripping length | 9 mm | |

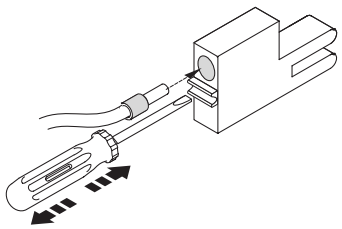
### 5.2.6 Use of plug connectors

**Stop!**

Observe the following to prevent any damage to plug connectors and contacts:

- ► Only pug in / unplug the plug connectors when the controller is disconnected from the mains.
- ► Wire the plug connectors before plugging them in.
- ► Unused plug connectors must also be plugged in.

**Use of plug connectors with spring connection**



E82ZAFX013

# 6 Commissioning

## 6.1 Before switching on


**Stop!**

Before you switch on the standard device and the plugged-in function module for the first time, check ...

- ► the entire wiring for completeness, short circuit and earth fault.
- ► the setting of the DIP switch S1 (📖 29):
  - – Setting for the last node = OFF
  - – Setting for all other nodes = ON

## 6.2 Commissioning steps

**Note!**

Do not change the setting sequence.

Step-by-step commissioning of the function module with the DRIVECOM device control is described below.

| Step | Procedure | Detailed information |
|---|---|---|
| 1. | Configure the host (master) for communication via the function module. | 📖 29 |
| 2. | Inhibit the standard device via terminal 28 (CINH).<br>● Set terminal 28 to LOW level.<br>● Later on the standard device can be inhibited and enabled via the bus system. | Documentation for the standard device |
| 3. | Set DIP switch S1:<br>● Setting for the last node = OFF<br>● Setting for all other nodes = ON | 📖 29 |
| 4. | Define user data length via ...<br>● DIP switches S2 ... S4 or<br>● code C1515 | 📖 30 |
| 5. | Connect the mains voltage and, if available, the separate voltage supply for the function module.<br>● The standard device is ready for operation after approx. 1 second.<br>● Controller inhibit (CINH) is active. | 📖 32 |
| | **Response**<br>● The green LED ”Connection status to standard device” at the front of the function module is lit (only visible in the case of the 8200 vector).<br>● Keypad: RDY IMP (if attached) | 📖 54 |
| 6. | It is now possible to communicate with the standard device, i.e. all codes can be read and all writable codes can be adapted to the application. | Documentation for the standard device |
| | **Response**<br>The yellow LED on the function module is blinking when the INTERBUS is active. | 📖 54 |
| 7. | If PCP communication is used, carry out the PCP service ”initiate”.<br>● It is now possible to access the parameters of the standard device with the PCP services ”read” and ”write”. | 📖 50 |
| 8. | Select the function module as the source for control commands and setpoints.<br>● Set C0005 = 200.<br>– A preconfiguration for operation with the function module is carried out.<br>– This preconfiguration already links the control words and status words. | |
| 9. | Use C1511 to assign the process output data words (POW) of the master to the process input data words of the standard device.<br>**Lenze setting:**<br>POW1: DRIVECOM control word (DRIVECOM CTRL)<br>POW2: Setpoint1 (NSET1-N1)<br>POW3: Setpoint2 (NSET1-N2)<br>POW4: Additional setpoint (PCTRL1-NADD) | INTERBUS communication manual<br>📖 59 |
| 10. | Use C1510 to assign the process output data words of the standard device to the process input data words (PIW) of the master.<br>**Lenze setting:**<br>PIW1: DRIVECOM status word (DRIVECOM STAT)<br>PIW2: Output frequency with slip (MCTRL1-NOUT+SLIP)<br>PIW3: Output frequency without slip (MCTRL1-NOUT)<br>PIW4: Apparent motor current (MCTRL1-IMOT) | INTERBUS communication manual<br>📖 58 |

| Step | Procedure | Detailed information |
|---|---|---|
| 11. | Enable process output data with C1512 = 255.<br>**Only required when C1511 has been changed.** | |
| 12. | Enable the standard device via terminal 28 (CINH).<br>● Set terminal 28 to HIGH level. | |
| 13. | Select setpoint.<br>● The master transmits the setpoint via the selected process output data word. | |
| 14. | Change to the READY TO START state:<br>● The master transmits the DRIVECOM control word: 0000 0000 0111 $1110_{bin}$ ($007E_{hex}$). | INTERBUS communication manual<br>📖 42 |
| 15. | The standard device is in the READY TO START state.<br>● The master receives the DRIVECOM status word: xxxx xxxx x01x $0001_{bin.}$ | |
| 16. | Change to the OPERATION ENABLED state.<br>● The master transmits the DRIVECOM control word: 0000 0000 0111 $1111_{bin}$ ($007F_{hex}$). | |
| 17. | The drive starts up. | |

## 6.3 Configuring Host (master)

For communication via the function module, first the host (master) must be configured.

### Master settings

The configuration of the INTERBUS requires the device description file (EDS file) for the communication module to be imported to the master configuration software.

The EDS file can be downloaded in the download area on **http://www.Lenze.com**.

## 6.4 Setting for last bus node

### DIP switch 1


**Note!**

- ► DIP switch 1 must only be set to OFF for the *last* physical node.
- ► Lenze setting: all switches OFF

| Position | Notes |
|---|---|
| OFF | Standard device with function module is the last bus node |
| ON | Standard device with function module is *not* the last bus node. |

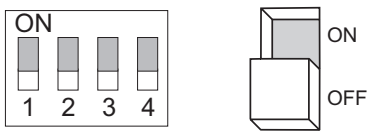
## 6.5 Defining the user data length

The number of process data words (PCD) and parameter data words (PCP) can be set via code C1515 or via the DIP switches S2 ... S4.

**Note!**

- ► Sum of all data words (PZD + PCP): max. 4 words
- ► Switch off the voltage supply of the function module and the controller and then on again to activate the changed settings.

### Settings via DIP switches S2 ... S4




E82ZAFI009

- ► If one of the DIP switches S2 ... S4 is set to OFF, the configurations resulting from *all switch positions* are active at switch-on.
- ► If the switch positions are invalid, the Lenze setting is activated:
  – DIP switches S2 ... S4 = OFF (2 PCD words + 1 PCP word)
- ► Code C1525 displays the current settings of the DIP switches S2 ... S4.

| DIP switch | | | Value | Number of process data words (PCD) | Number of parameter data words (PCP) | ID code |
|---|---|---|---|---|---|---|
| S2 | S3 | S4 | | | | |
| OFF | OFF | OFF | 0 | 2 | 1 | 227 |
| **ON** | OFF | OFF | 1 | 3 | 1 | 227 |
| OFF | OFF | **ON** | 4 | 2 | 0 | 3 |
| **ON** | OFF | **ON** | 5 | 4 | 0 | 3 |
| **ON** | **ON** | **ON** | Code C1515 active. | | | |

### Settings via code

- ► DIP switches S2 ... S4 = ON
- ► Set the number of data words (PCD + PCP) via C1515.

| Code | Name | | | | Index |
|---|---|---|---|---|---|
| **C1515** | **Process/parameter data specification** | | | | **0x5A14 (23060)** |
| Subcode | Lenze | Values | | | Access | Data type |
| - | 0 | 0, 1, 4, 5 | | | rw | FIX32 |
| | | 11 | ... | 14 | | |
| | | 21 | ... | 23 | | |

| Values | Description |
|---|---|
| 0, 1, 4, 5 | The configuration resulting from the values corresponding to the set DIP switch positions becomes active. |
| 11 ... 14 | ● No PCP<br>● 1**1** (1 word PCD) ... 1**4** (4 words PCD) |
| 21 ... 23 | ● 1 word PCP<br>● 2**1** (1 word PCD) ... 2**3** (3 words PCD) |

## 6.6 Connecting the mains voltage

**Note!**

If the external voltage supply of the function module is used, switch it on as well.

- ► The standard device is ready for operation approx. 1 s after switching on the supply voltage.
- ► The controller inhibit is active.
- ► The green LED at the front of the function module is lit.

**Protection against uncontrolled start-up**

**Note!**

**Establishing communication**

For establishing communication via an externally supplied function module, the standard device must be switched on as well.

- ► After communication has been established, the externally supplied module is independent of the power on/off state of the standard device.

**Protection against uncontrolled start-up**

After a fault (e.g. short-term mains failure), a restart of the drive is not always wanted and - in some cases - even not allowed.

The restart behaviour of the controller can be set in C0142:

- ► C0142 = 0 (Lenze setting)
  - – The controller remains inhibited (even if the fault is no longer active).
  - – The drive starts in a controlled mode by explicitly enabling the controller: LOW-HIGH edge at terminal 28 (CINH)
- ► C0142 = 1
  - – An uncontrolled restart of the drive is possible.

# 7 Process data transfer

INTERBUS transmits two different data types between the host (master) and the controllers (slaves):

- Parameter data
- Process data

**Process data**

- Process data is transmitted via the process data channel.
- The process data serves to control the controller.
- The host can directly access the process data. Data in the PLC, for instance, are directly stored in the I/O area.
- The data exchange between the master drive and the controller is required in the shortest possible time. Here, small amounts of data can be transmitted cyclically.
- Process data ...
  - are not saved in the controller;
  - are transmitted between the host system and the controllers in order that a constant exchange between current input and output data takes place.
- Process data are, for instance, setpoints and actual values.

**Parameter data**

- Parameter data is transmitted via the parameter data channel (PCP channel).
- The transmission of parameter data is usually not time-critical.
- Parameter data are, for instance, operating parameters, motor data and diagnostic information.
- The access to all Lenze codes and indices is permitted.
- When saving parameter changes, please observe the notes regarding code C0003.

## 7.1 Lenze device control

**Note!**

Deactivate the DRIVECOM device control if you want to use the Lenze device control.

For this purpose, use code C1510 / C1511.

### 7.1.1 Process data transfer

Process data telegrams between the host (master) and the controllers (slaves) connected to the INTERBUS are distinguished as follows with regard to their direction:

- Process data telegrams **from** the master
  The master transmits max. 4 process output data words (POW) to the slave.
- Process data telegrams **to** the master
  The master receives max. 4 process input data words (PIW) from the slave.

Via the free configuration of the process data, assign the max. 4 process data words of the INTERBUS to the process data words of the controller. The assignments can be defined in the codes C1511 (process output data) ad C1510 (process input data).

**Process data telegram to the master**

The function block to be used for the cyclic process data telegram from the drive to the master is called AIF-OUT.

The status word (byte 1 and byte 2) contained in the process data telegram is sent to the master via the AIF-OUT function block.

**Process data telegram from the master**

The function block to be used for the cyclic process data telegram from the master to the drive is called AIF-IN.

The control word (byte 1 and byte 2) contained in the process data telegram is sent from the master and is received in the controller via the AIF-IN function block.

**Selection of setpoint source**

**8200 vector / 8200 motec controller**

For these controllers, the selection of the setpoint source is defined using code C0001 (index: 0x5FFE). For evaluating the process data, the code C0001 has to be set to the value ”3” when the controller is operated with the function module. The *setpoint source* is provided by the process data channel which describes the frequency setpoint (mapping to C0046) and the control word (C0135).

In C0412/x, the assignment of the setpoint source to the desired analog signal can be checked / changed.

**Note!**

The selection of the setpoint source (C0001) must be set identically in all parameter sets used in the controller.

### 7.1.2 Process data signals for 8200 vector / 8200 motec

#### Configuring process output data

The assignment of the max. 4 process output data words (POW) of the master to bit control commands or setpoints of the controller can be configured freely using C1511.

► In order to activate the DRIVECOM device control, assign the DRIVECOM control word to a POW (C1511/x = 17).
  – The DRIVECOM control word is mapped to the FIF control word 1.
  – The controller conforms to the DRIVECOM state machine (📖 42).

► The FIF control words can be used to set up an extended Lenze device control (📖 38).

**Note!**

When C1511 is changed, the process output data is automatically locked to ensure data consistency. Use C1512 to enable single or all POWs.

#### Configuration of the process output data

| Code | Name | | Index |
|---|---|---|---|
| **C1511** | **Configuring process output data** | | **0x5A18 (23064)** |

| Subcode | | Lenze | | Access | Data type |
|---|---|---|---|---|---|
| 1 | POW1 | 17 | DRIVECOM control word (DRIVECOM-CTRL) | rw | FIX32 |
| 2 | POW2 | 3 | Setpoint 1 (NSET1-N1) | rw | FIX32 |
| 3 | POW3 | 4 | Setpoint 2 (NSET1-N2) | rw | FIX32 |
| 4 | PAW4 | 5 | Additional setpoint (PCTRL1-NADD) | rw | FIX32 |

☑ Parameter set transfer

**Tip!**

For a detailed description of the code, see 📖 59.

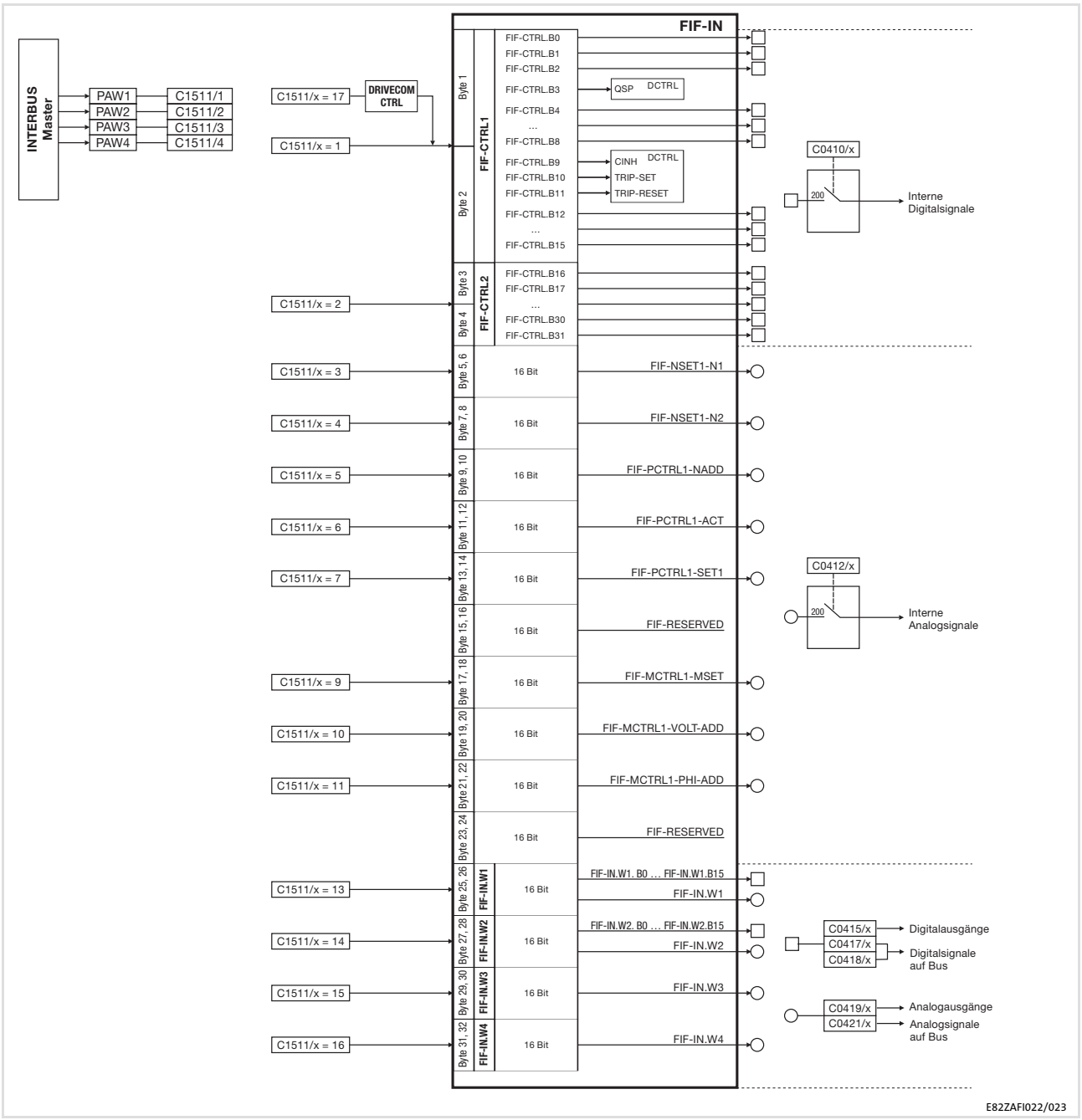



Fig. 7-1 Free configuration of the 4 process output data words of the INTERBUS

| FIF control word 1 (FIF-CTRL1) | | FIF control word 2 (FIF-CTRL2) | |
|---|---|---|---|
| **Bit** | **Assignment** | **Bit** | **Assignment** |
| **0 / 1** | **JOG values** (NSET1-JOG2/3 \| NSET1-JOG1/3)<br>Bit 1 0<br>0 0 C0046 active<br>0 1 JOG1 (C0037) active<br>1 0 JOG2 (C0038) active<br>1 1 JOG3 (C0039) active | **0** | **Manual/remote changeover** (DCTRL1-H/Re)<br>0 Not active<br>1 Active |
| | | **1** | **Switch off I-component of process controller** (PCTRL1-I-OFF)<br>0 Not active<br>1 Active |
| **2** | **Current direction of rotation** (DCTRL1-CW/CCW)<br>0 Not inverted<br>1 Inverted | **2** | **Switch off process controller** (PCTRL1-OFF)<br>0 Not active<br>1 Active |
| **3** | **Quick stop (QSP)** (FIF-CTRL1-QSP)<br>0 Not active<br>1 Active (deceleration via QSP ramp C0105) | **3** | Reserved<br>**Do not write to this bit!** |
| **4** | **Stop ramp function generator** (NSET1-RFG1-STOP)<br>0 Not active<br>1 Active | **4** | **Stop process controller** (PCTRL1-STOP)<br>0 Not active<br>1 Active |
| **5** | **Ramp function generator input = 0** (NSET1-RFG1-0)<br>0 Not active<br>1 Active (deceleration via C0013) | **5** | **CW rotation/quick stop (QSP)** (DCTRL1-CW/QSP)<br>0 Not active<br>1 Active |
| **6** | **UP function of motor potentiometer** (MPOT1-UP)<br>0 Not active<br>1 Active | **6** | **CCW rotation/quick stop (QSP)** (DCTRL1-CCW/QSP)<br>0 Not active<br>1 Active |
| **7** | **DOWN function of motor potentiometer** (MPOT1-DOWN)<br>0 Not active<br>1 Active | **7** | **X3/E1 is digital frequency input** (DFIN1-ON)<br>0 Not active<br>1 Active |
| **8** | Reserved | **8** | Reserved |
| **9** | **Controller inhibit** (FIF-CTRL1-CINH)<br>0 Controller enabled<br>1 Controller inhibited | **9** | Reserved |
| **10** | **External fault** (FIF-CTRL1-TRIP-SET) | **10** | Reserved |
| **11** | **Reset fault** (FIF-CTRL1-TRIP-RESET)<br>0 ⇒ 1 Bit change resets TRIP | **11** | Reserved |
| **12 / 13** | **Parameter set changeover** (DCTRL1-PAR3/4 \| DCTRL1-PAR2/4)<br>Bit 13 12<br>0 0 PAR1<br>0 1 PAR2<br>1 0 PAR3<br>1 1 PAR4 | **12** | Reserved |
| | | **13** | Reserved |
| **14** | **DC injection brake** (MTCRL1-DCB)<br>0 Not active<br>1 Active | **14** | Reserved |
| **15** | Reserved | **15** | Reserved |

Tab. 7-1 Parameter structure of FIF control word (FIF-CTRLx)

**Note!**

**Use of bit 5 and bit 6 in FIF control word 2**

Set codes **C0410/22** (DCTRL1-CW/QSP) and **C0410/23** (DCTRL1-CCW/QSP) to ”200”.

### Configuring process input data

The assignment of the bit status information or actual values of the controller to the max. 4 process input data words (PIW) of the master can be configured freely:

- In order to access DRIVECOM-compliant status information, assign the DRIVECOM status word to a PIW (C1511/x = 18).
- The FIF status word 1 is mapped to the DRIVECOM status word.

### Configuration of the process input data

| Code | Name | | Index |
|---|---|---|---|
| **C1510** | **Configuring process input data** | | **0x5A19 (23065)** |

| Subcode | | Lenze | | Access | Data type |
|---|---|---|---|---|---|
| 1 | PIW1 | 18 | DRIVECOM status word (DRIVECOM-STAT) | rw | FIX32 |
| 2 | PIW2 | 3 | Output frequency with slip (MCTRL1-NOUT+SLIP) | rw | FIX32 |
| 3 | PIW3 | 4 | Output frequency without slip (MCTRL1-NOUT) | rw | FIX32 |
| 4 | PIW4 | 5 | Apparent motor current (MCTRL1-IMOT) | rw | FIX32 |

☑ Parameter set transfer

**Tip!**

For a detailed description of the code, see 📖 58.

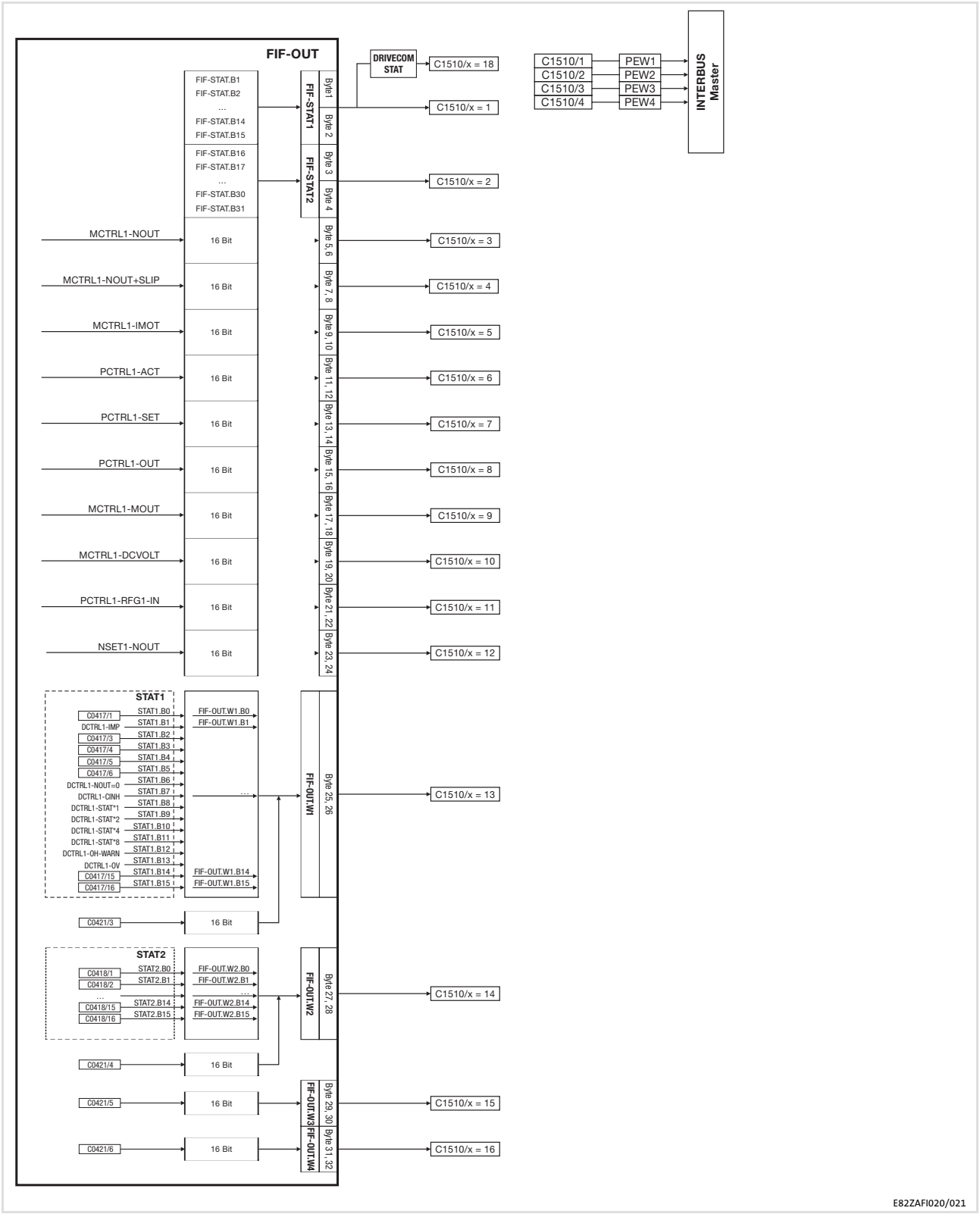



Fig. 7-11 Free configuration of the 4 process input data words of the INTERBUS

| FIF status word 1 (FIF-STAT1) | | FIF status word 2 (FIF-STAT2) | |
|---|---|---|---|
| **Bit** | **Assignment** | **Bit** | **Assignment** |
| **0** | **Current parameter set bit 0** (DCTRL1-PAR-B0)<br>0 Parameter set 1 or 3 active<br>1 Parameter set 2 or 4 active | **0** | **Current parameter set bit 1** (DCTRL1-PAR-B1)<br>0 Parameter set 1 or 2 active<br>1 Parameter set 3 or 4 active |
| **1** | **Pulse inhibit** (DCTRL1-IMP)<br>0 Power outputs enabled<br>1 Power outputs inhibited | **1** | **TRIP, $Q_{min}$ or pulse inhibit active** (DCTRL1-TRIP-QMIN-IMP)<br>0 False<br>1 True |
| **2** | **$I_{max}$ limit** (MCTRL1-IMAX)<br>(If C0014 = 5: Torque setpoint)<br>0 Not reached<br>1 Reached | **2** | **PTC warning active** (DCTRL1-PTC-WARN)<br>0 False<br>1 True |
| **3** | **Output frequency = frequency setpoint**<br>(DCTRL1-RFG1=NOUT)<br>0 False<br>1 True | **3** | Reserved<br>**Do not write to this bit!** |
| **4** | **Ramp function generator input 1 = ramp function generator output 1** (NSET1-RFG1-I=O)<br>0 False<br>1 True | **4** | **C0054 < C0156 and $Q_{min}$ threshold reached**<br>(DCTRL1-(IMOT<ILIM)-QMIN)<br>0 False<br>1 True |
| **5** | **$Q_{min}$ threshold** (PCTRL1-QMIN)<br>0 Not reached<br>1 Reached | **5** | **C0054 < C0156 and NSET1-RFG1-I=O**<br>(DCTRL1-(IMOT<ILIM)-RFG-I=O)<br>0 False<br>1 True |
| **6** | **Output frequency = 0** (DCTRL1-NOUT=0)<br>0 False<br>1 True | **6** | **LP1 warning (fault in motor phase) active**<br>(DCTRL1-LP1-WARN)<br>0 False<br>1 True |
| **7** | **Controller inhibit** (DCTRL1-CINH)<br>0 Controller enabled<br>1 Controller inhibited | **7** | **f < $f_{min}$** (NSET1-C0010 ... C0011)<br>0 False<br>1 True |
| **11...8** | **Device status** (DCTRL1-STAT*1 ... STAT*8)<br>Bit 11 10 9 8<br>0 0 0 0 Controller initialisation<br>0 0 1 0 Switch-on inhibit<br>0 0 1 1 Operation inhibited<br>0 1 0 0 Flying-restart circuit active<br>0 1 0 1 DC-injection brake active<br>0 1 1 0 Operation enabled<br>0 1 1 1 Message active<br>1 0 0 0 Fault active<br>1 1 1 1 Communication with basic device not possible | **8** | **TRIP active** (DCTRL1-TRIP)<br>0 False<br>1 True |
| | | **9** | **Motor is running** (DCTRL1-RUN)<br>0 False<br>1 True |
| | | **10** | **Motor is running clockwise** (DCTRL1-RUN-CW)<br>0 False<br>1 True |
| | | **11** | **Motor is running counter-clockwise** (DCTRL1-RUN-CCW)<br>0 False<br>1 True |
| **12** | **Overtemperature warning** (DCTRL1-OH-WARN)<br>0 No warning<br>1 $\vartheta_{max}$ - 10 °C reached | **12** | Reserved |
| **13** | **DC-bus overvoltage** (DCTRL1-OV)<br>0 No overvoltage<br>1 Overvoltage | **13** | Reserved |
| **14** | **Direction of rotation** (DCTRL1-CCW)<br>0 CW rotation<br>1 CCW rotation | **14** | **C0054 > C0156 and NSET1-RFG1-I=0**<br>(DCTRL1-(IMOT>ILIM)-RFG-I=O)<br>0 False<br>1 True |
| **15** | **Ready for operation** (DCTRL1-RDY)<br>0 Not ready for operation (fault)<br>1 Ready for operation (no fault) | **15** | Reserved |

Tab. 7-2 Parameter structure FIF status word (FIF-STATx)

## 7.2 DRIVECOM control

### 7.2.1 DRIVECOM state machine

The control information is provided by the function module via the control word.

- The controllers have standardised device states according to DRIVECOM Profile 20.
- Information on the current device status is stored in the DRIVECOM parameter "status word".
- Commands in the DRIVECOM parameter "control word" can change the device status. These commands are represented by arrows in the following diagram.

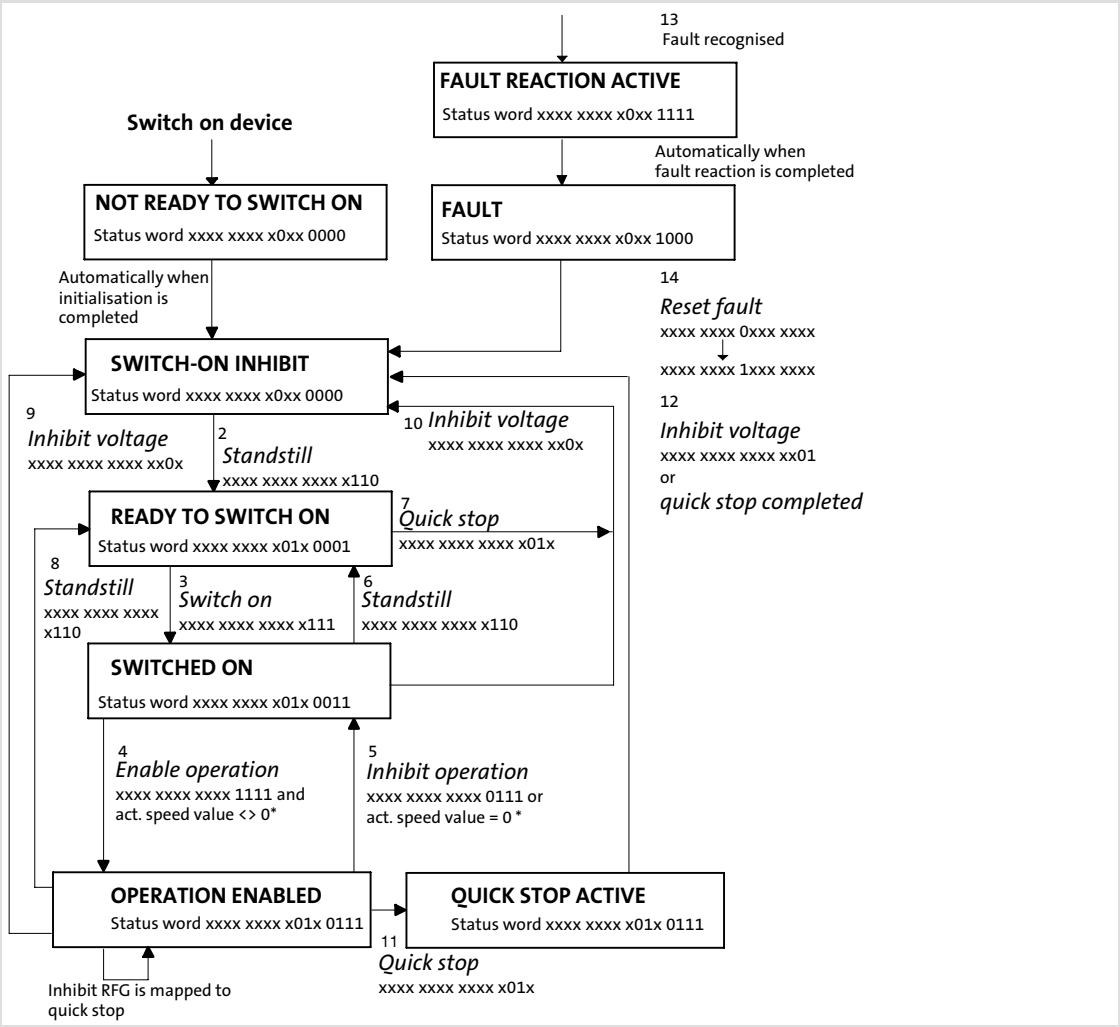



Fig. 7-2 Status diagram of DRIVECOM device control

* only effective for 821X, 8200 vector when the automatic DC injection brake is active (C0106, C2106 <> 0)

### 7.2.2 DRIVECOM control word

| Bit | Meaning |
|---|---|
| **0** | **"Switch on" command** |
| 0 | "Standstill" command active |
| 1 | "Switch on" command active |
| **1** | **"Inhibit voltage" command** |
| 0 | "Inhibit voltage" command active |
| 1 | "Inhibit voltage" command not active |
| **2** | **"Quick stop (QSP)" command** |
| 0 | "Quick stop (QSP)" command active |
| 1 | "Quick stop (QSP)" command not active |
| **3** | **"Enable operation" command** |
| 0 | "Inhibit operation" command active |
| 1 | "Enable operation" command active |
| **4** | **"Inhibit RFG" command**<br>Inhibits the ramp function generator (NSET1-RFG1). The quick stop function (QSP) is activated; the device status of the drive does not change.<br>Mapping to FIF control word 1 (FIF-CTRL1), bit 3 negated (FIF-CTRL1-QSP) |
| 0 | "Inhibit RFG" active |
| 1 | "Inhibit RFG" not active |
| **5** | **"RFG stop" command**<br>Ramp function generator output (NSET1-RFG1) is "frozen"; the device status of the drive does not change.<br>Mapping to FIF control word 1 (FIF-CTRL1), bit 4 negated (NSET1-RFG1-STOP) |
| 0 | "RFG stop" active |
| 1 | "RFG stop" not active |
| **6** | **"RFG zero" command**<br>Sets ramp function generator input (NSET1-RFG1) to 0. ⇒ Controlled deceleration via the ramp set under C0013; the device status of the drive does not change.<br>Mapping to FIF control word 1 (FIF-CTRL1), bit 5 negated (NSET1-RFG1-0) |
| 0 | "RFG zero" active |
| 1 | "RFG zero" not active |
| **7** | **TRIP reset**<br>Resets fault (TRIP) |
| 0 ⇒ 1 | Bit change resets TRIP |
| **8** | DRIVECOM reserved |
| **9** | DRIVECOM reserved |
| **10** | DRIVECOM reserved |
| **11** | Mapping to FIF control word 1 (FIF-CTRL1), bit 10 (FIF-CTRL1-TRIP-SET) |
| **12** | Mapping to FIF control word 1 (FIF-CTRL1), bit 12 (DCTRL1-PAR2/4) |
| **13** | Mapping to FIF control word 1 (FIF-CTRL1), bit 13 (DCTRL1-PAR-3/4) |
| **14** | Mapping to FIF control word 1 (FIF-CTRL1), bit 14 (MCTRL1-DCB) |
| **15** | Not used |

Tab. 7-3 Parameter structure of "DRIVECOM control word" (DRIVECOM-CTRL)

### 7.2.3 DRIVECOM status word

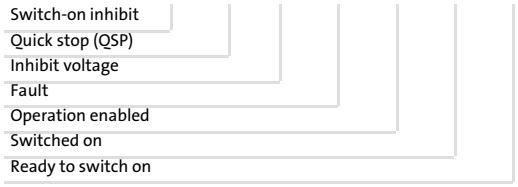
| Bit | Meaning |
|---|---|
| **0** | **Device status "Ready to switch on"** |
| 0 | Status less than "Ready to switch on" |
| 1 | Status at least "Ready to switch on" |
| **1** | **Device status "Switched on"** |
| 0 | Status less than "Switched on" |
| 1 | Status at least "Switched on" |
| **2** | **Device status "Operation enabled"** |
| 0 | Status less than "Operation enabled" |
| 1 | Status "Operation enabled" |
| **3** | **Device status "Fault"** |
| 0 | No fault (TRIP) |
| 1 | Fault (TRIP) active |
| **4** | **Status "Inhibit voltage" command** |
| 0 | Command applied |
| 1 | Command not applied |
| **5** | **Status "Quick stop (QSP)" command** |
| 0 | Command applied |
| 1 | Command not applied |
| **6** | **Device status "Switch-on inhibit"** |
| 0 | Status "Switch-on inhibit" not active |
| 1 | Status "Switch-on inhibit" active |
| **7** | **Collective warning** |
| 0 | No warning |
| 1 | Warning (overtemperature) active |
| **8** | **Collective message**<br>Automatic setting and resetting of pulse inhibit (IMP) in the device status "Operation enabled".<br>Possible causes: Undervoltage, overvoltage or overcurrent |
| 0 | No message |
| 1 | Message IMP active |
| **9** | Bus access right |
| 1 | Always |
| **10** | **Status speed/frequency deviation** |
| 0 | $RFG_{on} <> RFG_{off}$ |
| 1 | $RFG_{on} = RFG_{off}$ |
| **11** | **Status DRIVECOM speed limitation** |
| 0 | Always |
| **12** | Mapping of FIF status word 1 (FIF-STAT1), bit 0 (DCTRL1-PAR-B0) |
| **13** | Mapping of FIF status word 2 (FIFSTAT2), bit 0 (DCTRL1-PAR-B1) |
| **14** | Mapping of FIF status word 1 (FIFSTAT1), bit 2 (MCTRL1-IMAX) |
| **15** | Mapping of FIF status word 1 (FIF-STAT1), bit 5 (PCTRL1-QMIN) |

### 7.2.4 Bit control commands

| Bit control commands | | The bit control commands of the control word depend on other bit settings. The command is executed only for the following bit patterns: | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Bits of the control word | | | | | | | | Note |
| **Command** | **Meaning** | **7** | **6** | **5** | **4** | **3** | **2** | **1** | **0** | |
| Standstill | From different device states ⇨ "Ready to switch on" | x | x | x | x | x | 1 | 1 | **0** | 1: Bit set |
| Switch on | Transition ⇨ "Switched on" | x | x | x | x | x | 1 | 1 | **1** | |
| Enable operation | Transition ⇨"Operation enabled"<br>The controller inhibit (CINH) is deactivated. | x | x | x | x | **1** | 1 | 1 | 1 | 0: Bit not set |
| Inhibit operation | Transition ⇨ "Switched on"<br>The controller inhibit (CINH) is activated. | x | x | x | x | **0** | 1 | 1 | 1 | |
| Inhibit voltage | Transition ⇨ "Switch-on inhibit"<br>The controller inhibit (CINH) is activated. | x | x | x | x | x | x | **0** | x | x: Any bit status |
| Quick stop (QSP) | Transition ⇨ "Switch-on inhibit"<br>If the drive has been enabled ⇨ controlled deceleration via the quick stop ramp. | x | x | x | x | x | **0** | 1 | x | |
| Reset fault | Reset fault<br>If the fault has been removed, automatically ⇨ "Switch-on inhibit". | 0<br>⇨1 | x | x | x | x | x | x | x | |

### 7.2.5 Status bits

| Status bits | | The current device status is unambiguously coded in the bits 0 ... 6 of the status word: | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Bits of the status word | | | | | | | Note |
| **Device status** | **Meaning** | **6** | **5** | **4** | **3** | **2** | **1** | **0** | |
| Not ready to switch on | Controller is being initialised and is not yet ready to operate.<br>After initialisation automatically ⇨ "Ready to switch on" | 0 | x | x | 0 | 0 | 0 | 0 | 1 Bit set |
| Switch-on inhibit | Controller inhibited (CINH).<br>Waiting for "Standstill" command | 1 | x | x | 0 | 0 | 0 | 0 | |
| Ready to switch on | Controller inhibited (CINH).<br>Waiting for "Switch-on" command | 0 | 1 | x | 0 | 0 | 0 | 1 | 0 Bit not set |
| Switched on | Controller inhibited (CINH).<br>Waiting for "Operation enabled" command. | 0 | 1 | x | 0 | 0 | 1 | 1 | |
| Operation enabled | Controller enabled ($\overline{\text{CINH}}$).<br>Pulse inhibit can be set automatically | 0 | 1 | x | 0 | 1 | 1 | 1 | x Any bit status |
| Fault reaction active | Fault (TRIP) recognised, a time-based, fault-dependent reaction is executed.<br>Then automatically ⇨ "Fault" | 0 | x | x | 1 | 1 | 1 | 1 | |
| Fault | Controller is in the device status "Fault". | 0 | x | x | 1 | 0 | 0 | 0 | |
| Quick stop (QSP) active | "Quick stop (QSP)" command has been sent in the device status "Operation enabled" ⇨ controlled deceleration via the quick stop ramp.<br>After deceleration automatically ⇨ "Switch-on inhibit" | 0 | 0 | x | 0 | 1 | 1 | 1 | |



# 8 Parameter data transfer

## 8.1 Configure parameter data channel (PCP communication)

### Access to the codes of the controller

The parameter data channel (PCP) ...

- ► enables parameter setting and diagnostics of the controller;
- ► permits access to Lenze parameters (codes);
- ► is built up identically for both transfer directions.

The parameter data is addressed via codes that can be found listed in a code table in the documentation of the controller.

The drive parameters to be changed are included in the Lenze controllers as codes.

The codes of the controller are addressed by the index while being accessed via the function/communication module.

The index for Lenze code numbers is within 16576 (0x40C0) and 24575 (0x5FFF).

Conversion formula:

$$Index[dez] = 24575 - Lenze\text{-}Codestellennummer$$

Example for code C0001 (operating mode):

| Decimal notation | Hexadecimal notation |
|---|---|
| Index = 24575 - LENZE CODE NO | $Index_{hex}$ = 0x5FFF - LENZE CODE $NO_{hex}$ |
| Index = 24574 (= 24575 - 1) | $Index_{hex}$ = 0x5FFE (= 0x5FFF - 1) |

### Value range of the Lenze parameters

The value range of the Lenze codes can be obtained from the ”Code table” in the documentation of the controller.

The data of the Lenze parameters is mainly represented in a fixed point format of INTEGER32 data type with four decimal decimal positions. This means that the parameter value from the documentation has to be multiplied by 10000.

Example for code C0039 (JOG) = 150.4 Hz

Parameter value multiplied by factor: 150.4 x 10000 =

- ► 1504000 (decimal notation)
- ► 0x0016F300 (hexadecimal notation)

### 8.1.1 Parameter sets for 8200 vector controller

The 8200 vector controller has four parameter sets the parameters of which can be directly addressed via the INTERBUS.

**Addressing**

Addressing is carried out with a code offset:

- Offset ”0” addresses the parameter set 1 with the codes C0000 ... C1999.
- Offset ”2000” addresses the parameter set 2 with the codes C2000 ... C3999.
- Offset ”4000” addresses the parameter set 3 with the codes C4000 ... C5999.
- Offset ”6000” addresses the parameter set 4 with the codes C6000 ... C7999.

If a parameter is only available once (see documentation of the controller), use the code offset ”0”.

**Example**

Addressing of the code C0011 (maximum field frequency) in different parameter sets:

- C0011 in parameter set 1: Code no. = 11
- C0011 in parameter set 2: Code no. = 2011
- C0011 in parameter set 3: Code no. = 4011
- C0011 in parameter set 4: Code no. = 6011

**Note!**

Automatic saving of the changed parameter data is activated (Lenze basic setting, can be switched off via C0003).

## 8.2 Initialise PCP communication

### 8.2.1 CRL entries

In order that communication between the host (master) and the function/communication module can take place, the following entries in the communication relation list (CRL) of the master have to be set:

| Field name | Entry |
|---|---|
| Communication reference | 2 |
| Connection type | Master/slave acyclic |
| Connection attribute | Defined |
| Max-PDU Sending-High-Prio | 0 |
| Max-PDU Sending-Low-Prio | 64 |
| Max-PDU Receiving-High-Prio | 0 |
| Max-PDU Receiving-Low-Prio | 64 |
| Supported Services Request | 0x80 30 00 |
| Supported Services Response | 0x00 00 00 |
| Maximum SCC | 1 |
| Maximum RCC | 1 |
| Maximum SAC | 1 |
| Maximum RAC | 1 |

### 8.2.2 Available PCP services

The PCP services (PCP = Peripherals Communication Protocol) serve to transmit parameters via the PCP channel.

Lenze controllers support the following PCP services:

- ”Initiate”: Establishing connection from the master to the controller (📖 50)
- ”Abort”: Aborting connection (📖 50)
- ”Read”: Reading parameters (📖 51)
- ”Write”: Writing parameters (📖 51)
- ”Get-OD”: Reading out the object directory (OD) (📖 51)
- ”Identify”: Identification of the controller (📖 52)
- ”Status”: Reading the status of the controller (📖 53)

In the following, only those parameters and their contents are shown which are returned by the Lenze controllers. All other transfer parameters of the given PCP services can be obtained from the corresponding descriptions of the master.

### Initiate

The ”Initiate” PCP service establishes a logic connection between the master and the function/communication module. The controller provides the following parameters:

| Designation | Value | Meaning |
|---|---|---|
| Profile number | 0x21 | DRIVECOM profile of version 1 |
| Password | 0 | Password function of INTERBUS is not supported. |
| Access groups | 0 | No access groups exist. |
| Access protection supported | TRUE | Access protection is supported. |
| OD version | 0 | Version of the object directory |

### Abort

The ”Abort” PCP service aborts a logic connection between the master and the function/communication module.

### Read and Write

The ”Read” PCP service reads parameters from the controller. The controller outputs the requested parameter or an error message.

The ”Write” PCP service writes on parameters of the controller. The controller outputs a positive or negative feedback or an error message.

The following error messages can occur

| Error class | Error code | Additional code | Meaning |
|---|---|---|---|
| 6 | 3 | 0x00 | No access authorisation |
| 6 | 5 | 0x10 | Impermissible job parameter |
| 6 | 5 | 0x11 | Invalid subindex |
| 6 | 5 | 0x12 | Data length too big |
| 6 | 5 | 0x13 | Data length too small |
| 6 | 6 | 0x00 | Object is no parameter |
| 6 | 7 | 0x00 | Object does not exist |
| 6 | 8 | 0x00 | Data types do not comply with each other |
| 8 | 0 | 0x00 | Job cannot be executed |
| 8 | 0 | 0x20 | Job cannot be executed at the moment |
| 8 | 0 | 0x21 | Cannot be executed because of local control |
| 8 | 0 | 0x22 | Cannot be executed because of device status |
| 8 | 0 | 0x30 | Quit value range/parameter can only be changed if controller is inhibited (CINH) |
| 8 | 0 | 0x31 | Value of the parameter too high |
| 8 | 0 | 0x32 | Value of the parameter too low |
| 8 | 0 | 0x33 | Sub parameter outside the value range |
| 8 | 0 | 0x34 | Value of the sub parameter too high |
| 8 | 0 | 0x35 | Value of the sub parameter too low |
| 8 | 0 | 0x36 | Maximum value is lower than minimum value |
| 8 | 0 | 0x41 | Communication object cannot be displayed on process data |
| 8 | 0 | 0x42 | Length of the process data exceeded |
| 8 | 0 | 0x43 | General collision with other values |

### Get-OD

The ”Get-OD” PCP service reads out the object description for every parameter and data type.

### Identify

The ”Identify” PCP service provides information on how to identify the controller. The controller provides the following parameters:

| Designation | Value | Meaning |
|---|---|---|
| Name of device manufacturer | ”Lenze” (as visible string) | Company name |
| Device name | Visible string with 15 characters | Device name for controller and function/communication module |
| Device version | Visible string with 15 characters | Software version of the device |

### Device name

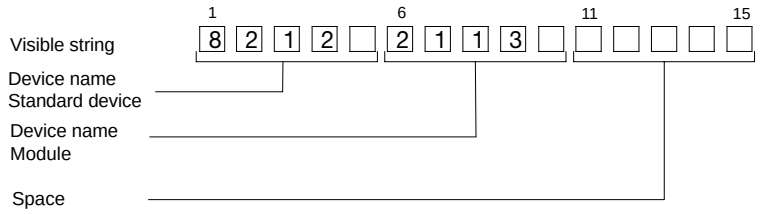
Composition of the visible string:

- Characters 1 ... 5: Name of the controller
  - 4 characters of device name
  - 1 space
- Characters 6 ... 10: Name of the function/communication module
  - 4 characters of device name
  - 1 space
- Characters 11 ... 15: No name
  - 5 space

If no function/communication module is available, the corresponding area is filled with spaces.

**Example:**

8200 vector controller with communication module EMF2113IB: ”8212 2113 ”



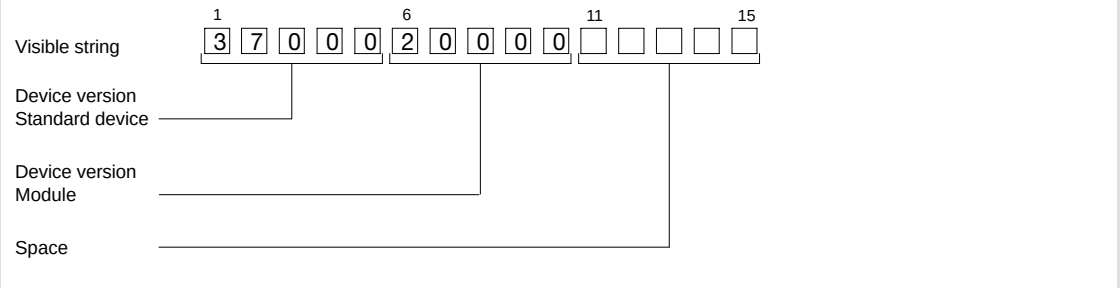
**Device version**

Composition of the visible string:

- Characters 1 ... 5: Software version of the controller:
  - 2 characters of basic version
  - 2 characters of variant
  - 1 character of version of variant
- Characters 6 ... 10: Software version of the function/communication module
  - 2 characters of basic version
  - 2 characters of variant
  - 1 character of version of variant
- Characters 11 ... 15: No name
  - 5 spaces

**Example:**

8200 vector controller (version V3.7; without variant and variant version) with communication module (version V2.0; without variant and variant version): ”3700020000 ”



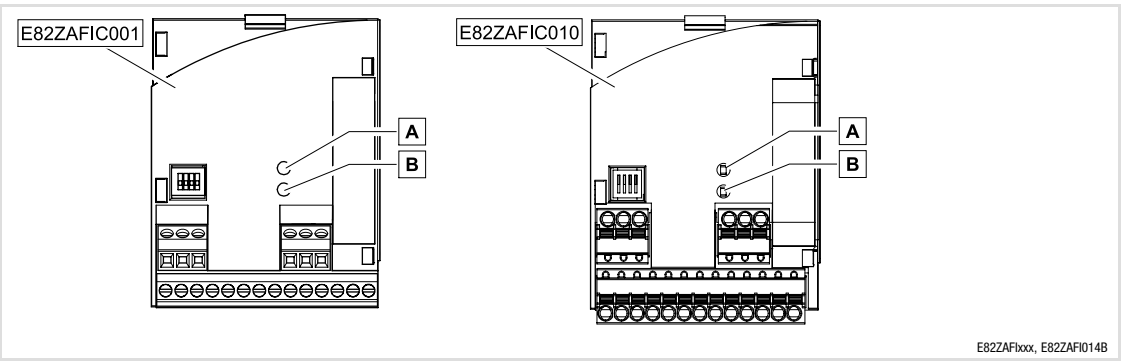

**Status**

The ”Status” PCP service provides status information on the controller. The controller provides the following values:

| Status | Value | Meaning |
|---|---|---|
| Logical status | 0 = ready for communication | Information on the current operating mode (C0001) of the controller regarding communication |
| Physical status | ● 0 = ready for operation Operating status ”OPERATION ENABLED”<br>● 1 = partly ready for operation all other device states | Information on the current operating status of the controller.<br>(for device states, see 📖 42) |
| Local detail | ”Status word” parameter | 24-bit value with:<br>● Bit 0 ... 15: ”Status word” profile parameter (index = 0x6041)<br>● Bit 16 ... 23: Value 0 |

# 9 Diagnostics

## 9.1 LED status displays




| LED | | | |
|---|---|---|---|
| **Pos.** | **Colour** | **Condition** | **Description** |
| **A** | Yellow | Off | No communication with the INTERBUS master. |
| | | Blinking | Communication to the INTERBUS master via the function module is established. |
| | | On | Internal error in the function module |
| **B** | Green | Off | ● The function module is not supplied with voltage.<br>● The standard device and/or the external voltage supply is/are switched off. |
| | | Blinking | The function module is supplied with voltage but not connected to the standard device.<br>Causes:<br>● The standard device is switched off.<br>● The standard device is in the initialisation phase.<br>● The standard device is not available. |
| | | On | The function module is supplied with voltage and is connected to the standard device. |

## 9.2 Troubleshooting and fault elimination

The following faults can occur with controllers interconnected via the INTERBUS:

| Fault | Possible cause | Remedy |
|---|---|---|
| INTERBUS master reports bus error. | • Short circuit / open circuit | Check INTERBUS ring circuit. |
| | • The DIP switch has been set incorrectly. | Set DIP switch correctly. |
| Drive cannot be enabled. | • No enable granted via the control word. | Send 0x007F. |
| | • Controller inhibit (CINH) is still active. | X3/28 = HIGH (+12 ... +30 V) |
| | • No setpoint has been defined. | 1. C0412/1 =200<br>INTERBUS must be set as setpoint source.<br>2. Assign process output data in C1511 to setpoint. |

# 10 Code table

## Overview

| Code | Subcode | Index | Designation | See |
|---|---|---|---|---|
| C0002 | - | 0x5FFD (24573) | Parameter set management | 📖 67 |
| C1500 | - | 0x5A23 (23075) | Software ID | 📖 62 |
| C1501 | - | 0x5A22 (23074) | Software creation date | 📖 62 |
| C1502 | 1 ... 4 | 0x5A21 (23073) | Display of the software ID | 📖 62 |
| C1503 | 1 ... 4 | 0x5A20 (23072) | Display of the software creation date | 📖 62 |
| C1510 | - | 0x5A19 (23065) | Configuring process input data | 📖 58 |
| C1511 | - | 0x5A18 (23064) | Configuring process output data | 📖 59 |
| C1512 | - | 0x5A17 (23063) | Enable process output data | 📖 60 |
| C1513 | - | 0x5A16 (23062) | Response monitoring time of the PCD communication | 📖 61 |
| C1514 | - | 0x5A15 (23061) | Monitoring response to PCD communication fault | 📖 61 |
| C1515 | - | 0x5A14 (23060) | Process data specification | 📖 60 |
| C1520 | 1 ... 10 | 0x5A0F (23055) | Display of all words to the master | 📖 63 |
| C1521 | 1 ... 10 | 0x5A0E (23054) | Display of all words from the master | 📖 63 |
| C1522 | 1 ... 16 | 0x5A0D (23053) | Display of all process data words to the standard device | 📖 64 |
| C1523 | 1 ... 16 | 0x5A0C (23052) | Display of all process data words from the standard device | 📖 65 |
| C1525 | - | 0x5A0A (23050) | Display of the current setting of the DIP switches S2 ... S4 | 📖 65 |
| C1530 | - | 0x5A05 (23045) | INTERBUS diagnostics | 📖 66 |
| C1531 | 1 ... 4 | 0x5A04 (23044) | Bus counter | 📖 66 |

## How to read the code table

| Column | Meaning | | |
|---|---|---|---|
| Code | (Lenze) code<br>● The parameters of a configurable code marked with an asterisk (<Code>*) can only be accessed via the communication module.<br>● The value of a configurable code marked with a double asterisk (<Code>**) is not transmitted with the parameter set transfer. | | |
| Subcode | Subcode | | |
| Name | Designation of the Lenze code | | |
| Index | Index under which the parameter is addressed. | | |
| Lenze | Lenze setting of the code | | |
| | Disp | Display code<br>Configuration of this code is not possible. | |
| Values | Fixed values determined by Lenze (selection list) *or* a value range: | | |
| | Minimum value | [Smallest increment/unit] | Maximum value |
| Access | R = read access (reading permitted)<br>W = write access (writing permitted) | | |
| Data type | ● FIX32: 32-bit value with sign; decimal with 4 decimal positions<br>● U16: 2 bytes bit-coded<br>● U32: 4 bytes bit-coded<br>● VS: visible string, character string with defined length | | |

## 10.1 Communication-relevant Lenze codes

### C1510: Configuring process input data

| Code | Name | | | Index |
|---|---|---|---|---|
| **C1510** | **Configuring process input data** | | | **0x5A19 (23065)** |
| Subcode | Lenze | Values | Access | Data type |
| 1 PIW1 | 18 | see table below | rw | FIX32 |
| 2 PIW2 | 3 | | | |
| 3 PIW3 | 4 | | | |
| 4 PIW 4 | 5 | | | |
| ☑ Parameter set transfer | | | | |

The assignment of the bit status information or actual values of the controller to the max. 4 process input data words (PIW) of the master can be configured freely.

**Note!**

For reasons of compatibility, subcodes 5 and 6 can also be read and written with modules from software version V3.0. However, this has no effect.

| Selection | | Scaling |
|---|---|---|
| 1 | FIF status word 1 (FIF-STAT1) | 16 bits |
| 2 | FIF status word 2 (FIF-STAT2) | 16 bits |
| 3 | Output frequency with slip (MCTRL1-NOUT+SLIP) | ±24000 ≡ ±480 Hz |
| 4 | Output frequency without slip (MCTRL1-NOUT) | ±24000 ≡ ±480 Hz |
| 5 | Apparent motor current (MCTRL1-IMOT) | $2^{14}$ ≡ 100 % rated device current |
| 6 | Actual process controller value (PCTRL1-ACT) | ±24000 ≡ ±480 Hz |
| 7 | Process controller setpoint (PCTRL1-SET) | ±24000 ≡ ±480 Hz |
| 8 | Process controller output (PCTRL1-OUT) | ±24000 ≡ ±480 Hz |
| 9 | Device utilisation (MCTRL1-MOUT) | ±$2^{14}$ ≡ ±100 % rated motor torque |
| 10 | DC-bus voltage (MCTRL1-DCVOLT) | 16383 ≡ 565 VDC at 400 V mains<br>16383 ≡ 325 VDC at 230 V mains |
| 11 | Ramp function generator input (NSET1-RFG1-IN) | ±24000 ≡ ±480 Hz |
| 12 | Ramp function generator output (NSET1-NOUT) | ±24000 ≡ ±480 Hz |
| 13 | FIF-OUT.W1 | 16 bits or 0 ... 65535 |
| 14 | FIF-OUT.W2 | 16 bits or 0 ... 65535 |
| 15 | FIF-OUT.W3 | 0 ... 65535 |
| 16 | FIF-OUT.W4 | 0 ... 65535 |
| 17 | DRIVECOM control word (DRIVECOM-CTRL) | 16 bits |
| 18 | DRIVECOM status word (DRIVECOM-STAT) | 16 bits |

## C1511:
## Configuring process output data

| Code | Name | | | Index |
|---|---|---|---|---|
| **C1511** | **Configuring process output data** | | | **0x5A18 (23064)** |
| Subcode | Lenze | Values | Access | Data type |
| 1 POW1 | 17 | see table below | rw | FIX32 |
| 2 POW2 | 3 | | | |
| 3 POW3 | 4 | | | |
| 4 POW 4 | 5 | | | |
| ☑ Parameter set transfer | | | | |

The assignment of the max. 4 process output data words (POW) of the master to bit control commands or setpoints of the controller can be configured freely using C1511.

**Note!**

For reasons of compatibility, subcodes 5 and 6 can also be read and written with modules from software version V3.0. However, this has no effect.

| Selection | | Scaling |
|---|---|---|
| 1 | FIF control word 1 (FIF-CTRL1) | 16 bits |
| 2 | FIF control word 2 (FIF-CTRL2) | 16 bits |
| 3 | Setpoint 1 (NSET1-N1) | ±24000 ≡ ±480 Hz |
| 4 | Setpoint 2 (NSET1-N2) | ±24000 ≡ ±480 Hz |
| 5 | Additional setpoint (PCTRL1-NADD) | ±24000 ≡ ±480 Hz |
| 6 | Actual process controller value (PCTRL1-ACT) | ±24000 ≡ ±480 Hz |
| 7 | Process controller setpoint (PCTRL1-SET1) | ±24000 ≡ ±480 Hz |
| 8 | reserved | |
| 9 | Torque setpoint / limit value (MCTRL1-MSET) | $2^{14}$ ≡ 100 % rated motor torque |
| 10 | PWM voltage (MCTRL1-VOLT-ADD) | STOP Only for special applications. Modifications only after consulting Lenze! |
| 11 | PWM angle (MCTRL1-PHI-ADD) | |
| 12 | reserved | |
| 13 | FIF-IN.W1 | 16 bits or 0 ... 65535 |
| 14 | FIF-IN.W2 | 16 bits or 0 ... 65535 |
| 15 | FIF-IN.W3 | 0 ... 65535 |
| 16 | FIF-IN.W4 | 0 ... 65535 |
| 17 | DRIVECOM control word (DRIVECOM-CTRL) | 16 bits |

### C1512:
### Enable process output data

| Code | Name | | | Index |
|---|---|---|---|---|
| C1512 | Enable process output data | | | 0x5A17 (23063) |
| Subcode | Lenze | Values | Access | Data type |
| - | 1 | 1 [1] 255 | rw | FIX32 |

☑ Parameter set transfer

When C1511 is changed, the process output data is automatically locked to ensure data consistency.

C1512 serves to unlock single or all process output data words (POW) again.

The decimal value of the bit settings enables any combination of the process output data words (POW).

► 0 = Lock output word

► 1 = Unlock output word

| Valency of the bit settings | | | |
|---|---|---|---|
| POW 4 | POW 3 | POW 2 | POW 1 |
| $2^3$ | $2^2$ | $2^1$ | $2^0$ |

The value 16 (0x10) in code C1512 serves to enable all process output data.

### C1515:
### Process/parameter data specification

| Code | Name | | | Index |
|---|---|---|---|---|
| C1515 | Process/parameter data specification | | | 0x5A14 (23060) |
| Subcode | Lenze | Values | Access | Data type |
| - | 0 | 0, 1, 4, 5 | rw | FIX32 |
| | | 11 ... 14 | | |
| | | 21 ... 23 | | |

☑ Parameter set transfer

This code serves to change the number of process and parameter data words:

| Values | Description |
|---|---|
| 0, 1, 4, 5 | The configuration resulting from the settings of the DIP switches S2 ... S4 is accepted according to the valency entered. |
| 11 ... 14 | ● No PCP<br>● **1**1 (1 word PCD) ... **1**4 (4 words PCD) |
| 21 ... 23 | ● 1 word PCP<br>● **2**1 (1 word PCD) ... **2**3 (3 words PCD) |

**Note!**

► The settings of this code only become active if the DIP switches S2 ... S4 are set to ON (📖 .

► Switch off the voltage supply of the function/communication module and then on again to activate changed settings.

## 10.2 Monitoring

### C1513:
### Response monitoring time of the PCD communication

| Code | Name | | | | Index |
|---|---|---|---|---|---|
| **C1513** | **Response monitoring time of the PCD communication** | | | | **0x5A16 (23062)** |
| Subcode | Lenze | Values | | Access | Data type |
| - | 65535 | 0 [1 ms] 65535 | | rw | FIX32 |
| ☑ Parameter set transfer | | | | | |

Monitoring starts with the arrival of the first telegram.

If there is no message from the master within the response monitoring time set, the response set in C1514 is carried out.

**Note!**

A change of monitoring will be effective immediately.

The value 65535 switches off the response monitoring time.

### C1514:
### Monitoring response to PCD communication fault

| Code | Name | | | | Index |
|---|---|---|---|---|---|
| **C1514** | **Monitoring response to PCD communication fault** | | | | **0x5A15 (23061)** |
| Subcode | Lenze | Values | | Access | Data type |
| - | 0 | 0 | No action | rw | FIX32 |
| | | 1 | TRIP (trouble) | | |
| | | 2 | CINH (controller inhibit) | | |
| | | 3 | QSP (quick stop) | | |
| ☑ Parameter set transfer | | | | | |

If there is no message from the master within the response monitoring time (configurable in C1513), the response set in this code is carried out.

**Note!**

A change of the monitoring response will be effective immediately.

## 10.3 Diagnostics

### C1500: Software identification code

| Code | Name | | | Index |
|---|---|---|---|---|
| **C1500** | **Software ID** | | | **0x5A23 (23075)** |
| Subcode | Lenze | Values | Access | Data type |
| - | Disp | - | r | VS |

☐ Parameter set transfer

The code contains a string with a length of 14 bytes. The identification code is output, e.g. ’82ZAFI0C_xy000’.

### C1501: Software creation date

| Code | Name | | | Index |
|---|---|---|---|---|
| **C1501** | **Software creation date** | | | **0x5A22 (23074)** |
| Subcode | Lenze | Values | Access | Data type |
| - | Disp | | r | VS |

☐ Parameter set transfer

The code contains a string with a length of 17 bytes. The creation date and time of the software are output, e.g. ’Jun 21 2000 12:31’.

### C1502: Display of the software ID

| Code | Name | | | Index |
|---|---|---|---|---|
| **C1502** | **Display of the software ID** | | | **0x5A21 (23073)** |
| Subcode | Lenze | Values | Access | Data type |
| 1 ... 4 | Disp | | r | U32 |

☐ Parameter set transfer

Display of code C1500 in 4 subcodes with 4 characters each.

### C1503: Display of the software creation date

| Code | Name | | | Index |
|---|---|---|---|---|
| **C1503** | **Display of the software creation date** | | | **0x5A20 (23072)** |
| Subcode | Lenze | Values | Access | Data type |
| 1 ... 4 | Disp | | r | U32 |

☐ Parameter set transfer

Display of code C1501 in 4 subcodes with 4 characters each.

### C1520:
### Display of all words to the master

| Code | Name | | | | Index |
|---|---|---|---|---|---|
| **C1520** | **Display of all words to the master** | | | | **0x5A0F (23055)** |
| Subcode | Lenze | Values | | Access | Data type |
| 1 PIW 1 | Disp | 0 | [1] 65535 | r | U16 |
| 2 PIW 2 | | | | | |
| 3 PIW 3 | | | | | |
| 4 PIW 4 | | | | | |
| ☐ Parameter set transfer | | | | | |

Display of the process input data words 1 ... 4 under the single subcodes. All words are displayed, but only the configured ones are valid.

### C1521:
### Display of all words from the master

| Code | Name | | | | Index |
|---|---|---|---|---|---|
| **C1521** | **Display of all words from the master** | | | | **0x5A0E (23054)** |
| Subcode | Lenze | Values | | Access | Data type |
| 1 POW1 | Disp | 0 | [1] 65535 | r | U16 |
| 2 POW2 | | | | | |
| 3 POW3 | | | | | |
| 4 POW4 | | | | | |
| ☐ Parameter set transfer | | | | | |

Display of the process output data words 1 ... 4 under the single subcodes. All words are displayed, but only the configured ones are valid.

## C1522:
## Display of all process data words to the standard device

| Code | Name | | | | Index |
|---|---|---|---|---|---|
| **C1522** | **Display of all process data words to the standard device** | | | | **0x5A0D (23053)** |
| Subcode | Lenze | Values | | | Access | Data type |
| 1 ... 16 | Disp | 0 | [1] | 65535 | r | U16 |

☐ Parameter set transfer

Display of the process data output words 1 ... 16 that are transferred from the function/communication module to the standard device:

| Subcode | Process data word |
|---|---|
| 1 | FIF control word 1 (FIF-CTRL1) |
| 2 | FIF control word 2 (FIF-CTRL2) |
| 3 | Setpoint 1 (NSET1-N1) |
| 4 | Setpoint 2 (NSET1-N2) |
| 5 | Additional setpoint (PCTRL1-NADD) |
| 6 | Actual process controller value (PCTRL1-ACT) |
| 7 | Process controller setpoint (PCTRL1-SET1) |
| 8 | reserved |
| 9 | Torque setpoint or torque limit (MCTRL1-MSET) |
| 10 | PWM voltage (MCTRL1-VOLT-ADD) |
| 11 | PWM angle (MCTRL1-PHI-ADD) |
| 12 | reserved |
| 13 | FIF-IN.W1 |
| 14 | FIF-IN.W2 |
| 15 | FIF-IN.W3 |
| 16 | FIF-IN.W4 |

### C1523:
### Display of all process data words from the standard device

| Code | Name | | | | Index |
|---|---|---|---|---|---|
| **C1523** | **Display of all process data words from the standard device** | | | | **0x5A0C (23052)** |
| Subcode | Lenze | Values | | | Access | Data type |
| 1 ... 16 | Disp | 0 | [1] | 65535 | r | U16 |

☐ Parameter set transfer

Display of the process data words 1 ... 16 that are transferred from the standard device to the function/communication module:

| Subcode | Process data word |
|---|---|
| 1 | FIF status word 1 (FIF-STAT1) |
| 2 | FIF status word 2 (FIF-STAT2) |
| 3 | Output frequency with slip (MCTRL1-NOUT+SLIP) |
| 4 | Output frequency without slip (MCTRL1-NOUT) |
| 5 | Apparent motor current (MCTRL1-IMOT) |
| 6 | Actual process controller value (PCTRL1-ACT) |
| 7 | Process controller setpoint (PCTRL1-SET) |
| 8 | Process controller output (PCTRL1-OUT) |
| 9 | Device utilisation (MCTRL1-MOUT) |
| 10 | DC-bus voltage (MCTRL1-DCVOLT) |
| 11 | Ramp function generator input (NSET1-RFG1-IN) |
| 12 | Ramp function generator output (NSET1-NOUT) |
| 13 | FIF-OUT.W1 |
| 14 | FIF-OUT.W2 |
| 15 | FIF-OUT.W3 |
| 16 | FIF-OUT.W4 |

### C1525:
### Display of the current DIP switch positions (S2 ... S4)

| Code | Name | | | | Index |
|---|---|---|---|---|---|
| **C1525** | **Display of the current DIP switch positions (S2 ... S4)** | | | | **0x5A0A (23050)** |
| Subcode | Lenze | Values | | | Access | Data type |
| - | Disp | 0 | [1] | 7 | r | FIX32 |

☐ Parameter set transfer

This code shows the current settings of the DIP switches S2 ... S4. These switches serve to set the number of process and parameter data words (📖 30).

| DIP switch | Value |
|---|---|
| S2 | 1 |
| S3 | 2 |
| S4 | 4 |

### C1530: INTERBUS diagnostics

| Code | Name | | | | Index |
|---|---|---|---|---|---|
| **C1530** | **Diagnostics** | | | | **0x5A05 (23045)** |
| Subcode | Lenze | Values | | | Access | Data type |
| - | Disp | 0 | 0 | 0 | r | FIX32 |
| ☐ Parameter set transfer | | | | | | |

### C1531: Bus counter

| Code | Name | | | | Index |
|---|---|---|---|---|---|
| **C1531** | **Bus counter** | | | | **0x5A04 (23044)** |
| Subcode | Lenze | Values | | | Access | Data type |
| 1 ... 4 | Disp | 0 | [1] | 65535 | r | FIX32 |
| ☐ Parameter set transfer | | | | | | |

Dependent on the subcode, the following bus states are displayed:

- Subcode 1: Data cycles per second
- Subcode 2: Total data cycles
- Subcode 3: Reserved (value is always ’0’)
- Subcode 4: Reserved (value is always ’0’)

**Tip!**

When the maximum count value ’65535’ has been reached, the counter restarts at value ’0’.

## 10.4 Important controller codes

### C0002: Parameter set management (extract)

| Code | Name | | | Index |
|---|---|---|---|---|
| **C0002** | **Parameter set management** | | | **0x5FFD (24573)** |
| Subcode | Lenze | Values | | Access | Data type |
| - | 0 | 0 | Ready | rw | FIX32 |
| | | 1 | Lenze setting ⇨ PAR1 | rw | FIX32 |
| | | 2 | Lenze setting ⇨ PAR2 | rw | FIX32 |
| | | 3 | Lenze setting ⇨ PAR3 | rw | FIX32 |
| | | 4 | Lenze setting ⇨ PAR4 | rw | FIX32 |
| | | 31 | Lenze setting ⇨ FPAR1 | rw | FIX32 |
| | | 61 | Lenze setting ⇨ PAR1 + FPAR1 | rw | FIX32 |
| | | 62 | Lenze setting ⇨ PAR2 + FPAR1 | rw | FIX32 |
| | | 63 | Lenze setting ⇨ PAR3 + FPAR1 | rw | FIX32 |
| | | 64 | Lenze setting ⇨ PAR4 + FPAR1 | rw | FIX32 |

☑ Parameter set transfer

In the controller, up to 4 parameter sets (PAR1 ... PAR4) can be saved. In the function/communication module, 1 parameter set (FPAR1) can be saved.

By means of parameter setting, the parameter set or sets can be defined in which the delivery status is to be established.

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